Chapter 7: Aerial Systems and Electrostatic Generators

It is generally thought that aerials are not capable of gathering much power. The popular conception is that the only power available is low level radio waves from distant radio transmitters, and while it is certainly true that radio waves can be picked up with an aerial, the real sources of power are not radio transmitters.

For example, we will be looking at information from Hermann Plauson and he considered any aerial system of his which did not produce more than an excess power of 100 kilowatts, as a "small" system (admittedly, with many aerials). Thomas Henry Moray demonstrated his system to audiences repeatedly, pulling in power levels of up to 50 kilowatts from a single sort aerial. These power levels are not produced by radio station signals.

Nikola Tesla's Aerial System.
Nikola Tesla produced an aerial device which is worth mentioning. It was patented on May 21st 1901 as an "Apparatus for the Utilisation of Radiant Energy", US Patent number 685,957.

The device appears simple but Tesla states that the capacitor needs to be "of considerable electrostatic capacity" and he recommends using the best quality mica to construct it as described in his 1897 patent No. 577,671.   The circuit draws power via an insulated, shiny metal plate. The insulation could be spray-on plastic. The larger the plate, the greater the energy pick-up. The higher the plate is elevated, the greater the pick-up.
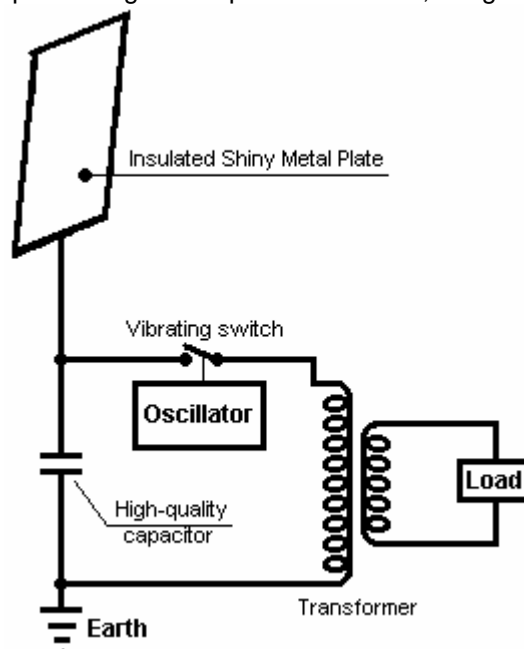
This system of Tesla's picks up energy day and night. The capacitor gets charged up and a vibrating switch repeatedly discharges the capacitor into the step-down transformer. The transformer lowers the voltage and raises the current available and the output is then used to power the electrical load.

It seems probable that this device operates primarily from static electricity, which some people believe is a manifestation of the zero-point energy field. Tesla's equipment might well operate when fed by a motor-driven

Wimshurst machine instead of a large aerial plate. Details of home-built Wimshurst equipment are available in the book 'Homemade Lightning' by R.A. Ford, ISBN 0-07-021528-6.

However, it should be understood that Tesla described two different forms of energy pick-up. The first is static electricity, picked up from very slight interaction of the pick-up plate with the zero-point energy field flowing through it, and the other being pick-up of dynamic radiant energy events, typically from lightning strikes. At a casual glance, the average person would not consider lightning as being a viable source of energy, but this is not the case as there are about two hundred lightning strikes per second - mainly in the tropics - and what is generally not understood is that they are radiant energy events and their effects are felt instantly everywhere on earth as transmissions through the zero-point energy field are instantaneous at any distance. To clarify the situation a little more, here are two of Tesla's patents, one on pick-up of the static field which Tesla remarks appears to be unlimited in voltage, and one patent on pick-up of dynamic energy.

This is a slightly re-worded copy of this patent, as some words have changed their meaning since this patent was issued. If you wish to see the original, then http://www.freepatentsonline.com will allow you to download a copy without any charge.

Patent US 685,957   5th November 1901   Inventor: Nikola Tesla

APPARATUS FOR THE UTILISATION OF RADIANT ENERGY

To all whom it may concern:
Be it known that I, Nikola Tesla, a citizen of the Unites States, residing at the borough of Manhattan, in the city, county and State of New York, have invented certain new and useful improvements in Apparatus for the Utilisation of Radiant Energy, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

It is well known that certain radiations - such as those of ultra-violet light, cathodic, Roentgen rays, or the like - possess the property of charging and discharging conductors of electricity, the discharge being particularly noticeable when the conductor upon which the rays impinge is negatively electrified. These radiations are generally considered to be ether vibrations of extremely small wave lengths, and in explanation of the phenomena noted, it has been assumed by some authorities that they ionise, or render conducting, the atmosphere through which they are propagated. However, my own experiments and observations lead me to conclusions more in accord with the theory heretofore advanced by me that sources of such radiant energy throw off with great velocity, minute particles of matter which are strongly electrified, and therefore capable of charging an electrical conductor, or, even if not so, may at any rate discharge an electrified conductor, either by bodily carrying off its charge or otherwise.

My present application is based upon a discovery which I have made that when rays or radiations of the above kind are permitted to fall upon an insulated conducting-body connected to one of the terminals of a capacitor, while the other terminal of the capacitor is made to receive or carry away electricity, a current flows into the capacitor so long as the insulated body is exposed to the rays, and under the conditions specified below, an indefinite accumulation of electrical energy in the capacitor takes place. After a suitable time interval during which the rays are allowed to act, this energy may manifest itself in a powerful discharge, which may be used for the operation or control of mechanical or electrical devices, or rendered useful in many other ways.

In applying my discovery, I provide a capacitor, preferably of considerable electrostatic capacity, and connect one of its terminals to an insulated metal plate or other conducting-body exposed to the rays or streams of radiant matter. It is very important, particularly in view of the fact that electrical energy is generally supplied to the capacitor at a very slow rate, to construct the capacitor with the greatest care. I prefer to use the best quality of mica as the dielectric, taking every possible precaution in insulating the armatures, so that the instrument may withstand great electrical pressures without leaking and may leave no perceptible electrification when discharging instantaneously. In practice, I have found that the best results are obtained with capacitors treated in the manner described in Patent 577,671 granted to me on 23rd February 1897. Obviously, the above precautions should be the more rigorously observed the slower the rate of charging and the smaller the time interval during which the energy is allowed to accumulate in the capacitor. The insulated plate or conducting-body should present to the rays or streams of matter, as large a surface as is practical, I having ascertained that the amount of energy conveyed to it per unit of time is, under otherwise identical conditions, proportional to the area exposed, or nearly so. Furthermore, the surface should be clean and preferably highly polished or amalgamated. The second terminal or armature of the capacitor may be connected to one of the poles of a battery or other source of electricity, or to any conducting body or object whatever of such properties or so conditioned that by its means, electricity of the required sign will be supplied to the terminal. A simple way of supplying positive or negative

electricity to the terminal is to connect it to an insulated conductor supported at some height in the atmosphere, or to a grounded conductor, the former, as is well known, furnishing positive, and the latter negative electricity. As the rays or supposed streams of matter generally convey a positive charge to the first terminal of the capacitor mentioned above. I usually connect the second terminal of the capacitor to the ground, this being the most convenient way of obtaining negative electricity, dispensing with the necessity of providing an artificial source. In order to use the energy collected in the capacitor for any useful purpose, I also connect to the capacitor terminals, a circuit containing an instrument or apparatus which it is desired to operate, and another instrument or device for alternately closing and opening the circuit. This latter device can be any form of circuit-controller with fixed or moveable parts or electrodes, which may be actuated either by the stored energy or by independent means.

My discovery will be more fully understood from the following description and drawings, where **Fig.1** is a diagram showing the general arrangement of the apparatus as usually employed.
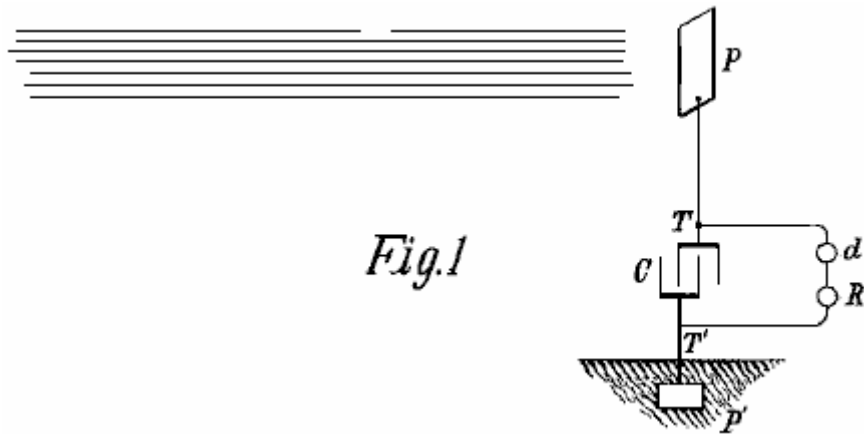

Fig.1

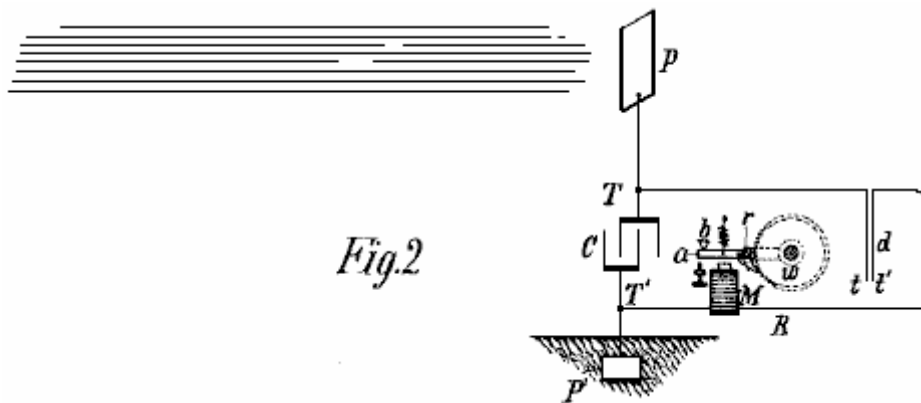**Fig.2** is a similar diagram, illustrating in more detail, typical forms of the devices or elements used in practice.

Fig.2

Fig.3 and **Fig.4** are diagrams of modified arrangements suitable for special purposes.
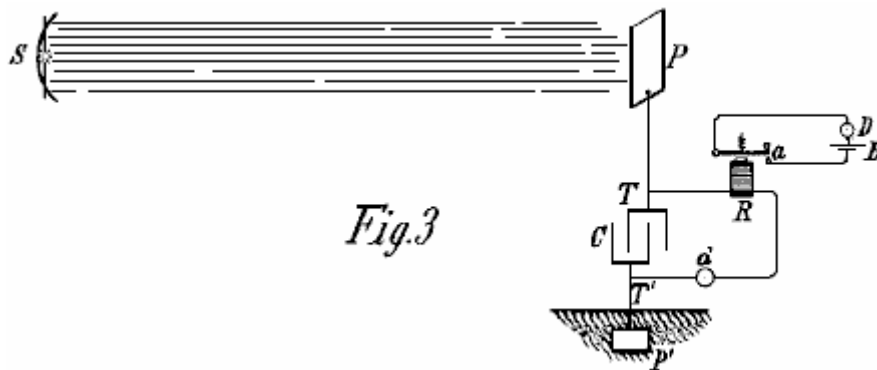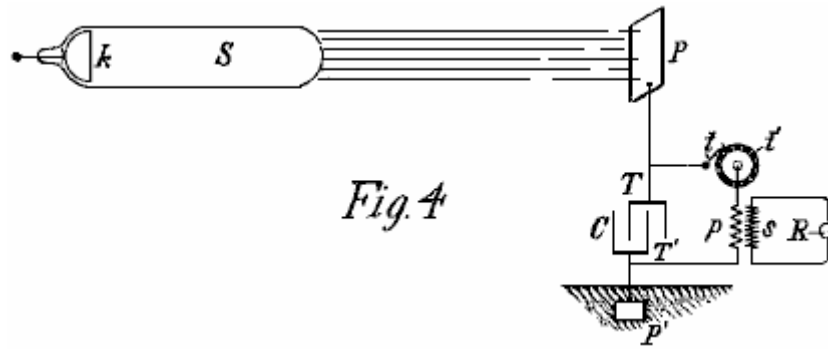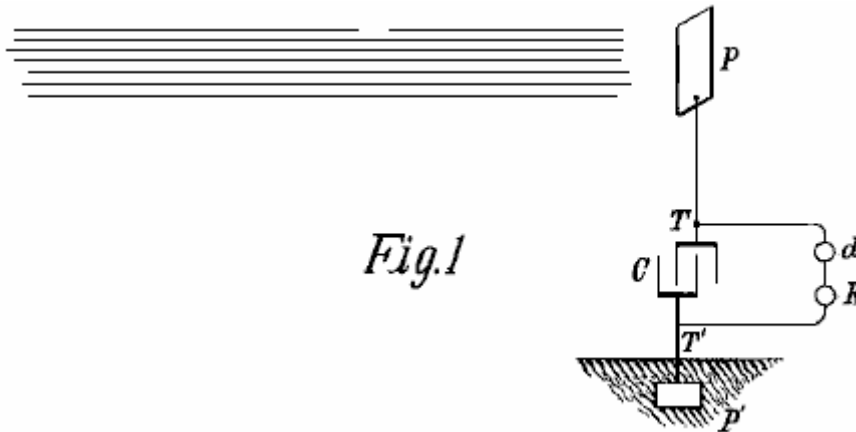

Fig.3

Fig.4

Fig.1

Fig.1 shows the simplest form, in which **C** is the capacitor, **P** the insulated plate or conducting-body which is exposed to the rays, and **P'** another plate or conductor which is grounded, all being connected in series as shown. The terminals **T** and **T'** of the capacitor **C** are also connected to a circuit which contains a device **R** which is to be operated, and a circuit-controlling device **d** as described above.

The apparatus being arranged as shown, it will be found that when the radiation of the sun, or any other source capable of producing the effects described above, fall on plate **P**, there will be an accumulation of energy in capacitor **C**. I believe that this phenomenon is best explained as follows: The sun, as well as other sources of radiant energy , throws off minute particles of positively electrified matter, which striking plate **P**, create an electrical charge on it. The opposite terminal of the capacitor being connected to the ground, which can be considered to be a vast reservoir of negative electricity, a feeble current flows continuously into the capacitor, and since these supposed particles are of an inconceivably small radius or curvature, and consequently, charged to a very high voltage, this charging of the capacitor may continue as I have actually observed, almost indefinitely, even to the point of rupturing the dielectric. If the device **d** be of such character that it will operate to close the circuit in which it is included when the capacitor voltage has reached a certain level, then the accumulated charge will pass through the circuit, operating the receiver **R**.
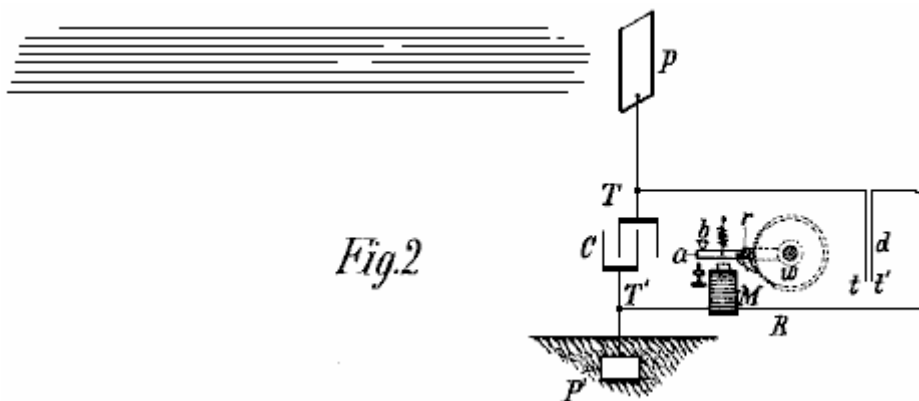

Fig.2

In illustration of this effect, **Fig.2** shows the same general arrangement as in **Fig.1**, and the device **d** is shown composed of two very thin conducting plates **t** and **t'** which are free to move and placed very close to each other. The freedom of movement can be either through the flexibility of the plates or through the character of their support. To improve their action they should be enclosed in a housing which can have the air removed from it.

