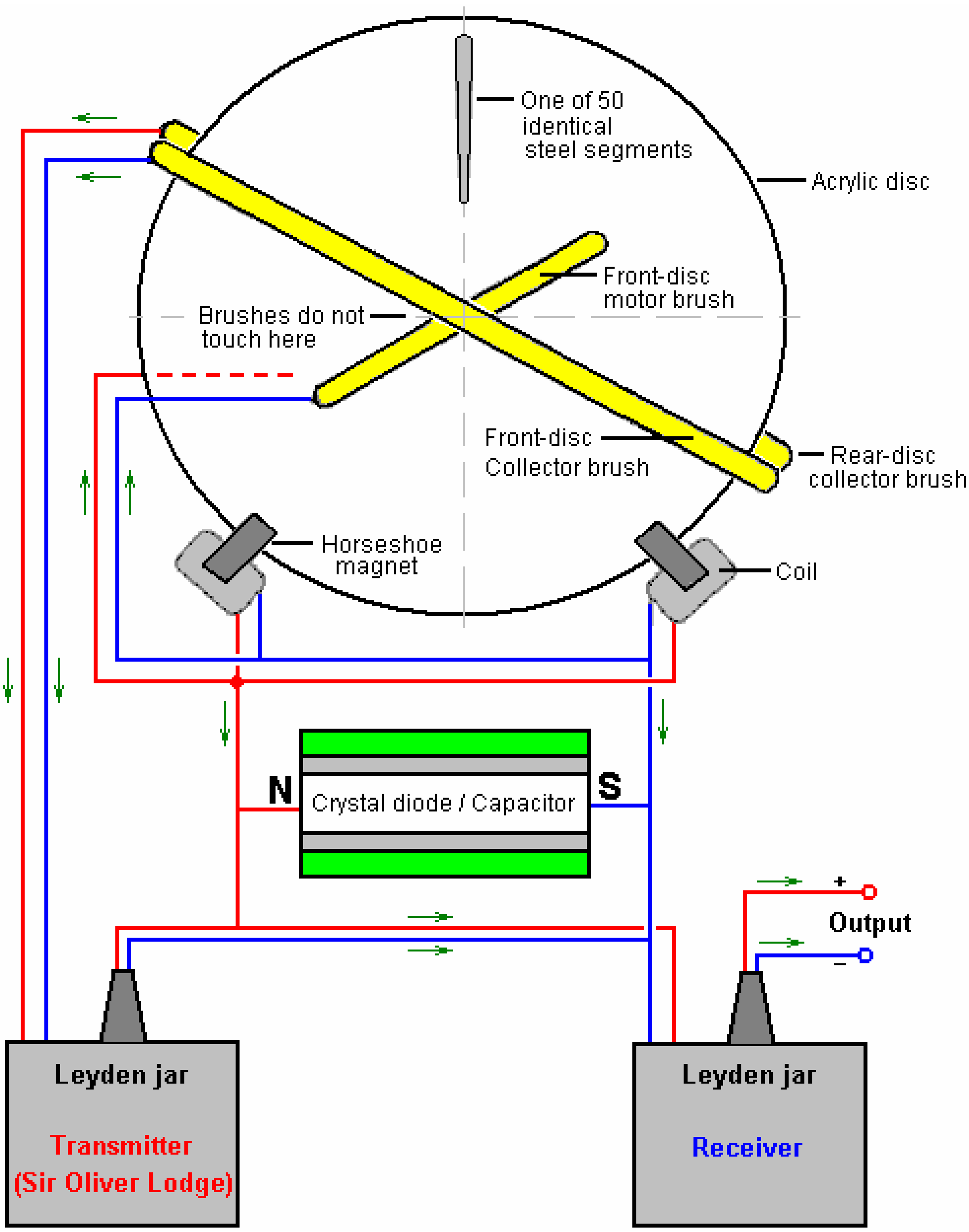
William Hyde's 20 Kilowatt Power Generator

It is not unusual for people to think that electrostatic electricity is only a trivial, very low-power, home entertainment type of thing. That is not correct. Paul Baumann designed and built two major electrical generators, one of 2 kilowatt output and the second of 3 kilowatt output, to allow a Swiss commune to have the use of electrical equipment without having a mains electricity supply. The commune refuses to provide any design information, saying that people like you and me "are not ready to have that kind of energy" – how very helpful of them !!

Paul's design is electrostatic and starts with a Wimshurst Machine electrostatic generator, one which has angled motor strips which make it become self-rotating:



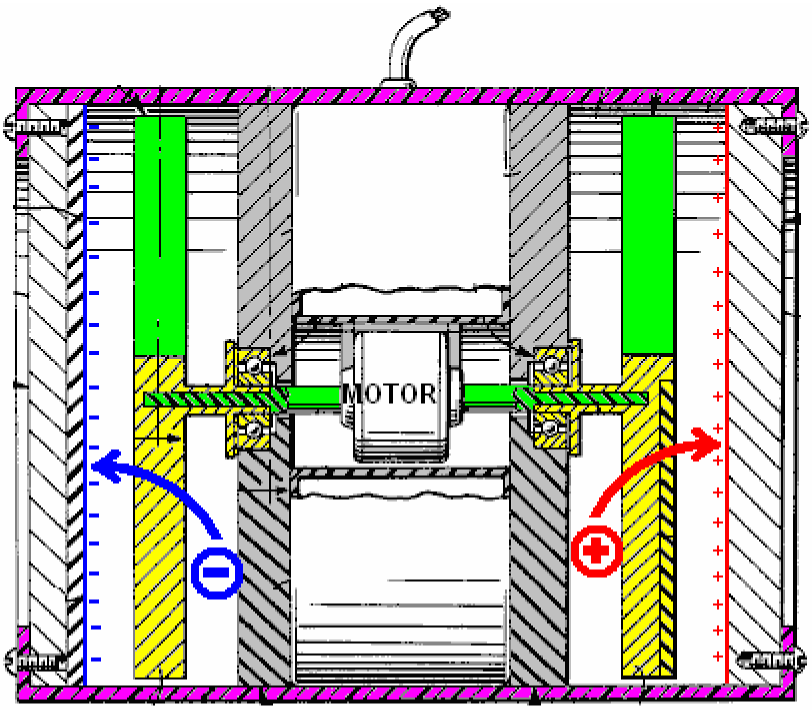
The collector brushes on the front and rear faces of the spinning disc collect charge and although the design has never been disclosed, it has a constant power output: of 300 volts at 10 amps which is 3 kilowatts. So much for electrostatic electricity being only trivial !!

We need to take the William Hyde design seriously. This is best described by his patent, a slightly re-worded version being shown here:

This patent describes a device which can be a little difficult to visualise and so some colour shading of parts has been used to help matters. Essentially, it is two circular motor driven rotors spinning inside a section of plastic pipe. These rotors generate electrostatic energy which people have mistakenly been led to believe is not a source of significant power. This design by William Hyde has an electrical output which is some ten times greater than the mechanical input power required. A **C**oefficient **O**f **P**erformance = 10 result like this, has to be significant, especially since the device is of fairly simple construction.

However, just before taking a look at the patent, it would be useful to have a broad outline description of what it is and how it works.

The device has an external power source which is connected to opposite ends of the generator. No current is drawn from this source as it's only purpose is to cause a disc at one end to have positive charges all across it's face and an opposing disc at the far end of the generator to have negative charges all across it's face:



Then the motor spins the two discs shown in Green and Yellow at high speed, picking up charge from the local environment, positive charge opposite the negatively charged plate and negative charge opposite the positively charged plate. Those charges are passed on to circuitry which lowers the voltage which is around 300,000 volts and raises the current to perhaps 38 amps. The result is a generator which is very, very different to running a plastic comb through hair and picking up scraps of paper with the resulting electrostatic charge. Yes, this Hyde generator uses electrostatic electricity as the input power but the output is kilowatts of normal electricity. Some interesting details are at https://rimstar.org/sdenergy/hyde_generator/index.htm

Electrostatic energy field power generating system

Patent US 4,897,592 **30th January 1990** **Inventor: William W. Hyde**

Abstract:

Externally charged electrodes of an electrostatic generator, induce charges of opposite polarity on segments of a pair of confronting stators by means of electric fields within which a pair of rotors are confined during rotation to vary the charge binding field linkages between confronting rotors and stators by a shielding action of the rotors in a plane perpendicular to the field flux. A high electric potential difference induced between the stators resulting from such rotation of the rotors, is transformed by an output circuit into a reduced DC voltage applied to a load with a correspondingly increase current conducted through it.

US Patent References:

2522106	Electrostatic machine	Sep 1950	Felici	310/309
3013201	Self-excited variable capacitance electrostatic generator	Dec 1961	Goldie	322/2A
4127804	Electrostatic energy conversion system	Nov 1973	Breaux	322/2A
4151409	Direct current variable capacitance electric generator	Apr 1979	O'Hare	250/212
4595852	Electrostatic generator	Jun 1986	Gundlach	310/309
4622510	Parametric electric machine	Nov 1986	Cap	322/2A

Description:

This invention relates to the generation of electrical power by conversion of energy from an electrostatic field. The conversion of energy from a static electric field into useful electrical energy by means of an electrostatic generator is already well known in the art as exemplified by the disclosures in U.S. Pat. Nos. 2,522,106, 3,013,201, 4,127,804, 4,151,409 and 4,595,852. Generally, the energy conversion process associated with such prior art electrostatic generators involves the input of mechanical energy to separate charges so that a considerable portion of the output is derived from the conversion of mechanical energy.

It is therefore an important object of the present invention to provide an electrostatic generator in which electrical power is derived from the energy of static electric fields with a minimised input of mechanical power.

Summary:

In accordance with the present invention, static electric fields are established between electrodes externally maintained at charge levels of opposite polarity and a pair of internal stator discs having segmental surfaces that are dielectrically spaced to confine thereon charges induced by the electric fields. A pair of rotor discs are rotated within continuous electric fields in planes perpendicular to the field flux to locationally vary the charge linkage established by the electric fields between the electrodes and stator discs. Such changes in charge linkage are effected by rotation of electrically conductive segments of the rotor angularly spaced from each other to partially shield the stator discs from the electric fields. The segments of each rotor disc have charged faces confronting the electrodes in its field to shield the stator disc over a total face area that is one-half the total area of the confronting segment surfaces on the stator disc to which the induced charges are confined. Charges on the rotors and stators are equalised by electrical interconnections established through the rotor shafts. The stator discs are electrically interconnected with an electrical load through an output circuit transforming a high potential between the stator discs into a reduced dc voltage to conduct a correspondingly multiplied current through the load.

Brief Description of the Drawings:

These and other objects and features of the present invention will become apparent from the following description taken in conjunction with the preferred embodiments thereof with reference to the accompanying drawings in which like parts or elements are denoted by the same reference numbers throughout all of the different views shown in the drawings and where:

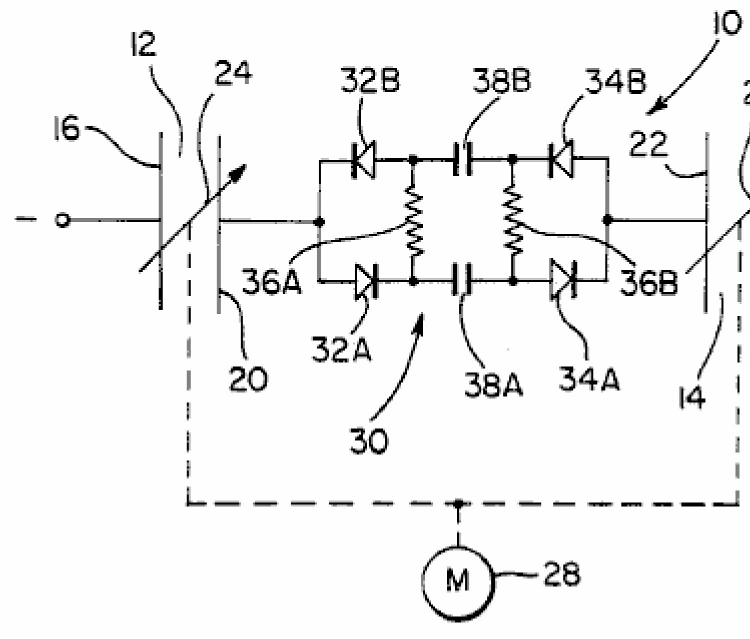


FIG. 1

Fig.1 is a simplified electrical circuit diagram corresponding to the energy conversion system of the present invention.

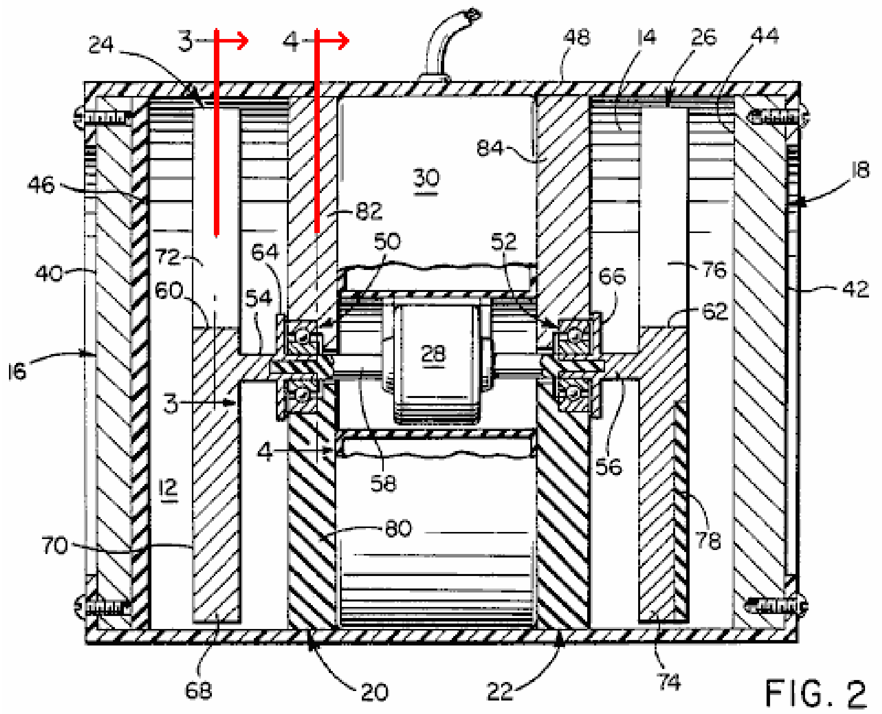
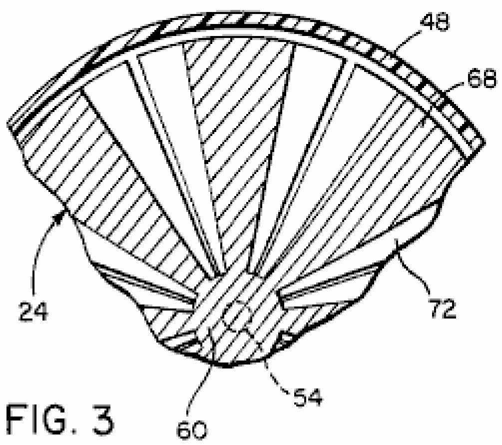


FIG. 2

Fig.2 is a side section view of an electrostatic generator embodying the system of Fig.1 in accordance with one embodiment of the invention.