The plates **t** and **t'** are connected in series in a working circuit which includes a suitable receiver, which in this example is shown as an electromagnet **M**, a moveable armature **a**, a spring **b**, and a ratchet wheel **w**, provided with a spring-pawl **r**, which is pivoted to armature **a** as illustrated. When the radiation falls on plate **P**, a current flows into the capacitor until its voltage causes the plates **t** and **t'** to be attracted together, closing the circuit and energising the magnet **M**, causing it to draw down the armature **a** and cause a partial rotation of the ratchet wheel **w**. When the current flow stops, the armature is retracted by the spring **b**, without, however, moving the wheel **w**. With the stoppage of the current, the plates **t** and **t'** cease to be attracted and separate, thus restoring the circuit to its original condition.
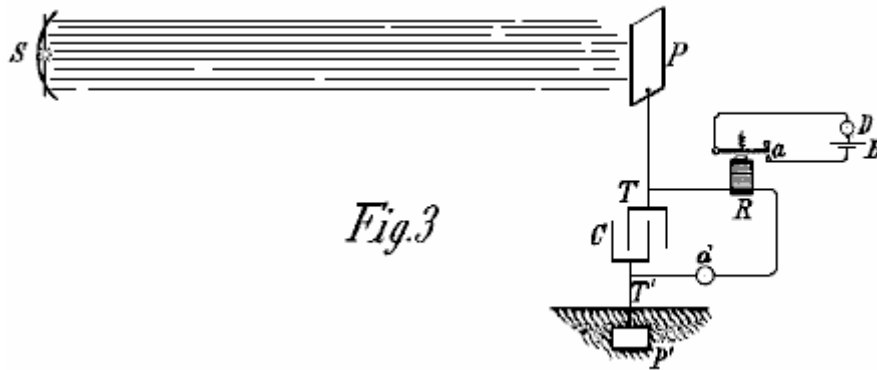

Fig.3

Fig.3 shows a modified form of apparatus used in connection with an artificial source of radiant energy, which in this case may be an arc emitting copious ultra-violet rays. A suitable reflector may be provided for concentrating and directing the radiation. A magnet **R** and circuit-controller **d** are arranged as in the previous figures, but in this case, instead of performing the whole of the work, the magnet performs the task of alternately opening and closing a local circuit, containing a source of current **B** and a receiving or translating device **D**. The controller **d** may, if desired, consist of two fixed electrodes separated by a minute air gap or weak dielectric film which breaks down more or less suddenly when a definite voltage difference is reached at the terminals of the capacitor, and returns to its original state when the discharge occurs.
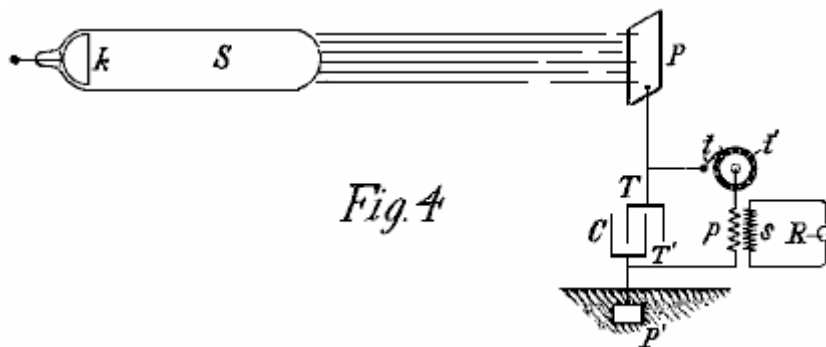

Fig.4

Still another modification is shown in **Fig.4**, in which **S**, the source of radiant energy is a special form of Roentgen tube devised by me, having only one terminal **k**, generally of aluminium, in the form of half a sphere, with a plain polished surface on the front side, from which the streams are thrown off. It may be excited by attaching it to one of the terminals of any generator with sufficiently high electromotive force; but whatever apparatus is used, it is important that the tube has the air inside it removed to a high degree, otherwise it might prove to be entirely ineffective. The working, or discharge circuit connected to the terminals T and T' of the capacitor, includes, in this case, the primary winding **p** of a transformer, and a circuit-controller comprised of a fixed terminal or brush **t** and a moveable terminal **t'** in the shape of a wheel, with conducting and insulating segments, which may be rotated at an arbitrary speed by any suitable means. In inductive relation to the primary winding **p**, is a secondary winding **s**, usually of a much greater number of turns, to the ends of which is connected a receiver **R**. The terminals of the capacitor being connected as shown, one to an insulated plate **P** and the other to a grounded plate **P'**. When the tube **S** is excited, rays or streams of matter are emitted from it and these convey a positive charge to the plate **P** and capacitor terminal **T**, while the capacitor terminal **T'** is continuously receiving negative electricity from plate **P'**. As already explained, this results in an accumulation of electrical energy in the capacitor, and this continues as long as the circuit including the primary winding **p** is interrupted. Whenever the circuit is closed by the rotation of the terminal **t'**, the stored energy is discharged through the primary winding **p**, giving rise to induced currents in the secondary winding **s**, which operates the receiver **R**.

It is clear from what has been stated above, that if the terminal **T'** is connected to a plate supplying positive instead of negative electricity, then the rays should convey negative electricity to plate **P**. The source **S** may be any form of Roentgen or Leonard tube, but it is obvious from the theory of action that in order to be very effective, the impulses exciting it should be wholly, or mainly of one sign. If ordinary symmetrical alternating currents are employed, then provision should be made for allowing the rays to fall on plate **P** only during those periods when they can produce the desired result. Obviously, if the source radiation is stopped or intercepted, or the intensity varied in any manner such as periodically interrupting or rhythmically varying the current exciting the source, there will be corresponding changes in the action upon the receiver **R** and thus signals may be transmitted and many other useful effects produced. Further, it will be understood that any form of circuit-closer which will respond, or be set in operation when a predetermined amount of energy is stored in the capacitor, may be used instead of the device already described in connection with **Fig.2**.

The second patent requires the equipment to be tuned to one quarter of the wavelength of the energy pulses being collected. This patent shows a transmission method as well as a receiving method, but our main concern here is the receiving section shown on the right of the diagram as that can receive naturally occurring energy pulses in the environment and so provides free usable energy.

As it may be a little difficult to visualise the coil arrangement in this patent as many people are familiar with the "Tesla Coil" arrangement where a few turns of thick wire or copper tubing are used as a winding placed around an ordinary cylindrical coil, much like, this illustration from Tesla's patent US 568,178:
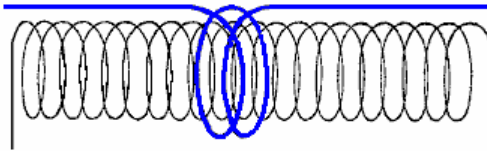
In this case it should be understood that Tesla is speaking about his flat "pancake" coil design and not the well-known Tesla Coil configuration.

Patent US 649,621   15th May 1900   Inventor: Nikola Tesla

APPARATUS FOR THE TRANSMISSION OF ELECTRICAL ENERGY

To all whom it may concern:
Be it known that I, Nikola Tesla, a citizen of the Unites States, residing at the borough of Manhattan, in the city, county and State of New York, have invented certain new and useful improvements in Apparatus for the Transmission of Electrical Energy, of which the following is a specification, reference being had to the drawing accompanying and forming a part of the same.
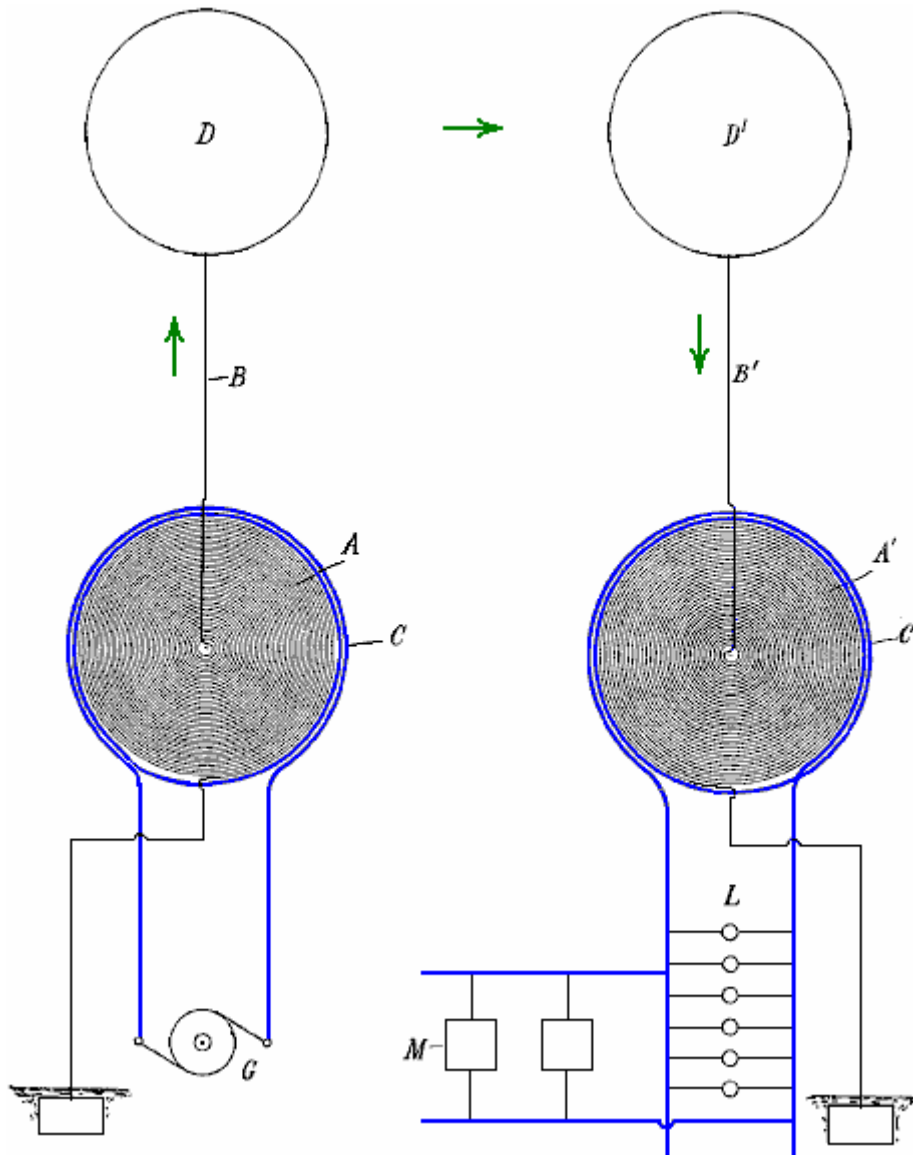
This application is a division of an application filed by me on 2nd September 1897, US 650,343 entitled "Systems of Transmission of Electrical Energy" and is based on new and useful features and combinations of apparatus shown and described in that patent application.

This invention comprises a transmitting coil or conductor in which electrical currents or oscillations are produced and which is arranged to cause these currents or oscillations to be propagated by conduction through the natural medium from one location to a remote location, and a receiving coil or conductor adapted to be excited by the oscillations or currents propagated by the transmitter.

This apparatus is shown in the accompanying diagram where **A** is a coil, generally of many turns and of a very large diameter, wound in spiral form, either around a magnetic core or not as may be desired. **C** is a second coil formed by a conductor of much larger size and smaller length, wound around and in proximity to coil **A**.

The apparatus at one point is used as a transmitter, the coil **A** in this case forming a high-voltage secondary of a transformer, and the coil **C** the primary which operates at a much lower voltage. The source of current for the primary winding is marked **G**. One terminal of the secondary winding **A** is at the centre of the spiral coil, and from this terminal the current is led by a conductor **B** to a terminal **D**, preferably of large surface, formed or maintained by such means as a balloon at an elevation suitable for the purpose of transmission. The other terminal of the secondary winding **A** is connected to earth, and if desired, to the primary winding also in order that the primary winding may also be at substantially the same voltage as the adjacent portions of the secondary winding, thus ensuring safety.

At the receiving station, a transformer of similar construction is used, but in this case the coil **A'** constitutes the primary winding and the shorter coil **C'** is the secondary winding. In this receiving circuit, lamps **L**, motors **M**, or other devices for using this current, are connected. The elevated terminal **D'** connects with the centre of the coil **A'** and the other terminal is connected to earth and preferably, also, to the coil **C'** again for safety reasons as mentioned above.

The length of the thin wire coil in each transformer should be approximately one quarter of the wave length of the electric disturbance in the circuit, this estimate being based on the velocity of propagation of the disturbance through the coil itself and the circuit with which it is designed to be used. By way of illustration, if the rate at which the current flows through the circuit containing the coil is 185,000 miles per second, then a frequency of 925 Hz would maintain 925 stationary nodes in a circuit 185,000 miles long and each wave would be 200 miles in length.

For such a low frequency, which would only be resorted to when it is indispensable for the operation of ordinary motors, I would use a secondary winding wound from a wire 50 miles in length. By adjusting the length of wire in the secondary winding, the points of highest voltage are made to coincide with the elevated terminals **D** and **D'**, and it should be understood that whatever wire length is chosen, this length requirement should be complied with in order to get the best possible results.

It will be readily understood that when these relationships exist, the best conditions for resonance between the transmitting and receiving circuits are attained and owing to the fact that the points of highest voltage in the coils **A** and **A'** are coincident with the elevated terminals, the maximum current flow will take place in the two coils and this implies that the capacitance and inductance in each of the circuits have the values which produce the most perfect synchronism with the oscillations.

When the source of current G is in operation and produces rapidly pulsating or oscillating currents in the circuit of coil **C**, corresponding induced currents of very much higher voltage are generated in the secondary coil **A**, and since the voltage in that coil gradually increases with the number of turns towards the centre, and the voltage difference between adjacent turns is comparatively small, a very high voltage is generated, which would not be possible with ordinary coils.

As the main objective is to produce a current with excessively high voltage, this objective is facilitated by using a current in the primary winding which has a very considerable frequency, but that frequency is in a large measure, arbitrary, because if the voltage is sufficiently high and the terminals of the coils be kept at the proper height where the atmosphere is rarefied, the stratum of air will serve as a conducting medium with even less resistance then through an ordinary conductor.

As to the elevation of terminals **D** and **D'**, it is obvious that this is a matter which will be determined by a number of things, such as the amount and the quality of the work to be performed, the condition of the atmosphere and the character of the surrounding countryside. Thus, if there are high mountains in the vicinity, then the terminals should be at a greater height, and generally, they should be at an altitude much greater than that of the highest objects near them. Since, by the means described, practically any voltage which is desired may be produced, the currents through the air strata may be very small, thus reducing the loss in the air.

The apparatus at the receiving station responds to the currents propagated by the transmitter in a manner which will be well understood from the description above. The primary circuit of the receiver - that is, the thin wire coil **A'** - is excited by the currents propagated by conduction through the intervening natural medium between it and the transmitter, and these currents induce in the secondary coil **C'**, other currents which are used to operate the devices connected to that circuit.

Obviously, the receiving coils, transformers, or other apparatus may be moveable - as for instance, when they are carried by a vessel floating in the air or by a ship at sea. In the former case, the connection of one terminal of the receiving apparatus to the ground might not be permanent, but might be intermittently or inductively established.