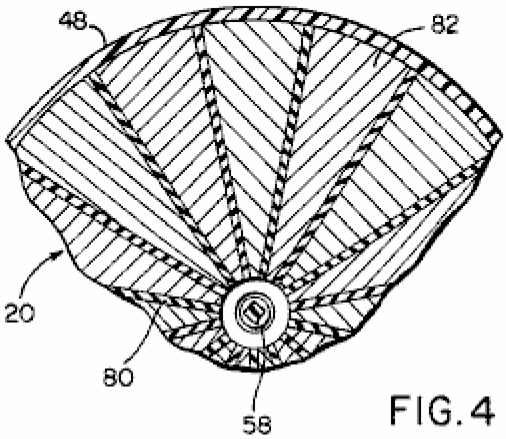
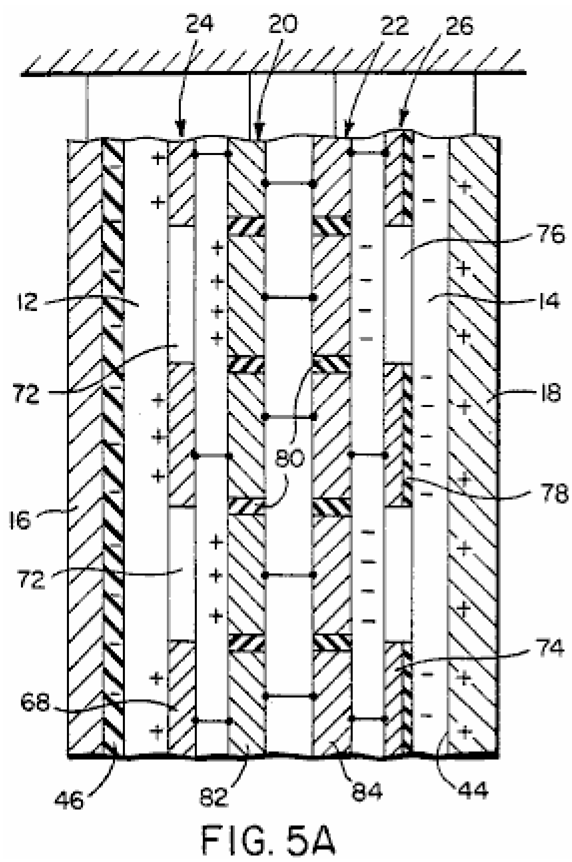


Fig.3 and **Fig.4** are partial section views taken substantially through planes indicated by section lines **3--3** and **4--4** in Fig.2.



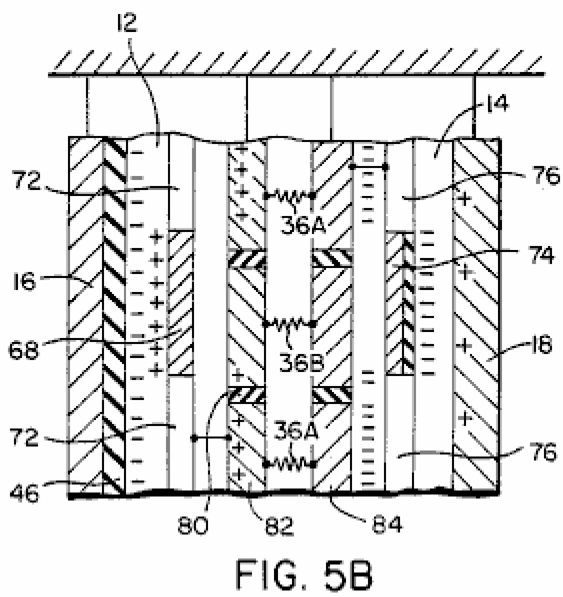


Fig.5A and **Fig.5B** are schematic partial laid out top views of the electrostatic generator of Figs.2-4, under static and dynamic charge distribution conditions, respectively.

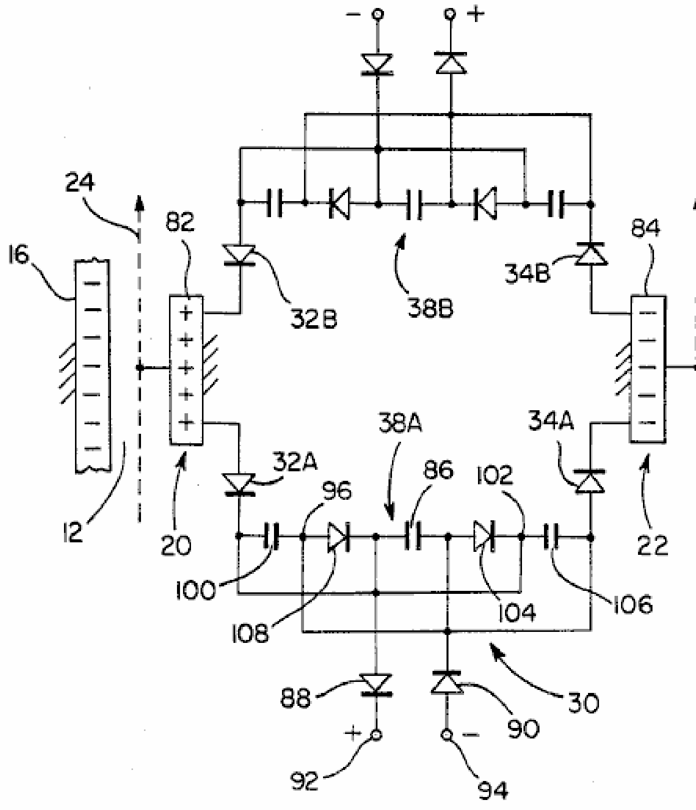


FIG. 6

Fig.6 is an electrical circuit diagram of the output circuit of the generator shown in Fig.2, in accordance with one embodiment.