It should be noted that Tesla's suggestion of using the conductive envelope of a specially constructed balloon as a good method of increasing the active area of the elevated receiving plate, is one that was taken up by Hermann Plauson when he was building power stations operating on naturally occurring energy.

Jes Ascanius' Version of Nikola Tesla's Aerial System.
This sort of information may seem confusing and maybe a little too technical for you, so let me tell you about the practical and useful applications used by Jes Ascanius, a Danish developer, to whom thanks is due for sharing his design. Initially, he set up a system to charge his mobile phone battery overnight from an aerial. Then he went on to produce a full-size Tesla Aerial System as described at the start of this chapter. Let's start with the very simple system and progress from that to the more powerful arrangements.

The initial circuit uses one strand of solid wire which rises vertically to a 700 mm diameter drum where there are some twenty turns. The arrangement is like this:
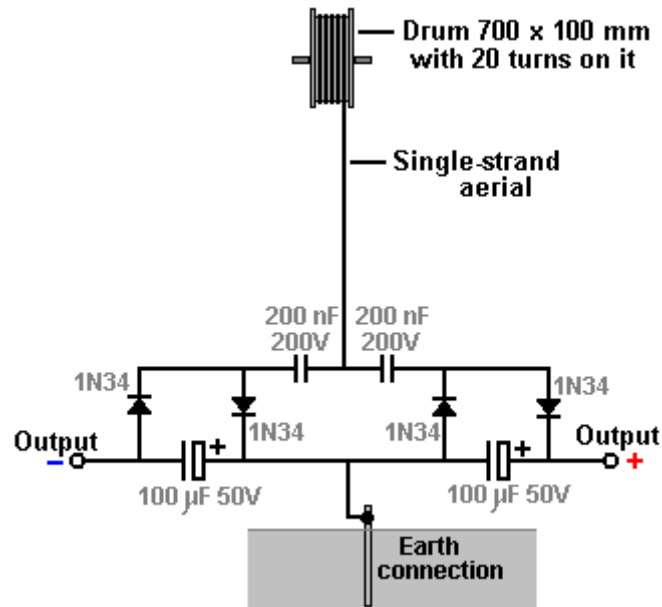
The aerial wire is several metres long, and in the prototype, was supported by (and insulated from) the eaves of a house. The aerial should be vertical or near vertical and a proper earth connection provided by driving a metal rod into the ground or connecting a wire to a metal plate and burying the plate in the ground as a good electrical connection is needed here. The earth connection used here is a 12 mm copper pipe 3 metres long, driven into the ground and the ground around it saturated with water:


The wire used to connect with the earthing rod is very important and should not be less than 8 swg copper wire, that is, 4 mm diameter and 13 sq. mm. cross-sectional area. As with all free-energy devices, the exact constructional details are vital.

The diodes used are germanium 1N34 or 1N34a which are particularly suited to this application. Ceramic disc types are recommended for the 200 nF capacitors.   The prototype build looked like this:

Now, consider this circuit as described, to be one modular building block which can lead to unlimited power from an aerial. I will represent the circuit shown above as a rectangle, showing the above circuit as:
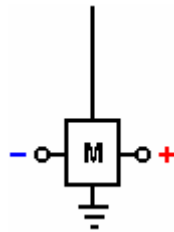

While it is possible to use more than one module with the aerial to get more power, the Danish developer then switched to the full-blown Tesla arrangement by attaching a 600 x 800 x 2 mm aluminium plate inside the sloping roof of his house:

The plate being suspended using nylon cord to prevent it touching the roof or anything else:

The plate is positioned between 3 and 3.5 metres (10 to 12 feet) above the ground and the attachment to the plate is also heavy-duty 8 swg cable:
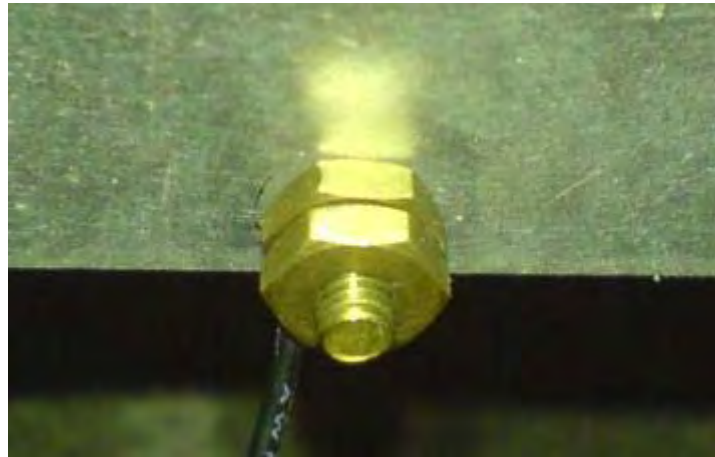
The cable is connected to the aluminium plate using a brass bolt and nuts which the builder thinks may be significant, quite apart from avoiding any galvanitic connection to the circuit. The cable is then run vertically downwards to the circuit. For this arrangement a second earthing point is also used. This is a galvanised iron pipe 3 metres long, driven vertically into the ground which is saturated with water. The second earth is 2 metres away from the first earth and there is no known significance in the use of an iron pipe as it was used because it was to hand at the time..

This arrangement provides serious power, enough to cause injury to, or kill a careless human. With two modules, it will light an LED very brightly, driving it to 2.6 volts. If the LED is removed, then the voltage climbs to about twenty volts and is easily sufficient to charge a 12V battery or battery bank although that takes time. With twenty modules a 12V battery can be charged over night. It is estimated that with two hundred modules, the power would be sufficient to power a household although that has not yet been done. It should be borne in mind that each module is easy and cheap to make, so arranging for a stack of them where additional modules can be added at a later date for more power, is an ideal arrangement. The circuit is like this:
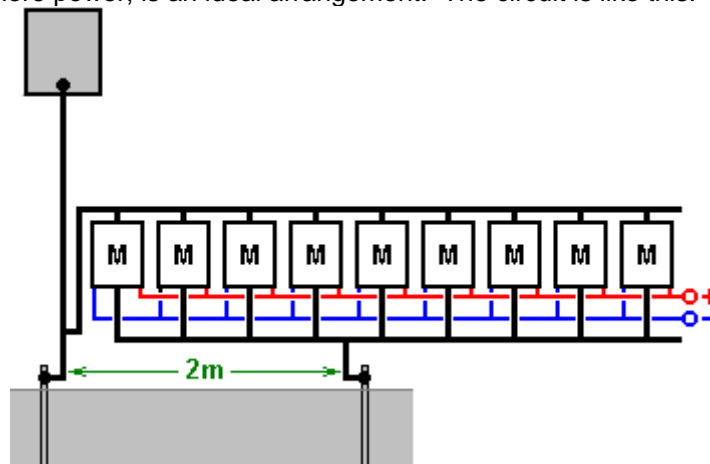
This circuit looks completely mad as the aerial input to the circuit appears to be directly short-circuited by the second earth connection. In spite of this, the circuit works very well when connected this way. Additional modules can be added without any known limit. Increased power can be had by either raising the aluminium plate higher above the ground, to say, 10 metres (33 feet), or by adding one or more additional aerial plates. As you

have a good aerial connected through to a very good earth, there has to be the possibility of the equipment being hit by lightning, and so it is recommended that a protective spark-gap is installed between the aerial and the earth, close to the circuit, so that if high-voltage is suddenly applied to the aerial, the spark gap will fire and shunt the excess power through to the earth. Alternatively, possibly a better solution is to install a standard lightning rod system a few metres away from the aerial and a metre or two higher up, so that it forms a more attractive point for a lightning strike.

Further experimentation has shown that altering the connection point for the aerial has a significant effect on the results. If the connection is made at the mid point between the aerial plate and the earth connection, it produces a greater output:
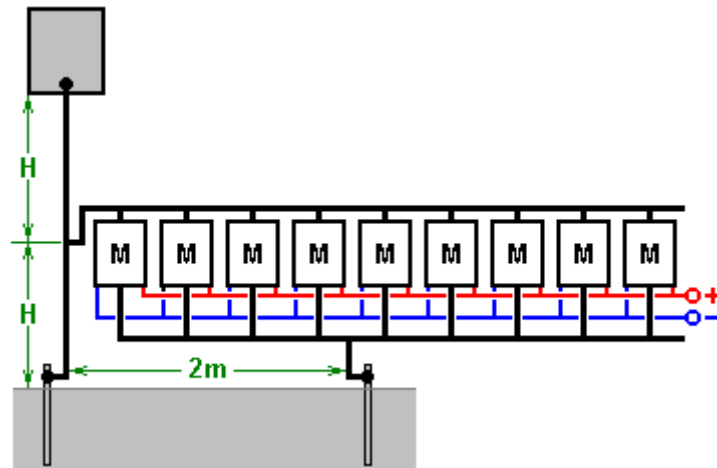
With this arrangement a single module produces around 30 volts while the original method of connecting near the earth was giving about 26 volts with two modules.

Dragan Kljajic has been experimenting with this circuit and has started by building many of these modules on a printed circuit board like this:

TEHNOLAB
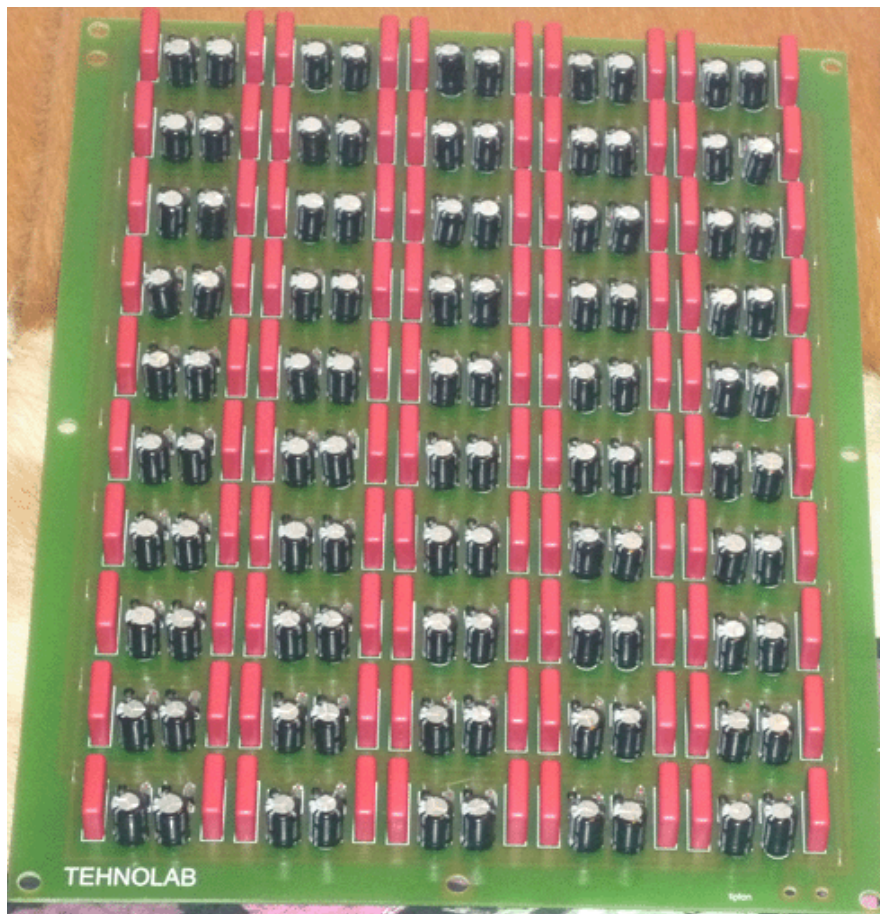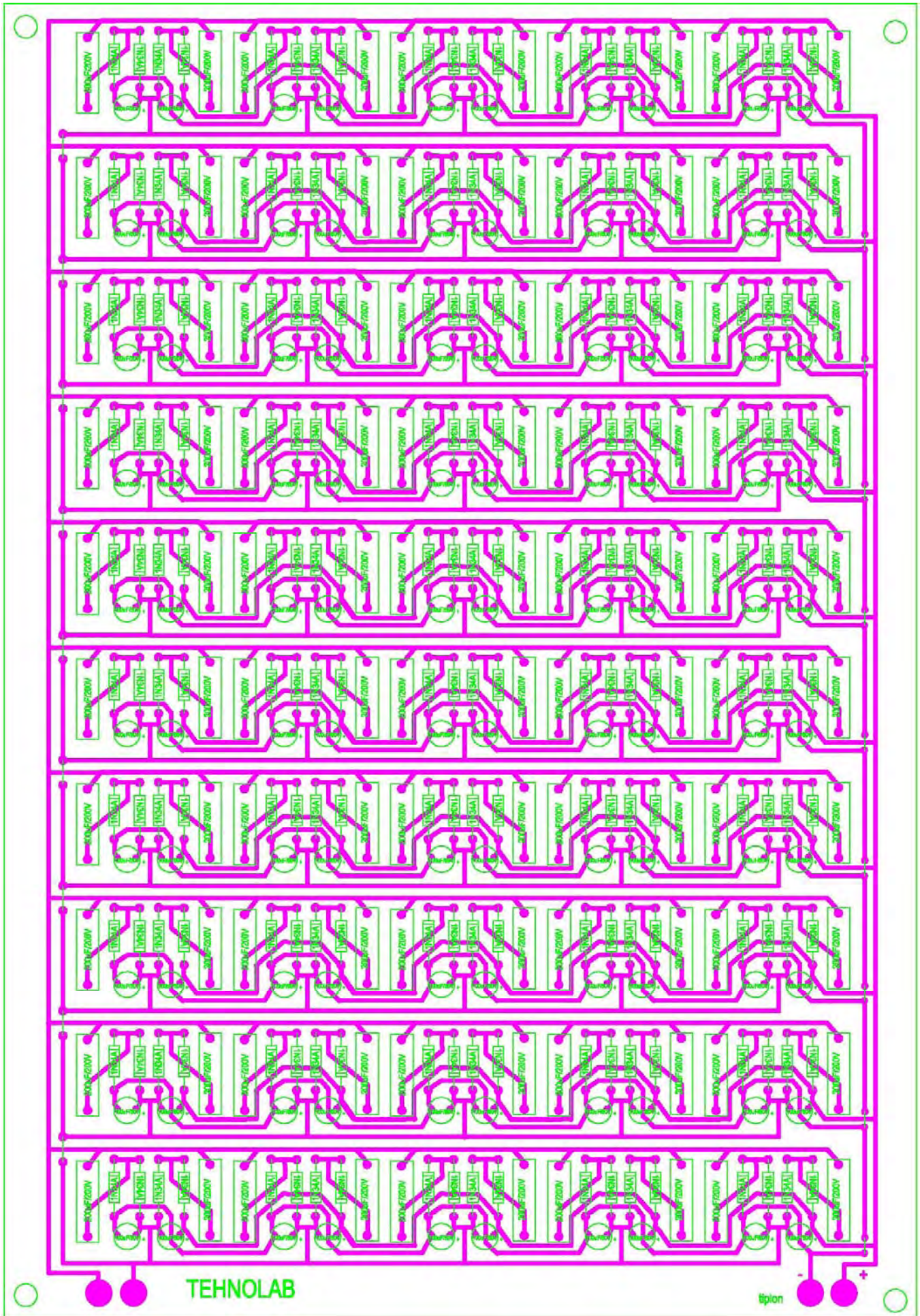
Using two of these boards, Dragan is pulling 96 watts continuously from his aerial plate. He intends to extend this arrangement much further, but is being hindered at present by a local civil war.

Here is a forum: http://www.energeticforum.com/renewable-energy/10947-jes-ascanius-radiant-collector.html where some builders of this system share comments. One comment is that there is an increased risk of a lightning strike where you have an earthed aerial, and so it is advisable not to place the aerial plate inside a house, but perhaps suspended between two trees. Also, using a car spark plug connected across the module set can protect against lightning strikes damaging the circuitry.