Detailed Description of the Preferred Embodiment:

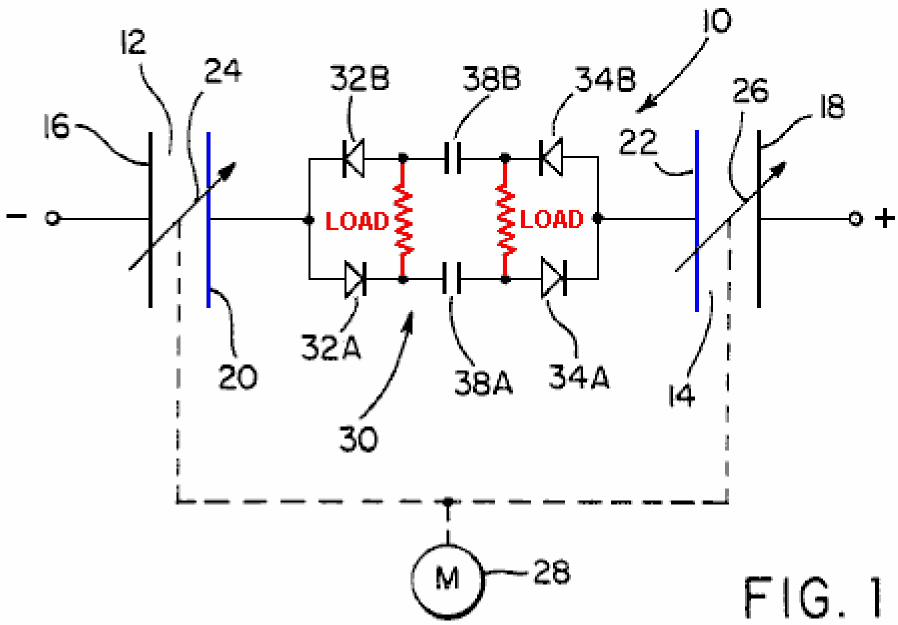


FIG. 1

Referring now to the drawings in detail, **Fig.1** diagrammatically depicts the energy conversion system of the present invention generally referred to by reference numeral **10**. As shown in **Fig.1**, the system includes a pair of electrostatic fields **12** and **14** established by electrostatic charges of opposite polarity applied to electrode plates **16** and **18** from some external energy source. Thus, the electrostatic field **12** is established between electrode **16** and a stator disc **20** while the electrostatic field **14** is established between electrode **18** and a stator disc **22**. In accordance with the present invention, electrostatic charge linkages established by the flux of the fields between the electrodes and stators are periodically varied by displacement within the continuous energy fields **12** and **14** in response to rotation of rotors **24** and **26** aligned with planes perpendicular to their common rotational axis and the field flux, as will be described.

The rotors are mechanically interconnected with an electric motor **28**, as diagrammatically illustrated in **Fig.1**, which rotates them around their common axis. Electrical energy may be extracted from the electric fields **12** and **14** during rotation of the rotors **24** and **26** (by motor **28**) through an output circuit generally referred to by the reference number **30**. The output circuit **30** as shown in a simplified fashion in **Fig.1**, includes two pairs of current-conducting diodes **32A, 32B** and **34A, 34B**. The diodes of each pair are connected with opposite polarity and each pair is connected in parallel to one of the stators **20** and **22**. The diodes of each pair are also electrically connected across an electrical load represented by resistors **36A** and **36B** with capacitor networks **38A** and **38B** interconnected between each pair of diodes by means of which the voltage potential between the stators **20** and **22** is reduced in favour of an increased current through the electrical load.