As a result of queries, Jes stresses the following points:

1. The plate **must** be high off the ground.
2. The plate **must** be polished and insulated.
3. The wire **must** be single-strand solid wire.
4. There **must not** be any part of the wire above the circuit, which is not insulated.

He further comments: you can use aluminium foil and cling film to make many collector plates 0.4 m x 5 m and connect them close together to feed the aerial wire. Remember, no uninsulated wire anywhere. Any queries should be asked on the forum shown above.


Thomas Henry Moray's Aerial System.
In this field, Thomas Henry Moray is outstanding. By 1936 he had developed a piece of apparatus which was capable of putting out high power with no human-generated input power at all.


Moray's equipment is said to have contained a germanium diode which he built himself in the days before solid-state devices became readily available. The equipment was examined and tested many times. On dozens of occasions, he demonstrated the equipment driving a bank of twenty 150W bulbs, plus a 600W heater, plus a 575W iron (a total of 4.175 kW). The power picked up by this device needed only small diameter wires and had characteristics different from conventional electricity. One demonstration which was repeated many times, was to show that the output power circuit could be broken and a sheet of ordinary glass placed between the severed ends of the wire, without disrupting the supply. This type of power is called "Cold electricity" because thin wires carrying major power loads, do not overheat. This form of energy is said to flow in waves which surround the wires of a circuit and not actually through the wires at all. Unlike conventional electricity, it does not use electrons for transmission and that is why it can continue through a sheet of glass which would stop conventional electricity dead in its tracks.

On one occasion, Moray took his equipment away from all urban areas to a place chosen at random by a critic. He then set up the equipment and demonstrated the power output, well away from any man-generated electrical induction. He disconnected the aerial and showed that the power output stopped immediately. He connected the aerial again to generate the output as before. He then disconnected the earth connection which stopped the output again. When the earth wire was connected again, the output power returned. He found that the power output level fell somewhat at night. The aerial used in his demonstrations was reported to be like this:
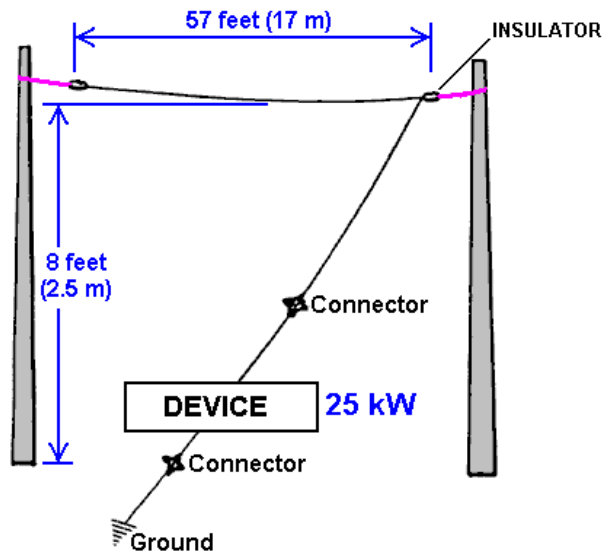
From which it can be seen that even a relatively short aerial wire suspended not far from the ground, is capable of collecting substantial amounts of usable electrical power. The earth used in the remote demonstrations was a length of gas pipe which was hammered into the ground. It was noted that as each hammer blow drove the pipe deeper into the earth, the light bulbs (which formed the electrical load) shone more brightly, indicating that the quality of the earth connection is very important when serious power is being drawn from an aerial.
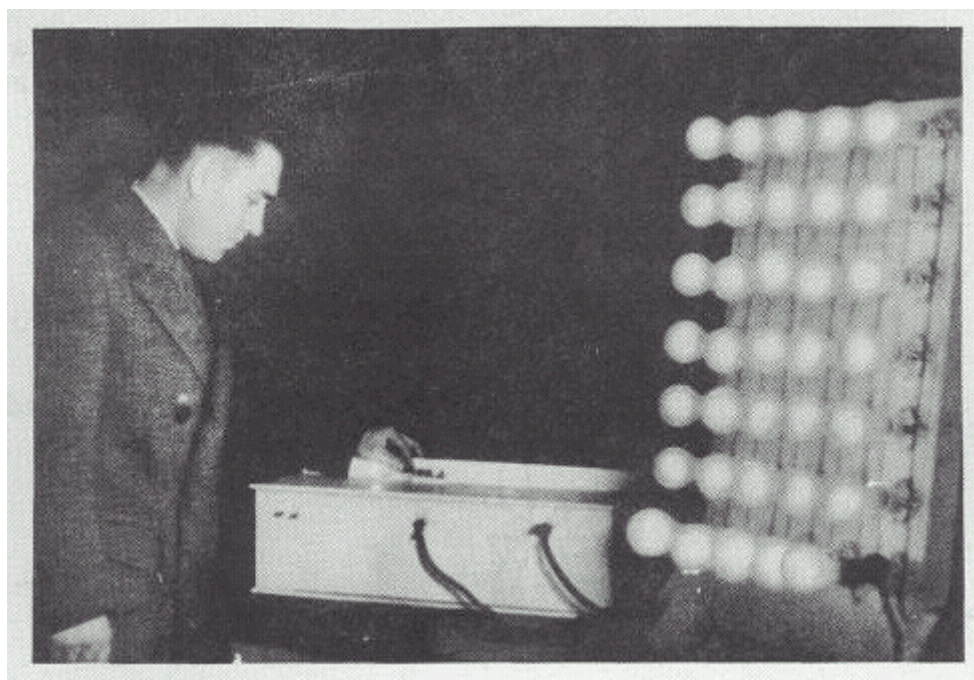
Thomas developed various versions of the device, the latest of which did not need the aerial or earth connections, weighed 50 pounds and had an output of 50 kilowatts. This device was tested in both an aeroplane and a submarine, thus showing the device to be fully self-contained and portable. It was also tested in locations which were fully shielded from electromagnetic radiation.

Moray was shot and wounded in an assassination attempt in his laboratory. This caused him to change the glass in his car to bullet-proof glass. He was threatened many times. His demonstration equipment was smashed with a hammer. When threats were made against his family, he stopped rebuilding his equipment and appeared to have turned his attentions to other things, producing a device for 'therapeutic' medical treatment.

In his book "The Energy Machine of T. Henry Moray", Moray B. King provides more information on this system. He states that Moray was refused a patent on the grounds that the examiner couldn't see how the device could output so much power when the valve cathodes were not heated. Moray was granted US Patent 2,460,707 on 1st February 1949 for an Electrotherapeutic Apparatus, in which he included the specification for the three valves

used in his power device, apparently because he wanted them to be covered by a patent. As far as can be seen, the valve shown here is an oscillator tube. Moray claimed that this tube had the very high capacitance of 1 Farad when running at its resonant frequency. Moray liked to use powdered quartz as a dielectric in the capacitors which he made, and he had a habit of mixing in radium salts and uranium ores with the quartz. These materials may well be important in producing ionisation in these tubes and that ionisation may well be important in tapping the energy field.
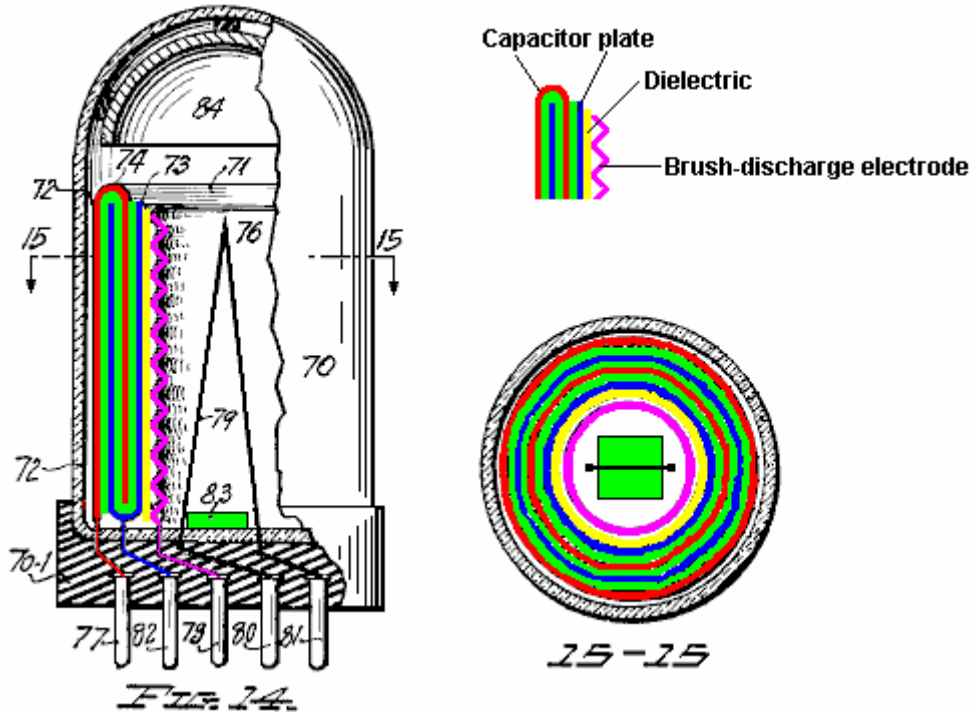
The tube shown above has a six-layer capacitor formed from two U-shaped circular metal rings with the space between them filled with a dielectric material. The plates are shown in red and blue, while the dielectric is shown in green. Inside the capacitor, there is a separate ring of dielectric material (possibly made from a different material) and an inside ring of corrugated metal to form an ion brush-discharge electrode. The capacitor and electrode connections are taken to pins in the base of the tube.

Quartz is suggested for the material of the outer covering of the tube and the wire element numbered **79** in the diagram is said to be a heating element intended to be powered by a low-voltage current source. However, as Moray had an earlier patent application refused on the grounds that there was no heating element in his tubes, it is distinctly possible that the heating element shown here is spurious, and drawn solely to avoid rejection by the examiners. In his patent, Moray refers to the capacitor in this tube as a "sparking" capacitor, so he may have been driving it with excessively high voltages which caused repeated breakdown of the capacitor material.
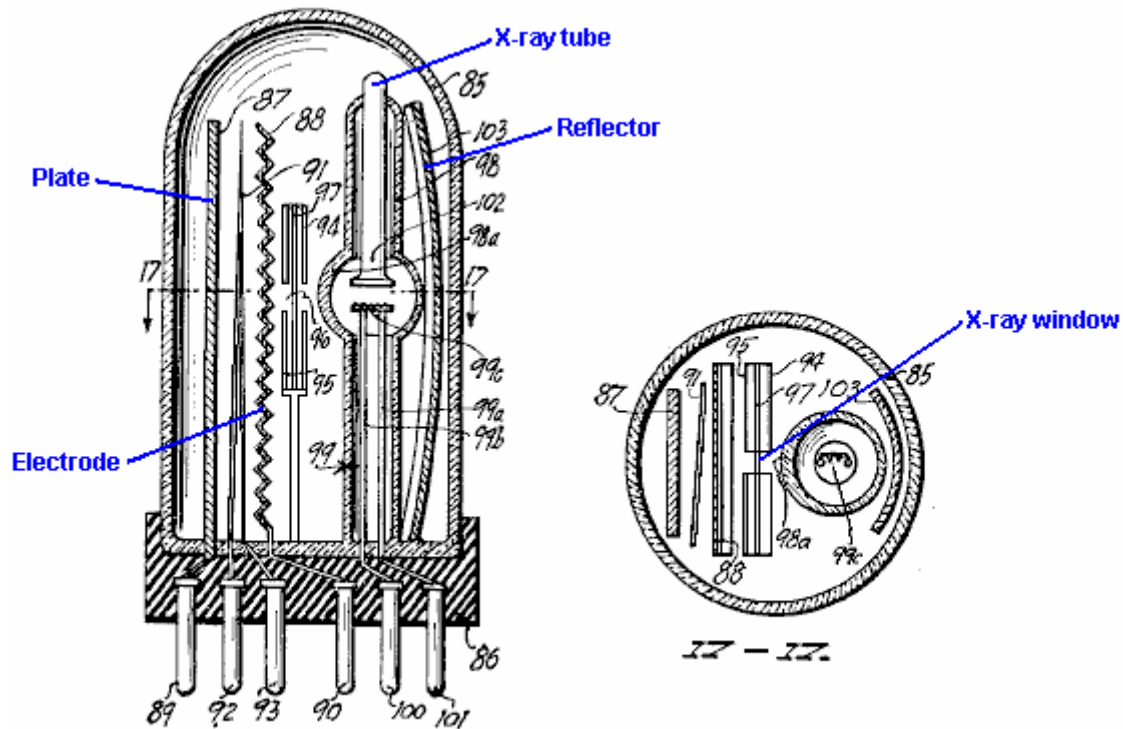
FIG. 16.

The tube of Fig.16 above, uses a different technique where an X-ray tube is used to bombard a corrugated electrode through a screen containing an X-ray window. It is thought that a brief burst of X-rays was used to trigger very short, sharp bursts of ions between the anode and cathode of the tube and these pick up extra energy with every burst.

An alternative version of this tube is shown in Fig.18 below. Here the construction is rather similar but instead of an X-ray window, a lens and reflector are used to cause the ionisation of the switching channel between the anode and cathode. In both tubes, the corrugated electrode supports a corona build-up just prior to the short X-ray switching pulse, and it is thought that the ions contribute to the intensity of the resulting pulses which emerge from the tube. Very short uni-directional pulses are capable of causing conditions under which additional energy can be picked up. From where does this extra energy come? In 1873, James Clerk Maxwell published his "Treatise on Electricity and Magnetism" and in it he pointed out that the vacuum contains a considerable amount of energy (Vol. 2, p. 472 and 473). John Archibald Wheeler of Princeton University, a leading physicist who worked on the US atomic bomb project, has calculated the flux density of the vacuum. Applying Einstein's $E=mC^2$ formula indicates that there is enough energy in every 1 cc of "empty" space, to create all of the matter in the visible universe which can be seen with our most powerful telescopes. That amount of energy is so great as to be beyond imagining. This energy field is referred to as "Universal Energy", "Cosmic Energy" or "Zero Point Energy". At this time, we do not have any instrument which responds directly to this energy and so it is almost impossible to measure.

The existence of this energy field is now widely accepted by mainstream science and it is borne out by the situation found at quantum levels. It is generally thought that this energy is chaotic in form and for useful energy to by drawn from it, it needs to be restructured into a coherent form. It appears that uni-directional electromagnetic pulses of one millisecond or less, can be used to cause the necessary restructuring as they generate an outward coherent wave of radiant energy, from which energy can be extracted for use in most electrical devices, if a suitable receptor system is used. Tom Bearden states that at the quantum level, the seething energy of this field appears continuously as positive and negative charges. As these are evenly distributed, the net charge at any point is always zero. If a "dipole" (two opposite charges near each other) is created anywhere, then it polarises the energy field disrupting the previously even distribution of charges and causing massive streams of energy to radiate outwards from the dipole.

A voltage pulse acts as a dipole, provided the voltage rise is fast enough, and that is what causes a wave of radiant energy fanning out from the location of the voltage pulse. Batteries and magnets create continuous dipoles and so cause the local quantum energy field to send out continuous streams of massive power which can be utilised if (and only if) you know how to do it. The search for mechanisms to capture and use even a tiny fraction of these energy streams is what the "free-energy" field of research is all about. Some people say that there is no such thing as "free-energy" because you have to pay for the device which captures it. That is like

taking a bus trip to a car dealership where they are giving away new cars, and saying that your new car was not a "free" car because you had to pay a bus fare to reach the car dealership.