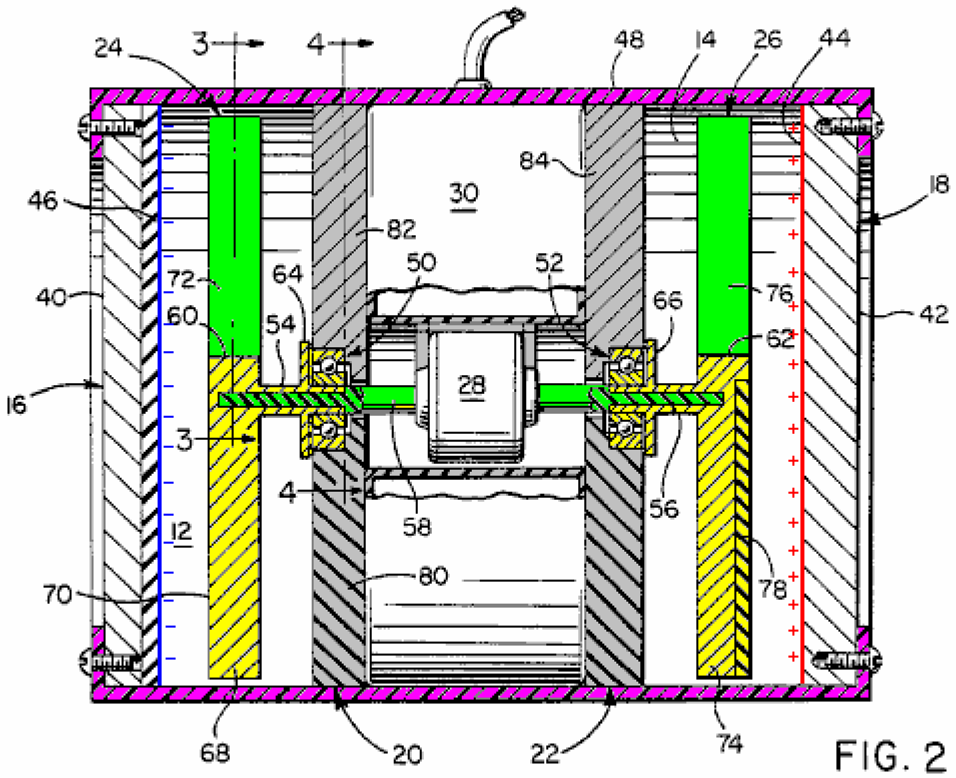


FIG. 2

Referring now to **Figs 2, 3** and **4** in particular, a physical embodiment of the energy conversion system shown in **Fig.1** is shown. The electrodes **16** and **18** are in the form of circular plates or discs made of an electrically conductive metal having external surfaces **40** and **42** adapted to be charged from the external source as already mentioned. The internal surface **44** of electrode **18** is thereby adapted to maintain a positive charge opposite in polarity to the negative charge of the electrode **16** which is maintained in a stable ion form within a dielectric surface portion **46** of the electrode **16**. The energy conversion system may be enclosed within an outer housing **48** to which the electrodes **16** and **18** are secured.

With continued reference to **Fig.2**, the stators **20** and **22** mounted by housing **48** in axially fixed spaced relation to the electrodes **16** and **18** are provided with bearings **50** and **52** supporting the powered rotor shaft driving the shaft assembly which has electrically conductive shaft sections **54** and **56** to which the rotors **24** and **26** are respectively connected. In the embodiment illustrated in **Fig.2**, the drive motor **28** is mechanically interconnected with the shaft sections **54** and **56** through an electrically nonconductive shaft section **58** of the power shaft assembly for the simultaneous rotation of both rotors **24** and **26** at the same speed and in the same direction about their common rotational axis perpendicular to the parallel spaced planes with which the electrode and stator discs are aligned. The electrically conductive shaft sections **54** and **56** are respectively keyed or secured in any suitable fashion to hub portions **60** and **62** of the rotors and are provided with flange portions **64** and **66** forming electrical wipers in contact with confronting surfaces of the stators **20** and **22**, which are inductively charged by the static electric fields **12** and **14** to equal levels of opposite polarity.

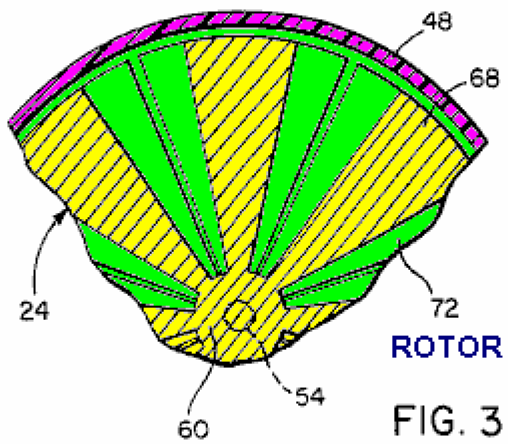


FIG. 3

As more clearly seen in **Fig.2** and **Fig.3**, the rotor **24** has several angularly spaced, field linkage controlling segments **68** projecting radially outwards from the hub portion **60**. Each rotor segment **68** is made of an electrically conductive metal having a face **70** on one axial side confronting the adjacent electrode **16**. The faces **70** confronting the electrode **16** are charged positively by the electric field **12** extending between the dielectric surface portion **46** of electrode **16** and the stator disc **20**. While the electric field **12** projects through the spaces **72** between the rotor segments **68**, the rotor segments **68** themselves shield portions of the stator disc **20** from the electric field.

The rotor **26** is similarly formed with rotor segments **74** angularly spaced from each other by spaces **76** through which the electric field **14** extends between the positively charged surface **44** of electrode **18** and the stator **22**. The rotor segments **74** of rotor **26** as shown in **Fig.2**, are provided with dielectric surface portions **78** confronting the internally charged surface **44** of electrode **18**. While the rotor segments **74** are negatively charged by the electric field **14** within the surface portions **78**, they also shield portions of the stator disc **22** from the electric field as in the case of the rotor segments **68** already described. The internal dielectric surface portion **46** of electrode **16** and dielectric surface portions **78** of rotor **26** act as a stabiliser to prevent eddy currents and leakage of negative charge. Further, in view of the electrical connections established between the rotors and the stator discs, the charge on each stator is equalised with that of the charge on its associated rotor.