Fig. 18.
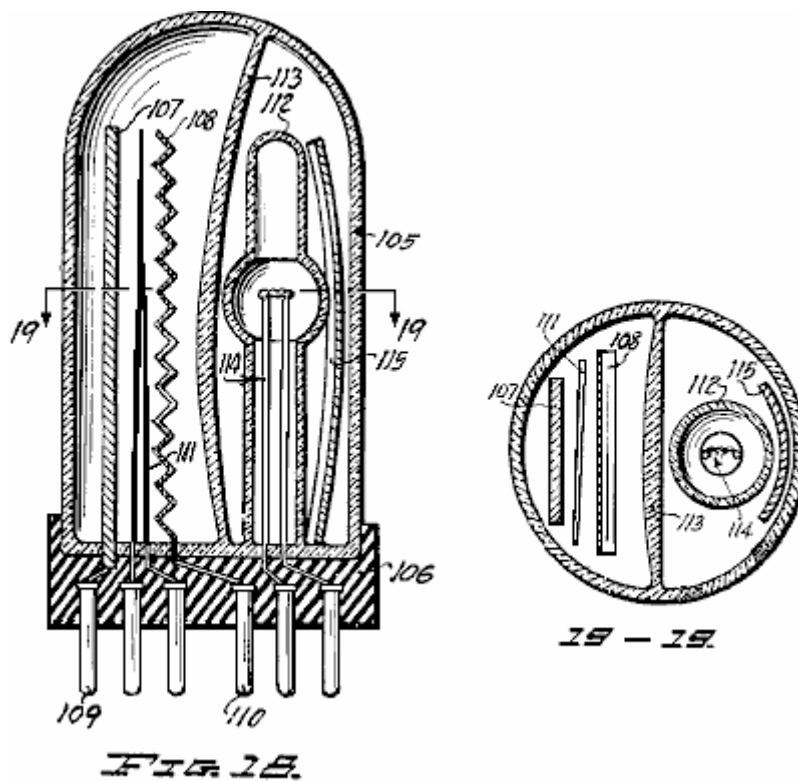
Moray King suggests that the circuit used by Thomas Henry Moray was as follows:
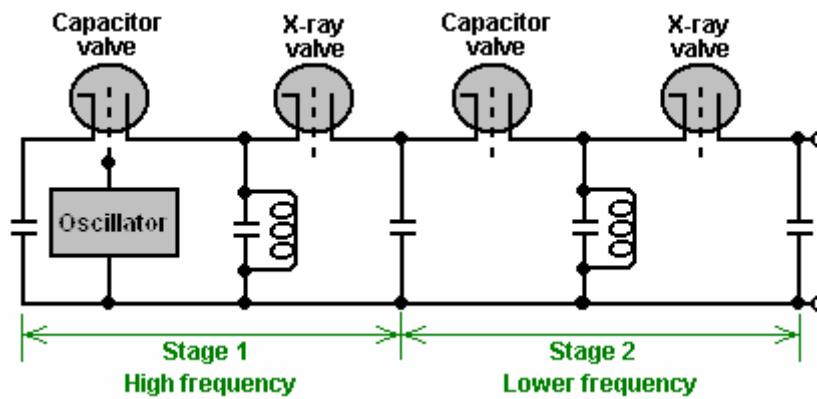
There can be little doubt that Thomas Henry Moray built several versions of his apparatus, each of which produced output power well in excess of any input power needed. It seems highly likely that most of them used no input power whatsoever, and if there were any others, they will have been powered by a tiny fraction of the output power. If mild radioactive material was used as described, then the output power could in no way be attributed to that source alone, since the output power was thousands of time greater than any power available from the radioactive materials.

It is perhaps time to explain a little more about, voltage, power and current. We have been raised with the notion that it is necessary to "burn" a fuel to get power, that batteries "run down" when used and that you have to keep turning the shaft of an electrical generator to be able to draw current from it. These things are not actually true. The relatively recent field of Quantum Mechanics shows that if a charge, such as an electron has, is positioned in what is supposed to be "empty" space, it is not alone. The "empty" space is actually seething with energy, to the extent that "virtual" particles are popping into existence for a fraction of a second and then disappearing again. They are called "virtual" because they exist for such a short time.

Because of the negative charge of the electron, the particles appearing and disappearing around it will all be positive in charge. The electron has "polarised" the space around itself because it has a charge. The instant that a positive "virtual" particle appears, there are two charges near each other - minus on the electron and plus on the

particle. When you have two opposite charges near each other, they form a "dipole". Dipoles form a gateway through which energy from the environment flows continuously. An instant later, the particle disappears, but it's place is immediately taken by another virtual particle. The result is a continuous stream of energy flowing out from the dipole.

Batteries with their positive and negative terminals are electrical dipoles, so too are generators when the input shaft is spun. Permanent magnets with their North and South poles are magnetic dipoles. Both of these have continuous streams of energy flowing through them. So, why then do batteries run down and lose their charge? The reason is that we power circuits using a closed loop. The energy flowing out of one terminal flows into the opposite terminal and instantly destroys the dipole. A new dipole has to be created every split second if the circuit is to deliver power, and it is that self-destructive method of use which causes the battery to discharge or which needs the generator shaft to be rotated continuously.

If a different operating technique is used, where the dipole is not continuously destroyed, then devices which can provide a continuous stream of energy drawn from our natural environment can be constructed. This is not magic, just the next step in conventional science and engineering. Thomas Henry Moray managed it, initially with an aerial and earth like a crystal set to provide the dipole, his device was able to draw many kilowatts of power from the environment. No fuel was needed, the energy is already there surrounding us all, all of the time. As far as I am aware, nobody has managed to replicate Moray's device (which was the reason for it being violently suppressed) but knowing that it existed and was repeatedly demonstrated to work perfectly well, is useful in that it shows that it is possible to tap the massive zero-point energy field with a practical, home-constructed device.

Here is a collection of additional items of information gathered from several different sources:

Moray started his experiments with 'the taking of electricity from the ground', as he described it, during the summer of 1909. By autumn 1910 he had sufficient power to operate a small electrical device, and demonstrated his idea to two friends. The early stages of this demonstration consisted of operating a miniature arc light. It soon became clear to him that the energy was not static and that the static of the universe would be of no assistance to him in obtaining the power for which he was searching.

During the Christmas Holidays of 1911, he began to realise fully, that the energy with which he was working, was of an oscillating nature. He also realised that the energy was not coming out of the earth, but instead, was coming to the earth from some outside source. These electrical oscillations in the form of waves were not simple oscillations, but were surging like the waves of the sea, coming continually to the earth but more in the daytime than at night, but always arriving as vibrations from the reservoir of colossal energy out there in space. By this time Moray was able to gather enough power to light a 16-candlepower carbon lamp to about a half of it's capacity, but he did not manage to gain any further improvement until the spring of 1925.

In 1912 Moray was called to go on a mission for the Church of Jesus Christ of Latter-Day Saints, and under a visitor's visa was allowed to enter Sweden during the Exhibition of 1912 in Stockholm. In his notebook, dated November 1, 1913, he included a note saying that he had obtained material from a railroad car at Abisco, Sweden the previous summer, also some more material from the side of a hill. He made electric tests of these materials, taking them home to try each as a detector for his energy machine. Tests indicated that this soft, white stone-like substance might make a good "valve-like detector". This "valve-like detector" is what led him to do research into semi-conductive materials, and from this soft white stone he developed his first valve and the valve which was used in some of his early Radiant Energy devices (silver wire touching a stone can act as a rectifier).

Moray demonstrated that energy was available by its actions on a resistive load, such as a flat-iron or a space heater, and by lighting bulbs. A resistive device acts as a load which is directly proportional to the amount of energy delivered to it. In heating a heater, or lighting a bulb, the number of watts produced can be calculated as equal to the number of watts provided to the device. This energy is fed into a load to give either heat, light, or power. A motor can be operated but it must be designed to run on a high frequency power supply. The Radiant Energy device used an antenna and a ground connected to his solid state Radiant Energy circuit:
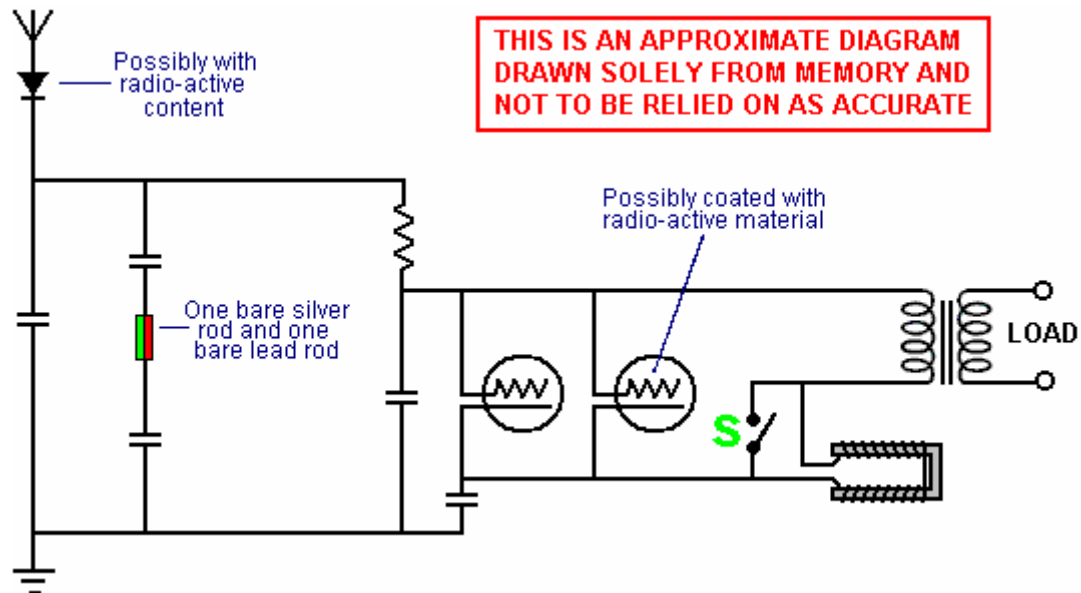
The diagram shown above is reproduced from a rough sketch drawn from memory after seeing Moray's circuit diagram. The person who drew it does not understand how the circuit works, so please treat this diagram as being just an overall suggestion as to what Moray's circuit might have been like. It is actually much more likely that is was a cascade of pairs of tank circuits containing Moray's valve, each pair being one series tank circuit followed by one parallel tank circuit, the oscillating frequency dropping with each tank pair and the output power rising with each tank pair. Moray's circuit was started oscillating by stroking the U-shaped coil with a permanent magnet for a few seconds, and when the circuit started operating, then switch '**S**' was closed, effectively removing the U-shaped coil from the circuit.

Moray was able to demonstrate that none of the output energy came from within his device. Internally the device was electrically dead when it had not been connected and tuned to the antenna. When his device was set up, he could connect it to an antenna and ground, and by priming it first and then tuning it as he primed it, the device would draw in electrical energy. This high frequency electrical energy produced up to 250,000 volts and it powered a brighter light than witnesses had ever seen before. Heavy loads could be connected to the device without dimming the lights already connected to it. This device worked many miles from any known source of electrical energy such as power transmission lines or radio signals. The device produced up to 50,000 watts of power and worked for long periods of time.

Moray initially assumed that this energy was electromagnetic in nature however, he never claimed that it was. He assumed at first that this energy came from the earth but later he believed it was flowing in from the universe. Finally he began to believe that it was present throughout all space, intermolecular space as well as terrestrial and celestial space. He did not necessarily understand how his detectors operated, only that if he built the device very carefully according to his calculations it would work. He was able to demonstrate the existence of an energy that today, though it has not been identified or proven, has been theorised by many researchers.

The largest instrument was about 6 inches high, circular in shape and about 8 inches in diameter. We went out on the roof of the chicken coop carrying the device on a small drafting board, erected an antenna upon the roof of the coop, the antenna being about 100 feet from the house. We pulled the main line switches in the house before going out upon the roof. Mr Judd had Moray move the drafting board from place to place and he also examined the inside of the coop for hidden equipment. The machine was then assembled in his presence and the device was started. Mr Judd timed me to see how long it would take to bring get the light operating. I was able to light the CGE lamp to its full brightness and to heat an old-style Hotpoint electric flat iron to sizzling point, which required 655 watts. Mr Judd asked for the antenna to be disconnected. When this was done, the light went out. The aerial was connected again and the light reappeared. We drove a new grounding rod at a spot selected by Mr Judd, made a connection to the new grounding point and the light burned dim, but came brighter and brighter as the new grounding rod was driven deeper and deeper into the ground.

If the ground or antenna is left disconnected for too long a time, the device becomes electrically dead and must be retuned in order to regain the energy flow. Dr Eyring found no fault with the demonstration and the worst that he could say about it was that it might be induction, but that if Moray would take the device out in the mountains away from all power lines, a distance of three or four miles, and it then operated, he would then acknowledge that it could not be induction and that his theory was wrong.

At last they decided to go up Emigration Canyon, as there are no power lines in that canyon. All three gentlemen were very well satisfied and pleased with what they saw. The antenna wire was put up without any aid or instructions whatever from Mr Moray, except that he suggested that the wire be stretched tighter to prevent so much sag at the centre. This was done and the wire then appeared to clear the ground by about 7 or 8 feet at its lowest point. The ground pipe was of half-inch water pipe consisting of two sections. The lower section was pointed at the end to make its driving into the creek bed easy. It was about 6 feet long and after being driven down about 5 feet the second section, which was about 4 feet long, was screwed on with a wrench and the pipe driven further down until it struck a hard object, so about 7 feet of pipe was in the ground.

The antenna wire was insulated from the poles with two glass insulators about 6 inches long and having holes in both ends. A piece of wire about 2 feet long connected each insulator with the pole. The lead-in wire was fastened to the antenna wire at a point about 10 or 15 feet from the east pole. I helped Mr Moray solder the connection. I paced the distance between the two antenna poles and estimated it to be 87 feet. Mr Moray's equipment, apart from the antenna and ground wires, consisted of a brown box about the size of a butter box, another slightly smaller unpainted box, a fibre board box about 6" x 4" x 4", which Mr Moray referred to as containing the tubes, and a metal baseboard about 14" x 4" x 1" containing what appeared to be a magnet at one end, a switch near the middle and a receptacle for an electric light bulb at the other end. There were also several posts for connecting wires on the baseboard.

When all of the wires were connected and everything was ready, Mr Moray began tuning in. Before tuning, he placed the key on the post: he said it would be in contact while the light burnt, but no light appeared. The tuning consisted of stroking the end of a magnet across two metal projections protruding from what I referred to above as being 'a magnet'. After tuning for slightly more than 10 minutes the key was put on the operating post and the light appeared immediately. Mr Moray put the key on the operating post two or three times before during the tuning operation but no light appeared. We allowed the light to burn for 15 minutes. In my opinion, the brilliance of the light coming from the 100-watt bulb, was about 75% as bright as a 100-watt bulb connected to an ordinary house socket. It was an steady light, without fluctuations of any kind.

While the light was burning Mr Moray disconnected the antenna lead-in wire from the apparatus and the light went out. He connected it again and the light appeared. He also disconnected the ground wire and the light went out. He then connected it and the light appeared again.

In another demonstration, Mr Moray opened the device and let everyone see everything except one small part that he placed his hand over and hid in his fist. This part he cut off and put in his vest pocket. Everything else, people were allowed to examine to their hearts' content. "If that part is able to make such power itself, then it's some device and worth selling. Such a battery would be worthwhile", were some of the remarks made.

On several occasions Dr Moray would disconnect the antenna wire momentarily, but not long enough to lose the light. In disconnecting and connecting the antenna wire a flash of electricity could always be seen at the

At a demonstration in 1928, the aerial used was about 200 feet long and positioned about 80 feet above the ground: the wire is a copper cable approximately a quarter of an inch in diameter, and well insulated. The earth connection used was the water pipe in the basement of Dr Moray's home.   The device was assembled in a trunk through the sides of which were holes for the connections to ground and to the antenna and for observation; the holes were about one-half inch in diameter. There were two boxes about 10 by 20 by 4 inches, one on top of the other; both were closed and the covers fastened with screws. On the upper box was lying an insulating panel about an inch thick by 15 inches long and 3 inches wide; it was made of slate or hard rubber or some material of similar appearance. On this were two binding posts which could be connected together by a small switch; also mounted on this panel was an object about 2.5 inches square, wrapped in friction tape, from which protrude two poles about 1/4-inch in diameter, apparently of sift iron. Two light bulb sockets were connected in the circuit. In one of these there was a 20-watt bulb, and in the other a 100 watt bulb.

Dr Moray then took a magnet, which was a very broad, short limbed U, and began to stroke one pole of it on the poles in the taped body. Mr Jensen placed his fingers on the binding posts several times, and at last received a rather vigorous shock. Mr Moray then threw the switch and the bulbs lit up.   As a further proof that the conversion of the energy was due to the mechanism in the box, Dr Moray hit the table on which the trunk was standing, a moderate blow with a hammer whereupon the light flickered and went off, due to the detector being shaken out of adjustment.   The boxes, in which the mechanism had been housed during the test, were opened and the contents examined.   There were capacitors, the detector, a transformer, and two tubes in them but nothing else. Nothing that in the least resembled a battery.

It is to be noted that after a total run of 158 hours the device supplied 635 watts; inasmuch as a horsepower is but 746 watts this equals 0.878 of a horsepower or slightly more than 7/8 horsepower. This alone is sufficient to dispose of any suggestion of a battery.

A report from 1929 says: It is now more than 2 years since I first became acquainted with Dr T. H. Moray and the work he is carrying on, and in that time he has demonstrated inventive ability of an exceptional order. Perhaps the most wonderful of his inventions is a device whereby he is able to draw electric power from an antenna. This energy is not derived by induction from power lines, as has been suggested by some, nor is it derived from radio stations, as has been demonstrated by taking the apparatus more than 26 miles from the nearest power line and over a hundred miles from the nearest radio station and showing that it operates just as well as anywhere else.

This device was subjected to an endurance test in which it was operated continuously for a week, and at the end of that time a 100-watt lamp was lighted simultaneously with the heating of a 575 watt standard Hotpoint flat iron, making a total of 675 watts; it is very evident that no batteries could sustain such a drain as this.

He has also invented a very sensitive sound detector whereby it is possible to hear conversations carried on in an ordinary tome of voice at a distance of several blocks.   He has also worked out numerous radio hook-ups which eliminate many of the parts now considered necessary for good reception, yet there is no diminution in quality or volume; in fact, there is a notable elimination of interference from static when some of these are used. He has devised a means by which he is able to measure with some degree of accuracy the energy evolved during mental activity; that is, he gets definite, variable deflections of the needle of a sensitive galvanometer which appeared to be related to the vigour of mental activity. There are a great many other equally remarkable things which he has done, such as reducing old rubber from truck tires to the state of a viscous fluid which is readily vulcanisable without the addition of smoke sheet as is necessary with other processes; also a high frequency therapeutic device, and numerous other devices which show great ingenuity.

The 6 lamps are set up in parallel and a small diameter wire is used as the current enters the tube prior to and connecting with the step-down transformer, this takes the very high voltage to the transformer. This voltage will jump across a spark gap of at least six inches. The operating frequency is so high that I have no instrument in my laboratory that is able to measure the amperage or the voltage at this frequency. (Signed, Murray O. Hayes, PhD.).

Dr Milton Marshall was attempting to identify the material that Moray called his "Swedish Stone". Moray described the radio detector which he had developed. He compared it to what was commonly known as the crystal of a crystal set. However, his detector was superior since it could drive a loudspeaker without the use of a battery. He used the most easily demonstrated device, the germanium diode, that worked on the same principle to illustrate how he thought the Radiant Energy Detector worked (Moray originally built the radio simply for the purpose of showing how he was able to pick up radio signals with a solid-state device, producing sufficiently strong signals which could drive a loudspeaker, which was something unheard of in that day. His circuit did not have batteries, and it was very similar to the old crystal-set circuitry.
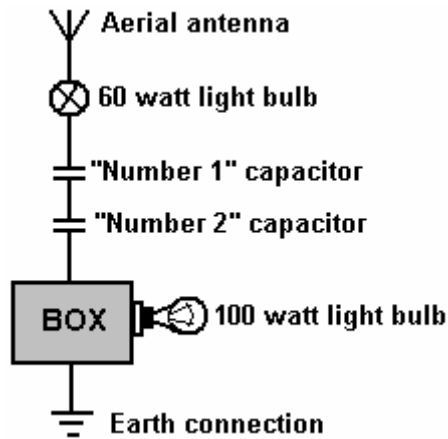
The device was housed in a wooden box something like 12" by 18", with an antenna and a ground going into it. Wires leading out of the box led to a bank of some forty 100-watt light bulbs and to an electric iron. Moray touched a switch at the top of the box with a hand electrostatic plate and the globes all lit up brilliantly. We all noted that the bulbs burned cold except each had a hot spot about the size of a dime on the top slightly off centre. I also recall that I could turn the lights on and off by approaching and retreating to and from the device, either with my whole body or my hand. If my memory is clear, the machine had to be tuned with a dial to be placed in this condition. (Chester M. Todd, 1971)

In 1938, after examining the transformer of the device, Mr E. G. Jensen stated that he considered that the amount of current which he had seen taken from the device was positive proof that the current developed by or in the machine was different to any in use at that time. This was because the transformer would have burned out if it had been carrying normal current, but the transformer showed no signs of even ever having been warm. He was informed by Dr Hayes that the transformer had been in use under the same loading conditions during many demonstrations in the past.

The "Number 1" capacitor consisted of two small sheets of aluminium of about 30 gauge, separated by and making contact with a piece of one-quarter inch thick plate glass. The plate glass was larger than the aluminium sheets and overlapped them.

The "Number 2" capacitor was a commercial unit manufactured by Igred Condenser & Mfg. Co. and had a capacity of 0.025 mfd.

They were used as shown here:

Aerial antenna

60 watt light bulb

"Number 1" capacitor

"Number 2" capacitor

BOX — 100 watt light bulb

Earth connection

With the 60 watt lamp and the two capacitors attached to the antenna and the antenna and ground attached to the box containing the Radiant Energy equipment as shown in the sketch, the 100-watt lamp on the secondary or output side was lighted. Unscrewing the 60-watt lamp from its socket caused the 100-watt amp to go out, but it immediately lighted when the 60-watt lamp was screwed into its socket again. The 60-watt lamp did not light. Shorting the antenna and ground by placing a wire across them, caused the 100-watt lamp to go out. Similar shorting with the hands also caused the 100-watt lamp to go out. No electricity could be felt when shorting with the hands. If either the ground or the antenna wires were disconnected from the box, the 100-watt lamp would go out. Neither of the capacitors or the 60-watt lamp on the primary side of the box were necessary but were simply put there to show that the high frequency power will jump or pass through them.

Moray's patent application on this device was filed in 1931 and rejected on a number of grounds. Firstly, "Because no means was provided for causing the cathode to emit an appreciable number of electrons, the current produced in the cathode by the antenna will not heat the cathode to a temperature at which an appreciable number of electrons per second are emitted". In other words, according to Thomas E. Robinson, Commissioner of Patents, a solid state device, such as a transistor, cannot possibly work. Secondly, because "No natural source of electric wave energy is known to the Examiner and proof of the existence of such a source is required". In other words, it was not enough for Moray to demonstrate the effect of the energy source; he also had to identify it, which he could not do. None of the original patent applications that Henry made are any longer available at the US Patent Office. Although their file jackets are there, the contents and applications themselves are gone.

In 1942, Moray attempted to rebuild a Radiant Energy device, using the remaining bit of what was known as the "Swedish Stone". This material, which was the heart of his original RE detector, he had never managed to duplicate, and the shortage of this material limited the amount of power which he could draw. Consequently, in the large unit, he developed a second detector that forced him into extensive research involving nuclear materials and radioactive reactions. He became deeply involved in the study of synthetic radioactivity as described by Gustave LeBon in his book "The Evolution of Matter". The years slipped by and Moray spent most of his time working on what he called the "counter-balance" to eliminate the need for an aerial antenna.

Moray said:
Enough energy is coming to the earth to light over 1,693,600 100-watt lamps for every human being on the earth today. No fuel of any kind need be taken as this energy can be picked-up directly by ocean liners, railroads, airplanes, automobiles, or any form of transportation. Heat, light and power can be made available for use in all kinds of buildings and for all kinds of machinery. An example would be to pump water onto the desert lands, the power source being only a fraction of the weight of any steam plant or any kind of engine in use today and all this at a fraction of the current cost.

The total energy involved in "cosmic" radiations is very large. The mechanism of its generation involves a basic relationship with the total structure and action of the universe. Today it is believed that cosmic radiation consists primarily of protons and some heavier nuclei. At times this cosmic energy packs a wallop of around 100 quadrillion volts. Coming continuously with slight variations in time, the radiations have a uniformly directional isotropy. The earth is, therefore, surrounded in an atmosphere of radiation with cosmic rays coming continually to the earth from all directions, although there may be a slight deflection of the weaker rays by the earth's magnetic field. There is every indication that our sun is not the source of any appreciable amount of this radiation. The origin, therefore, is from the universe as a whole. The total energy of cosmic radiation is more than the entire luminous output of all the stars and nebulae of the universe combined. Unlimited power is being delivered to everyone's doorstep.

The Moray Radiant Energy discovery, using radiations from the cosmos as its power source, gives the greatest amount of energy per pound of equipment of any system known to man. Electrical power through an electric

motor or an electric jet far exceeds any form of energy in any engine in the delivery of power. There is no dead centre of lost motion in an electric motor nor loss of push in an electric jet. Also, the starting torque is much higher in the electrically powered engine than in the combustion engine.

Harnessing cosmic energy is the most practical method yet discovered by man. Furthermore, it is possible to utilise this vast source of energy from the universe without a prime mover at any point on the earth --- on the ground, in the air, on the water, under the water, or even underground. If one considers that an electrical generator is not in the true sense a generator - as electricity is not made by the generator - but is merely an electrical pump, the Moray Radiant Energy device may then be referred to as a cosmic ray pump: that is, a high speed electron oscillator serving as a detector of cosmic radiations which causes a pumping action or surging within its circuitry.

To account for the propagation of heat and light - two of the forms of Radiant Energy - man has postulated the existence of a medium filling all space. But, the transference of the energy of radiant heat and light is not the only evidence in favour of the existence of such a medium. Electric, magnetic, and electromagnetic phenomena and gravitation itself point in the same direction.

Attractions and repulsion take place between electrified bodies, magnets, and circuits conveying electric currents. Large masses may be set in motion in this manner, acquiring kinetic energy. If an electric current is started in any circuit, corresponding induced currents spring up in all very closely neighbouring conductors. To originate a current in any conductor requires the expenditure of energy. How, then, is the energy propagated from the circuit to the conductors? If we believe in the continuity of the propagation of energy - that is, is we believe that when it disappears at one place and reappears at another it must have passed through the intervening space and, therefore, have existed there somehow in the meantime - we are forced to postulate a vehicle for its conveyance form place to place.

When a particle is electrified, what one must first observe is that a certain amount of energy has been spent; work has been done. The result is an electrified state of the particle. The process of electrifying a conductor is, therefore, the storing of energy in some way in or around the conductor in some medium. The work is spent in altering the state of the medium, and when the particle is discharged, the medium returns to its original state, and the store of energy is disengaged. Similarly, a supply of energy is required to maintain an electric current, and the phenomenon arising from the current are manifestations of the presence of this energy in the medium around the circuit. It used to be that an electrified particle or body was supposed to have something called "electricity" residing upon it which caused electrical phenomena. An electric current was regarded as a flow of electricity travelling along a wire (for example), and the energy which appeared at any part of a circuit (if considered at all) was supposed to have been conveyed along the wire by the current. But, the existence of induction and electromagnetic interactions between bodies situated at a distance from each other leads one to look upon the medium around the conductors as playing a very important part in the development of these electrical phenomena. In fact, it is the storehouse of the energy.

It is upon this basis that Maxwell founded his theory of electricity and magnetism, and determined the distribution of the energy in the various parts of an electric field in terms of electric and magnetic forces. The medium around an electrified body is charged with energy and not of an imaginary electric fluid distributed over the electrified body or conductor. When we speak of the charge of an electrified conductor we are referring to the charge of energy in the medium around it, and when we talk of the electric flow or current in the circuit we are referring to the only flow we know of, namely, the flow of energy through the electric field within the wire.

The work in producing the electrification of a conductor is spent on the medium and stored there, probably as energy of motion. To denote this we shall say that the medium around the conductor is polarised, this word being employed to denote that its state or some of its properties have been altered in some manner and to a certain extent depending on the intensity of the charge. If the charge is negative the polarisation is in the opposite sense, the two being related, perhaps, like right-handed and left-handed twists or rotations.

Now consider the case of a body charged alternately, positively and negatively in rapid succession. The positive charge means a positive polarisation of the medium, which begins at the conductor and travels out through space. When the body is discharged the medium is once more set free and resumes its former condition. The negative charge now induces a modification of the medium or polarisation in the opposite sense. The result of alternate charges of opposite sign is that the medium at any point becomes polarised alternately in opposite directions, while waves of opposite polarisations are propagated through space, each carrying energy derived from the source or agent supplying the electrification. Here, then, we have a periodic disturbance of some king occurring at each point, accompanied by waves of energy travelling outwards from the conductor.

The phenomenon of interference leads to the conclusion that light is the result of periodic disturbances or vibrations of the medium, but as to the nature of these vibrations, as to the exact nature of the periodic changes or what it is that changes them, we possess no knowledge. We know that alternating electric charges are

accompanied by corresponding changes of state or vibrations of the medium, and if the charge is varied periodically and with sufficient rapidity, we have a vibration at each point analogous to, perhaps identical with, that which occurs in the propagation of light - a combination of wave and particle properties. This then is the electromagnetic theory of the luminous vibration.

In the older elastic-solid theory, the light vibrations were supposed to be actual oscillations of the elements or molecules of the medium about their positions of rest, such as takes place when waves of transverse disturbance are propagated through an elastic solid. Such limitation is unwarranted to some extent, but one cannot afford to entirely disregard the particle theory of light either. A combination of the theories has merit. We know that the change, disturbance, vibration, polarisation, or whatever we wish to term it, is periodic and transverse to the direction of propagation. The electromagnetic theory teaches us nothing further as to its nature, but rather asserts that whatever the charge may be, it is the same in kind as that which occurs in the medium when the charge of an electrified body is altered or reversed. It reduces light and heat waves to the same category as waves of electrical polarisation. The only quality of the later required to constitute the former is sufficient rapidity of alteration. These speculations were given the strongest confirmation by experiments of Prof. Hertz many years ago.

When a resilient substance is subjected to strain and then set free, one of two things may happen. The substance may slowly recover from the strain and gradually attain its natural state, or the elastic recoil may carry it past its position of equilibrium and cause it to execute a series of oscillations. Something of the same sort may also occur when an electrified capacitor is discharged. In ordinary language, there may be a continuous flow of electricity in one direction until the discharge is completed, or an oscillating discharge may occur. That is, the first flow may be succeeded by a backrush, as if the first discharge had overrun itself and something like recoil had set in. The capacitor thus becomes more or less charged again in the opposite sense, and a second discharge occurs, accompanied by a second backrush, the oscillation going on until all the energy is either completely radiated or used up in heating the conductors or performing other work.

When capacitors are filled with energy captured by the Moray Radiant Energy device and then discharged through a circuit of proper impedance, reactance and inductance, thereby synchronising the oscillation of the device with those of the universe, electrical inertia is set up. In the reversal of the current, the capacitors are charged, discharged and recharged slowly until the energy stored in them is radiated in kinetic energy through the device, and this energy can be kept alive indefinitely by establishing resonance with the oscillations of the universe.