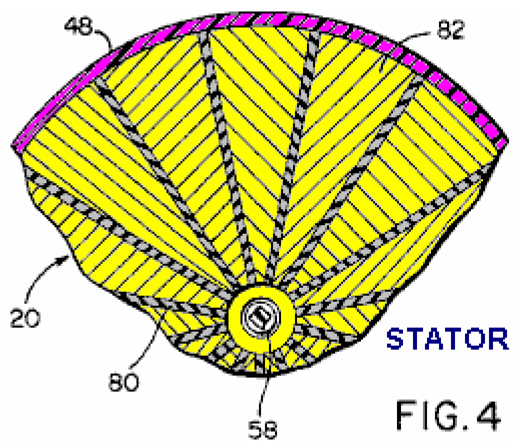


FIG.4

As shown in **Fig.2** and **Fig.4**, the stator disc **20** includes several segments **82** to which charges are confined, closely spaced from each other by dielectric spacers **80**. The segments **82** are electrically interconnected with the rotor segments **68** through rotor shaft section **54**. Similarly, the segments **84** of the stator **22** are electrically interconnected with the rotor segments **74** through rotor shaft section **56**. The stator segments **82** and **84** are therefore also made of electrically conductive metal. Each of the segments **82** of stator **20** is electrically interconnected through the output circuit **30** with each of the segments **84** of the stator. The stator discs being fixedly mounted within the housing **48**, centrally mount the bearings **50** and **52** through which the electrically nonconductive motor shaft section **58** is journaled as shown in the embodiment of the invention illustrated in **Fig.2**. Further, the total area of the charged segment surfaces on each of the stator discs is greater than the total area of the faces **70** or **78** on the segments of each associated rotor disc **24** or **26**. According to one embodiment, the total charged stator surface area is twice that of the rotor face area.

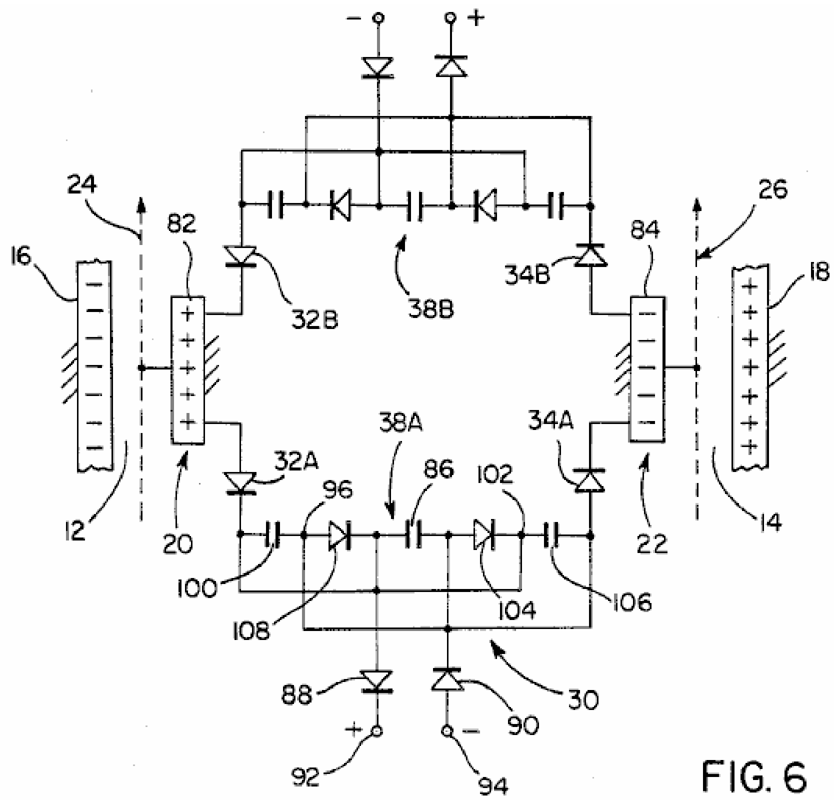


FIG. 6

According to the embodiment of the invention illustrated in **Fig.6**, the output circuit **30** includes the two oppositely poled capacitive circuit networks **38A** and **38B** connected across each aligned pair of stator segments **82** and **84** on the stators **20** and **22** by means of the oppositely poled diodes **32A** and **34A**. Each of these capacitive circuit networks includes a capacitor **86**, the opposite sides of which are connected by oppositely poled diodes **88** and **90** to positive and negative load terminals **92** and **94** across which a suitable electrical voltage is established for operating an electrical load. The diode **88** is connected to the junction **102** between diode **104** and one side of capacitor **106**. The diode **88** is also connected to the junction between one side of capacitor **100** and the diode **32A**. The diode **90**, on the other hand, is interconnected with the junction **96** between diode **108** and capacitor **100**. Also, diode **90** is connected to the junction between the other side of capacitor **106** and the diode **34A**. The foregoing circuit arrangement of capacitive network **38A** is the same as that of network **38B** by means of which aligned pairs of the stator segments **82** and **84** have the electrical potentials between them transformed into a lower voltage across the load terminals **92** and **94** to conduct a higher load current.