Considering oscillations from a mechanical, electrical and mathematical point of view, we find that electrical resistance is the same as mechanical friction and current is comparable to mechanical velocity. Inertia and inductance may then be considered analogous terms. In mechanics the greater the inertia of a body, the longer it will stay in motion. In the Radiant Energy device's resistance-inductance-capacity (REC or RLC) circuit, the greater the electrical inductance, the longer the current continues to flow once it is established by synchronisation with cosmic surges.

Expressed mathematically, the equations are the same for electrical or mechanical phenomena. Which means, that $R < \sqrt{(4L / C)}$, where R is the resistance in ohms, L is the inductance in henries, and C is the capacitance in farads. When this is true, an oscillatory discharge will occur and a very powerful inductance inertia will assert itself. For low values of R, the frequency of the oscillations can be shown by $f = 1/2 \pi \sqrt{(CL)}$. The rapidity of the oscillations is governed by the capacitance and inductance.

In the vibrational forces of the universe, we find the key to the source of all energy. How we can utilise this energy for modern industry without being limited to mechanical prime movers is the question. And, the answer may be an energy generator, balanced so as to oscillate in synchronisation with the oscillations of the universe.

Dr Ross Gunn, a civilian scientist for the US Navy, stated years ago that the earth is a huge generator, generating over 200 million amperes of electric current continuously. For example, the aurora borealis is considered to be a very large definite electrical phenomenon produced by the passage of electric charges through the rarefied gases of the higher atmosphere. The earth has since been shown, by Dr Gunn and others, to have a negative charge amounting to 400,000 coulombs. Yet, six feet above the ground the air is charged with more than +200 volts with respect to the ground.

It is known that air conducts electricity away from charged objects. This being true, how does the earth maintain its charge since it is a charged object exposed to the surrounding atmosphere? If the air conducts electricity, the earth's charge must be constantly passing into the atmosphere. And it has been calculated that the earth has a continuous discharge into the atmosphere of 1,800 amperes. At this rate, the earth should lose 90% of its charge into the air in one hour, yet the earth's charge does not diminish. From where does the earth's energy come?

The conversion of matter to energy in the stars is accepted, and, reasoning from what occurs in radioactive disintegration during which energy waves are radiated, one may conclude that energy waves of very high

frequency are sent out from the stars (one of which is our sun). Now, of course, the conversion of energy into matter must equally be accepted.

It has been found that ionisation, which could be the medium for the flow of energy, increases with increasing altitude, instead of decreasing as would be expected. Since the source of energy is the universe, the generation of energy by rotary action and by all prime movers is an effect and not a cause. Oscillatory energy action, be it in a Leyden jar, another man-made capacitor, or in what we may call natural capacitors, always behaves the same. The oscillations will continue until they have reach their cycle of height and then there will be a backrush returning to where the oscillations originated. Every oscillation, whether large or small, is completed during the same interval of time. These oscillations all prove the same great fact, that they are governed by the same cycle of time, completed during the same interval of time. Waves of energy have a regular beat note, coming and going as the waves of the sea, but in a very definite mathematical order - coming to the earth from every direction with a definite rhythm.

Energy has a definite elastic or resilient rigidity and density, which is subject to displacement and strain. When strain is removed, the medium will spring back to its old position and beyond, surging back and forth, and will continue to oscillate until the original pressure is used up. If the internal impedance is too great, there will be no oscillations, but it will merely slide back in a dead beat to its unrestrained state.

By cutting down resistance to a minimum and synchronising the resilient ionic actions of the Moray device with the wave actions of the universe, periods of oscillation can be made to come quicker and quicker until inertia asserts itself, thus lengthening out the time of final recovery. This is done by carrying the recoil beyond the natural oscillations and prolonging the vibrations by capturing the in oscillatory action. When the recovery becomes distinctly oscillatory, a harmonic pattern is initiated and the oscillations continue, resonance thereby being established with the universe.

In the universe we see the same laws being obeyed as in our laboratories. As one traces down to the almost infinitesimal constituents of the atom, one finds that matter does not exist at all as the realistic substance which we have supposed it to be. There at the very foundation, it consists of nothing more than energy charges emitted at various wavelengths or frequencies. It is becoming more and more certain that the apparent complexity of nature is due to our lack of knowledge. And, as the picture unfolds, it promises a marvellous simplicity.

One of the most marvellous relationships that has ever been revealed in the entire science of physics is that between light and electricity and the existence of electronics in atoms of matter. Knowing what we do at the present time with regard to the structure of atoms, this relationship is not quite so surprising. However, considering the total absence of this knowledge about a half century ago, the discovery that light, and radiation in general, are vibratory phenomena was revolutionary.

Speaking of radiation, "Radiant" here means proceeding from a centre in straight lines in every direction. Energy is internal and inherent. "Energy" is defined as a condition of matter, by virtue of which, any definite portion may affect changes in any other definite portion. This was written in 1892, and discoveries since confirm it. Energy then is a state of matter, or rather, the result of a particular state or condition in which matter may be when any observed phase of energy appears.

In addition to possessing kinetic energy, the atom is capable of absorbing energy internally. This internal energy is associated with the configuration of the particles of which the atom is composed. Under ordinary conditions an atom is in what is known as a state of equilibrium, in which there is neither a giving off, nor an absorbing of energy. But, the internal energy of the atom can be altered. When the internal energy of the atom exceeds that of its normal state it is said to be excited. Excitations may be caused in several ways, e.g., the collision of an atom with rapidly moving positive or negative particles or the breaking of lines of force in an electromagnetic generator. Kinetic energy is released when excitation causes a particle to give up some or all of its kinetic energy to the atom during collisions. This is taking place in the universe all the time.

The electric motor and generator would never have been discovered if a dielectric (insulator) had not been discovered. If one discovers a dielectric valve for the energy of the universe, one has the answer to harnessing the energy of the universe! A limiting case of excitation is ionisation, wherein energy is absorbed by the atom sufficiently to allow a loosely bound electron to leave the atom, against the electrostatic forces which tend to hold it within the atom. An atom which has given up one or more electrons is said to be ionised. It is possible that ionisation, i.e., excitation, may take place in successive steps through absorption of quanta energy. The return of an ionised atom to a state of lower energy is associated with electromagnetic radiation. Also, from the process of ionisation, electrical energy may become associated with the vibrational forces of the universe coming into the earth as cosmic radiation. The higher the frequency, the greater the ionisation or excitation, a form of energy which is kinetic in nature. There are tremendous energies coming to the earth from outer space. These energies are only different manifestations of the energies we see in operation all around us. In most cases we are not even aware of their existence. They penetrate everything including our own bodies. Every one of us is alive by virtue

of these energies. Every part and particle of the universe is alive with them. The generators that now furnish our electric power do not create or originate any power or electricity; they merely direct, pump, the existing energy or electricity.

As in musical notes of high and low "C", the vibrational rates (frequencies) are different, but all "C" notes are essentially the same (harmonically related). This is the foundation upon which much of my investigation of vibratory phenomena is based.

It has been agreed that all forms of matter are vibrating at a particular rate or frequency. And, so it is with the various forms of energy - heat and light, magnetism and electricity. These are but forms of vibratory motion connected with and being generated from the same source, the universe. Matter vibrates at a particular rate, according to its character, and may be transmitted into other substance by lowering or raising its rate of frequency. If the frequency is raised high enough, the molecules will separate and the atoms become free. Raising the frequency still higher, the atoms resolve themselves into their original components. Matter then becomes a form of energy. Frequencies may be developed which will balance the force of gravity to a point of neutralisation. One can then go beyond the force of gravitation. Understanding the principles of vibration is truly understanding energy.

In gamma rays, we find potentials which are equivalent to as much as 1,000,000 volts, yet their wave lengths are not the shortest known. In octaves still higher there are rays which are known as "cosmic rays". Who can draw a definite line and say how much higher other octaves exist than those knows as the cosmic rays? Our starting point from the discovery of these different waves was electrical conductivity of the air, and it has been found that this conductivity is just as strong by night as by day. Radiations emitted by the sun can scarcely be the sole cause of this energy. All space is saturated with vibration, energies, which are no doubt electrical in character. The relation of matte to energy and energy to matter then becomes the potential of the universe - one continuous series of oscillations.

Atoms maintain an equilibrium by oscillations, rotations, attractions and repulsions, but this does not interfere with a transformation of equilibrium, which, when the transformations of equilibrium are rapid enough, become energy, i.e., matter is turning into energy and energy into matter.

There can be no generation of electrical current and no kinetic energy if there is no disturbance of equilibrium, i.e., change of potential or change of energy levels. When one thinks of the oxygen and nitrogen molecules of the air all about us moving with the speed of bullets and striking us and everything else at this speed, one can form some idea of the agitation taking place here and in the universe.

The oscillations from outer space are emitting electromagnetic waves of many wavelengths and frequencies. The Moray device is so constructed that the frequency is very much lower on the secondary side than on the primary side, and almost complete resonance is established. I am convinced that the energies from the universe are active radiations produced by the evolution of matter into energy and energy into matter.

Dr Anderson's cloud chamber at the California Institute of Technology, in which the positron was discovered, has furnished much information about cosmic ray energies. He found that some positrons are born of cosmic rays smashing into matter. The cosmic ray energies deduced from the tracks left in the Anderson cloud chamber range from 100 volts to 3,000,000,000 volts. The Lemaitre-Vallarts theory, together with Dr Johnson's asymmetry measurements, give definite values for the energy of half of the cosmic radiation, and shows it continuously distributed between 5 billion and 50 billion volts.

The figure of 100 billion volts is a result of Dr W. Kolhorster's measurement of penetrating radiation in the depths of the Strassfurt salt mines. He found that the minimum energy of these rays had a penetration which was greater than ever before demonstrated. Dr Axel Corlin of Sweden's Lund Observatory found radiation that still had energy after passing through somewhat greater depths and, therefore, the voltage figures can be made even higher. Energies of 100 billion volts or more are indicated by the great bursts set off by cosmic ray collisions, called the stosse, which have been observed particularly in Germany. The Moray RE devices have worked equally well in deep mines, under water or high in the mountains and in an airplane.

It is about 100 years since science began to consider light, heat, magnetism, galvanism, and electricity as natural forces. In the early part of the 19th century school books termed these things "imponderable substances". The corpuscle theory of light was taught, the sun was supposed to provide an endless supply of those corpuscles. After the corpuscle theory faded, scientists turned to the wave theory, but even that was based on a crude concept of movement of the ultimate principles or atoms, of matter. The electron theory has superseded the earlier ones now, and while the electron theory explains the observed and theoretical "facts" better than the previous concepts did, could it be that, as the greater light of knowledge leads us on, the electron theory in turn will fall short of providing "absolute" knowledge? The Einstein Theory may stand in need of revision or amendment; or, in time, it may join the theories of corpuscles and waves on the back shelf.

A specific case, in which the electric field performs the double function of molecular excitation and the creation of intermolecular and atomic ions, is being given by the system used by the inventor. It is a system utilising the principles of the wire corona with a concentric cylinder at different pressures. The system is modified in conformity to the concept that chemical reactions must take place when the oppositely charged molecular ions from an appropriate activated catalyst are accelerated against one another in the wire corona. It consists of a cylinder made of a suitable catalyst from which positive ions are emitted. The reactants (gases) streaming through the chamber parallel to the length of the wire attain the polarity of the negative molecular ions by the high electric field close to the wire. As these negative molecular ions are accelerated at the right angles to the wire in the direction of the electric field toward the positively charged catalyst cylinder, they are met by an avalanche of onrushing atomic ions from the catalyst. A certain amount of reaction takes place in that instant, 10^{-8} seconds. However, some of the negative molecular ions outside the mean free path of the positive atomic ions are free to rush headlong toward the positive cylindrical field where they are neutralised, and instantly given a positive charge by the avalanche of out-rushing positive ions. These positive molecular ions are accelerated back into the field and collide against the negative molecular ions coming from the direction of the negative electrode corona. This melee continues until the reaction has come to a point where the individual participants are either all gone or the mixture is outside of the electric field: backrush oscillations.

The Moray apparatus combined with other equipment, consists of a combination of specially constructed tubes which we will refer to as valves, "pressure transmitters", interceptors and oscillators. The valves are not rectifiers in the sense that they operate as radio valves in changing Alternating Current or High Frequency oscillations into Direct Current. They have an actual valve action in stopping the "flow" of energy which may be thought of as oscillatory action similar to the waves of the sea, without rectification, from returning to the outer circuit, much as a retaining wall could stop the waves of the sea from returning. The other modalities and "tubes" of the device are equally unique in their performance. Although no new laws of energy are being advanced or claimed as having been discovered, the application in the method of utilisation of the energy throughout space is unique in that "generation" is accomplished by oscillatory utilisation rather than by the conventional prime mover. These detector tubes have a synchronised pull with the specially developed oscillators of high faradic capacity and provide a means through which oscillating energy may pass to specially constructed valve oscillators whose relation to the first stage valve is such as to permit oscillations to come in from but not return to the outer circuit with an automatic variable relation to the oscillations from the universe, and capable of setting up within their circuits initial oscillations which coincide with the oscillations of the universe.

Special provision is provided to stop RE tubes from becoming blocked in their dissipation of the charges created by the oscillations that continually accumulate based on the oscillatory capacity backrush effect common to capacitors and are herein applied in vacuum tubes. This action of these devices has the effect of enlarging and prolonging the time of charge and discharge of the capacitors and the capacity energy in the circuit to an appreciable interval in perfect harmony with the natural energy wave through the interceptor's valves and oscillators in the circuit which set up in the circuit electrical pulsations corresponding to the energy waves captured by the interceptor and again kept from returning to the second outer circuit by "multi-walled" valves. The final tubes act as energy pressure transmitters with a means to prevent "shunting" condensation by a special form of "getter". This stops condensation accumulating at the base of the tubes which would block their ionic action.

One must "split" the energy discharge band into lines of variation (call this what you will), lines of energy or lines of light beyond the "light rays". The oscillations, therefore, do not become simple oscillations but through the action of the universe set up an energy flow which might be referred to as the assertion of inertia. When inertia sets in, the action will continue because of the oscillations of the cosmos, otherwise one would have a complete dissipation of energy and no oscillations. The oscillation will vibrate during the same period of time regardless of the potential, but the rate of vibration of the device depends on the "capacity" of its modalities, i.e., condensers, etc.

Put together in pure energy resonance, certain energy responding apparatus which synchronise with the resonance of certain vibrations in the universe, and what do you have? Useable energy from the universe. This energy may come to the planets as oscillations similar to the oscillations and tides of the sea. The Radiant Energy tubes receive this energy in surges which may last only a few microseconds by the pressure and current in those surges are so strong that sufficient energy is delivered to the equipment in resonance to be useable in multiples of flashes and in a magnitude which competes with the light of day. Remember resonance and pressure can do a lot to amplify energy. Also remember that the vibrations going out from the sources in the universe must also return to their sources. Nothing is lost. There is only a lowering of potential like water flowing over a water wheel.

The Radiant Energy tubes present no new laws of physics. They simply expand the application of known laws, thereby obtaining results not at first thought possible. This is the history of science. Radiant Energy tubes possess greater ability to obtain "saturation" and thus charge the accompanying capacitors at a more steady rate.

When a certain voltage is reached, ionisation occurs in the gases of the discharged tube and causes the capacitors of the valve circuit to discharge into other capacitors of the valve circuit, to discharge into other capacitors of the oscillators and the other modalities of the circuit.

When ionisation in the preceding tubes is no longer possible because of the reduced voltage, the process starts all over again. The first valve passes vibrations of energy into an oscillatory circuit; ionisation sets in, a discharge occurs, and energy passes through another valve into other oscillators. The process is repeated from the first stage on to the second stage, on to the third and so on, much like a bucket brigade. That is why I asked years ago, "Cannot a steady flow of water be obtained from the waves of the sea or energy from the vibrations of the cosmos?"