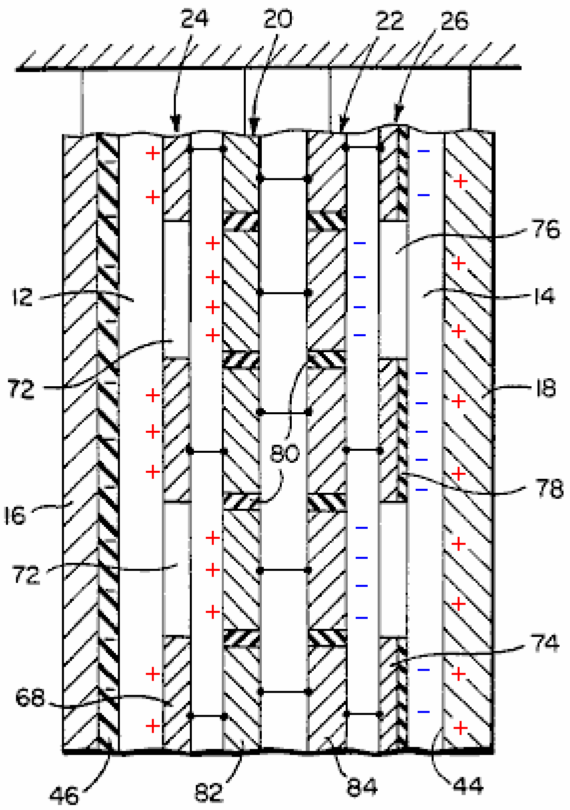


FIG. 5A

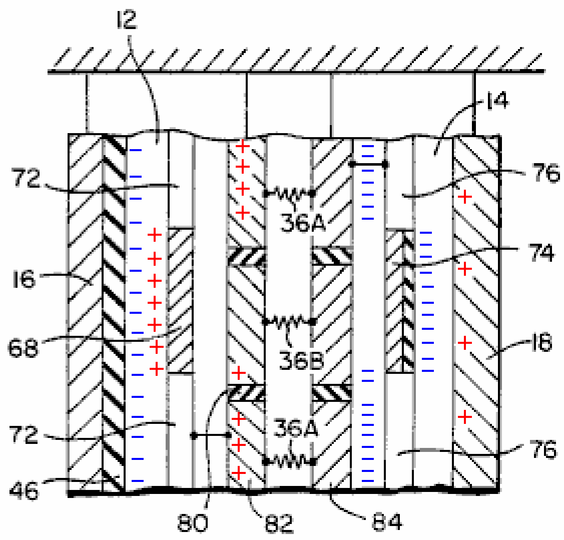


FIG. 5B

Fig.5A illustrates the distribution of charges established in the electric fields **12** and **14** between the electrodes and stators under static conditions in which each of the rotor segments **68** and 74 are positioned in alignment with one of the stator segments **82** and **84** to thereby shield alternate stator segments from the electric fields. The charges established by the electric fields are therefore confined to the faces of alternate stator segments confronting the electrodes and are equalised with the charges established on and confined to the shielding faces of the rotor segments confronting the electrodes by virtue of the electrical interconnection between the rotors and stators as already mentioned. As depicted in **Fig.5B**, when the rotors are rotated, the charge linkages established by the electric fields between the electrodes and alternate stator segments **82** or **84** are interrupted by the moving rotor segments **68** or **74** so that previously shielded stator segments become exposed to the fields to re-establish field energy linkages with the associated electrodes. Such action causes electrical potentials to be established between the stator segments **82** and **84**.

It will be apparent from the foregoing description that the electrostatic energy fields **12** and **14** of opposite polarity are established maintained between the externally charged electrodes **16** and **18** and the internally charged stators **20** and **22** under static conditions as depicted in **Fig.5A**. During rotation, the rotors **24** and **26** continuously positioned within the energy fields **12** and **14**, exert forces in directions perpendicular to the field flux representing the energy linkages between electrodes and stators to cause interruptions and reestablishment of energy linkages with portions of different stator segments as depicted in **Fig.5B**. Such energy linkage locational changes and the charge binding and unbinding actions between electrodes and stators creates an electrical potential and current to flow between stators through the output circuit **30**. Thus, the output circuit when loaded extracts energy from the electric fields **12** and **14** as a result of the field linkage charge binding and unbinding actions induced by rotation of the rotors. The stator segments **82** and **84** shielded from the electric fields by the moving rotor segments **68** and **74** as depicted in **Fig.5B**, have electric potentials of polarity opposite to those of the external electrodes **16** and **18** because of the field linkage charge unbinding action. Previously shielded stator segments being exposed to the electric fields by the moving rotor segments, have the same electric potential polarity as those of the external electrodes because of field linkage binding action. Since the forces exerted on the respective rotors by the electric fields **12** and **14** of opposite polarity act on the common rotor shaft assembly perpendicular to these fields, such forces cancel each other.

The energy input to the system may therefore be substantially limited to mechanical bearing losses and windage during conversion of electrostatic field energy to electrical energy as well as electrical resistance losses and other electrical losses encountered in the output circuit **30**.

Based upon the foregoing operational characteristics, rotation of the rotors in accordance with the present invention does not perform any substantial work against the external electric fields **12** and **14** since there is no net change in capacitance thereby enabling the system to convert energy with a reduced input of mechanical energy and high efficiency, as evidenced by minimal loss of charge on the electrodes. It was therefore found that working embodiments of the present invention require less than ten percent of the electrical output energy for the mechanical input. Further, according to one prototype model of the invention, a relatively high output voltage of 300,000 volts was obtained across the stators. By reason of such high voltage, an output circuit **30** having a voltage reducing and current multiplying attribute as already described, was selected so as to render the system suitable for many practical applications.

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