When a vibration of any kind strikes a boundary between two media of different vibratory impedances at an angle of less than 90 degrees, a transformation of the vibratory rate may be changed into another vibratory rate. The Radiant Energy device therefore will continue to capture energy by resonance, or call it what you will, as long as the "keep alive" vibration of the cosmos continues to oscillate the various stages of the valves and oscillators in the circuit. Simple, is it not? Just a case of the trapping of energy which is everywhere present in the primary circuit and causing it to oscillate through the secondary circuits through a blocked circuit of no return.

Our experiments have proved that there is an energy which exists in the universe which, by proper development of equipment, can be made available for commercial use.

Such an energy transformer or converter has been built. It has been operated, at full load continuously with no expenditure of fuels of any type, without a mechanical prime mover, kept alive by the oscillations of the energies from the cosmos; an energy converter, or transformer, which would be capable of converting the high frequency, high level energy of the cosmic radiation into current of usable frequency and voltage.

Basically the theory of operation is as follows:

Oscillations are started in the first stage or circuit of the device by exciting it with an external energy source.

The circuit is "tuned" until the oscillations are sustained by harmonic coupling to the cosmic wave frequencies.

The reinforcing action of the harmonic coupling increases the amplitude of the oscillations until the peak pulses "spill" over into the next stage through a special detector or valve which prevents the return or feedback of energy from succeeding circuits.

These "pulses" drive this stage, which oscillates at a lower frequency and is again reinforced by harmonic coupling with the ever present cosmic waves.

The second stage drives a third stage, and additional stages are coupled until a suitable power level at a useable frequency and voltage is obtained by means of special transformers.
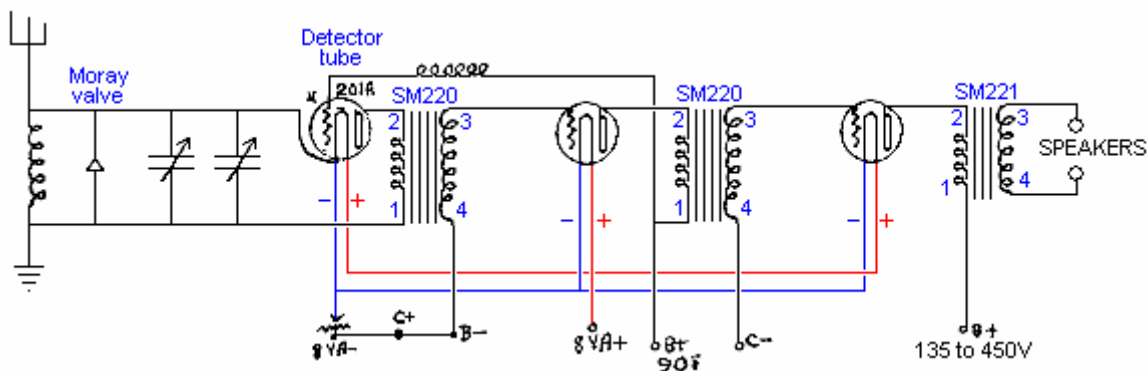
The specific information on Moray's system is very limited, especially since his patent application has been removed. The diagram above and the diagram below have been reproduced from what is alleged to be the notes from which the patent application was composed. These notes are not very clear both in wording and in the quality of reproduction, however, the diagrams shown here are an attempt to show clearly anything which is reasonably certain in those diagrams.
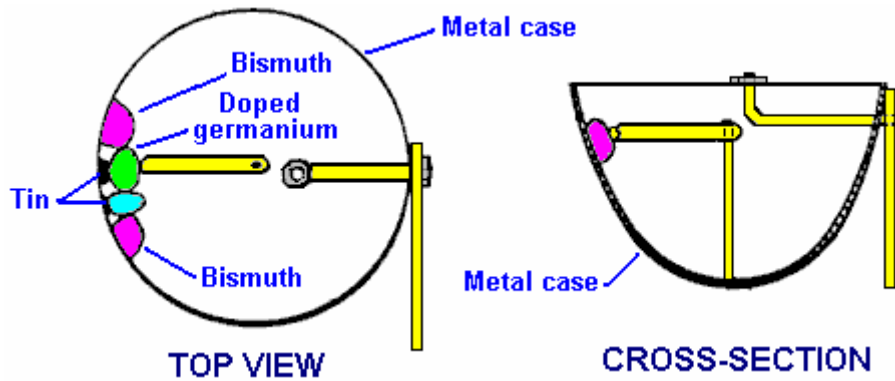
This is supposed to be the construction information on the Moray Valve which was capable of being set to either rectify a signal or to amplify a signal. The casing is a metal cup which also forms one of the contacts for the valve. inside the cup there are four pellets attached to the side. The outer two pellets are made of bismuth and are fused directly on to the metal case. The two inner pellets are attached to the case with tin instead of solder. Judging from the drawing, it looks as if the metal arm contacting the pellets can only connect with the inner two pellets. The arm presses sharply against the pellets in the same way that the "cat's whisker" diodes of the time were touched with a silver wire to make a point contact and produce rectification.

If it is correct that the rotatable arm only contacts one of the two inner pellets, then the reason for those outer bismuth pellets must be as an indirect part of the valve. So, this section of the case is an arrangement of the metal of the case, tin, bismuth and five junctions between different materials, not counting the contact arm. One of the two inner pellets is made of purified germanium with the addition of very small amounts of a doping material. Iron Sulphide (FeS), Molybdenum Sulphide (MoS), Bismuth, Uranium and Silver have been mentioned as possible doping agents. Another material mentioned is Lead which has had it's structure altered by the process described in Moray's patent US 2,460,707. The pellets are said to be produced under high pressure.

From this it can be seen that we do not have anything remotely like the full information on Moray's system. However, there are a number of important things which we can learn from this. Firstly, using just a good earthing connection and an aerial of just ninety feet (30 m) or so in length suspended only some eight feet off the ground, it is possible to draw significant current from the environment. The photograph shows 35 light bulbs being lit by Moray and that is a substantial amount of power. It is unlikely that we will be able to reproduce Moray's exact method of extracting power, but it is highly unlikely that his method is the only possible way of achieving efficient power extraction. So, if we experiment with the components and materials to hand today, it is distinctly possible that we could extract major amounts of power from a relatively small aerial wire positioned at quite a convenient height above the ground, and a good quality earth.

Moray's book "The Sea of Energy in which the Earth Floats" can be downloaded as a free 64-page eBook from http://www.free-energy-devices.com/P26.pdf

Hermann Plauson's Aerial Systems.
Hermann Plauson was granted US Patent 1,540,998 in June 1925. The patent is similar in style to Tesla's pick-up system and it illustrates the principle with a system which is very much like Paul Baumann's "Testatica" device hidden away in a Swiss religious commune. The patent is very detailed with 37 drawings showing different arrangements, and a more simply worded version is shown in full in the Appendix. In fact, the patent reads more like a tutorial rather than a patent.

A system of this type should most definitely be taken seriously: Hermann considers one of his systems with an output of 100 kilowatts as being a "small" system. However, it needs to be understood that each of Hermann's aerials, unlike those of Thomas Henry Moray, contributed less than one kilowatt each, and when Hermann speaks of a 100 kilowatt installation, he is referring to an array of more than one hundred separate aerials.

Hermann illustrates several different methods of energy capture and several methods of increasing the effectiveness of the captured energy. While an installation to capture a continuous supply of 100+ kilowatts is unrealistic for an individual, requiring amny tall aerials, there is the distinct possibility of making a scaled-down version which is capable of providing serious levels of free power. Reading his patent through carefully is definitely to be recommended.
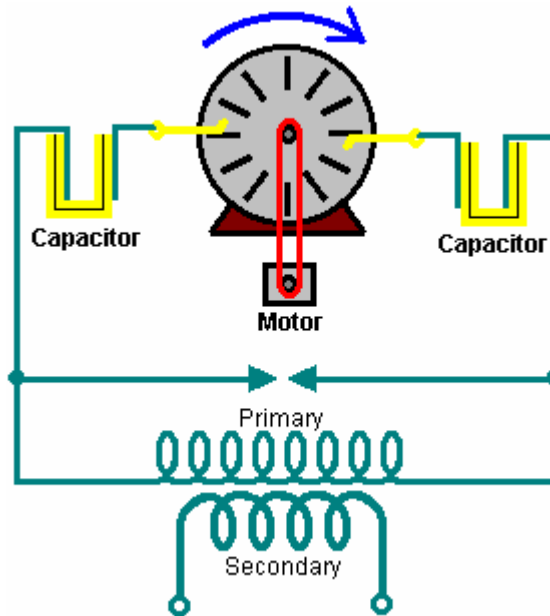
Herman starts by illustrating how working electricity can be taken from a Wimshurst machine. The Wimshurst output voltage is very high and the current capacity is very low and most people would dismiss it out of hand as being totally inadequate for any kind of practical work. However, Hermann boosts the power level by feeding the output into a step-down transformer which lowers the output voltage to a convenient level and raises the available current in proportion to the reduction in voltage. This is the same technique patented by Nikola Tesla. The apparatus which Herman illustrates is shown here:
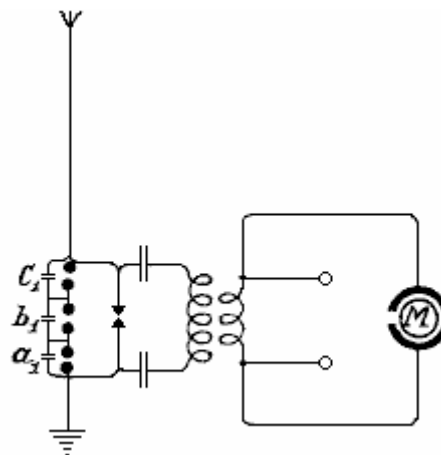
His patent says: "By suitably selecting the ratio between the number of turns in the primary and secondary windings, with regard to a correct application of the coefficients of resonance (capacitance, inductance and resistance) the high voltage of the primary circuit may be suitably converted into a low voltage high current output". It should be remembered that a spark produces a very sharply rising voltage pulse and that unbalances the local quantum energy field, as described earlier, producing very large energy flows as the local environment returns to its balanced steady-state. The spark, which is produced by relatively low power, is used as a trigger for vastly larger energy flows, which feed the step-down transformer, producing serious current at reasonable voltage, capable of doing useful work, without the requirement for any input power from the user.

You will notice how simple this circuit is. Three capacitors "a1", "b1" and "c1" in a chain, form a single high-voltage capacitor. The blobs shown connected across these capacitors are emergency discharge spark gaps put there to deal with unusual events like the aerial being hit by a lightning strike. This circuit is very much like the Wimshurst machine circuit which Hermann uses as an illustration of the principle of operation of these kinds of circuits. In this circuit, he shows a special motor marked "M" which is driven by the circuit and he also shows output terminals which can have other equipment connected across them.

When the oscillatory discharges in the primary circuit become weaker or cease entirely, the capacitors are charged again by the static electricity until the accumulated charge again breaks down across the spark gap. All this is repeated as long as electricity is produced by the static machine through the application of mechanical energy to it. Herman states that without the spark gap arrangement across the three capacitors connected

between the aerial and the earth, "it is impossible to collect and render available large quantities of electrical energy."

In addition to the use of spark gaps in parallel, a second measure of security is also necessary for taking the current from this circuit. This is the introduction of protective electromagnets or choking coils in the aerial circuit as shown by **S** in the diagram below. A single "electromagnet" having a core of the thinnest possible separate laminations is connected with the aerial. In the case of high voltages in the aerial network or at places where there are frequent thunderstorms, several such toroidal-wound coils may be connected in series.
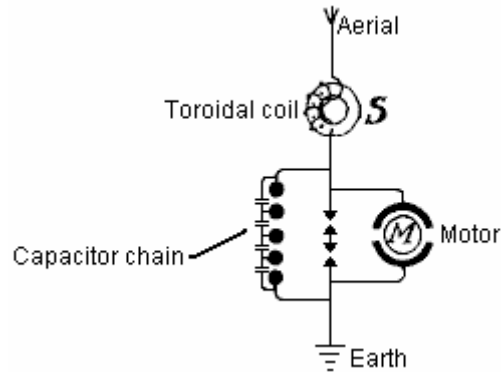
In the case of large units, several such magnets can be employed in parallel or in series parallel. The windings of these electromagnets may be simply connected in series with the aerials. In this case, the windings should be made up from several thin parallel wires, which together, make up the necessary cross-sectional area of wire. The winding may be made of primary and secondary windings in the form of a transformer. The primary winding will then be connected in series with the aerial network, and the secondary winding more or less short-circuited through a regulating resistor or an induction coil. In the latter case it is possible to regulate, to a certain extent, the effect of these choking coils.
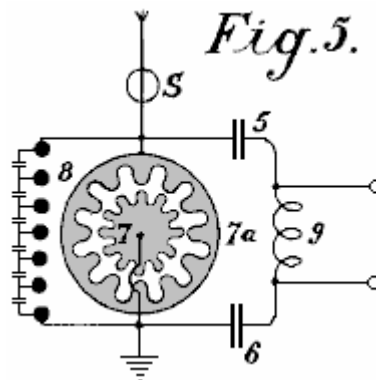

Fig.5 shows an arrangement for producing large currents which can be used directly, without motors, to provide heating and lighting. The main difference here is that the spark gap consists of a star-shaped disc **7** which can rotate on its own axis and is rotated by a motor opposite similarly fitted electrodes **7a**. When separate points of the stars face one another, discharges take place, thus forming an oscillation circuit with capacitors **5** and **6** and inductor **9**. A motor may also be connected directly to the ends of inductor **9**.

The patent continues by showing many ways to increase the power of the aerial system and many ways of applying the output to practical electrical devices. It contains 37 diagrams, a wealth of practical information, and a copy of it is in the Appendix.

Roy Meyer's Aerial Device.
Roy Meyers was granted UK Patent 1913,01098 in January 1914. The patent, which is included in the Appendix, shows an extremely simple device which produces an electrical output without any form of visible input whatsoever. This intriguing device was discovered when testing a very simple form, where two horseshoe magnets were interconnected with soft iron wire and two bars of zinc placed between the legs of the magnets. Roy found that he got an output of 8 volts using just two 4-inch magnets with 1-inch square legs and zinc bars of similar size. The physical orientation of the device is very important. The patent says that current is collected if the open ends of the magnets are pointing in a North - South direction and not if they are positioned in the East -

West direction. However, replication attempts seem to indicate the reverse of this with energy pick-up occurring when the alignment is East-West. Indications are that this is not an easy device to get operating correctly.

The first arrangement is shown in the following diagram:
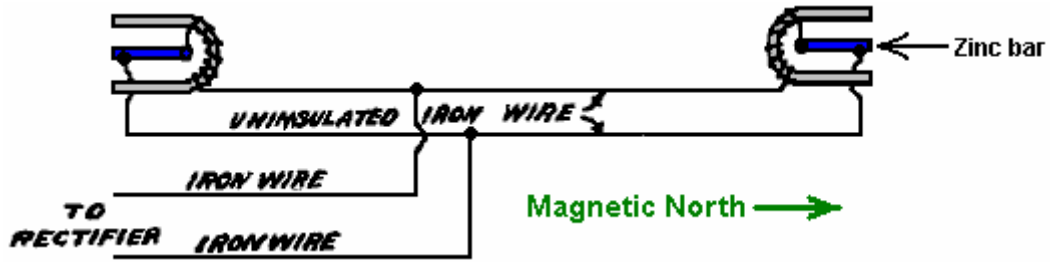
Roy developed his system further and found that while it works indoors, it does perform better if located outdoors and raised to a height of fifty or sixty feet. However, that is by no means essential, and the output power and voltage can be increased by increasing the number of collector units. Roy developed these to produce the style shown here:
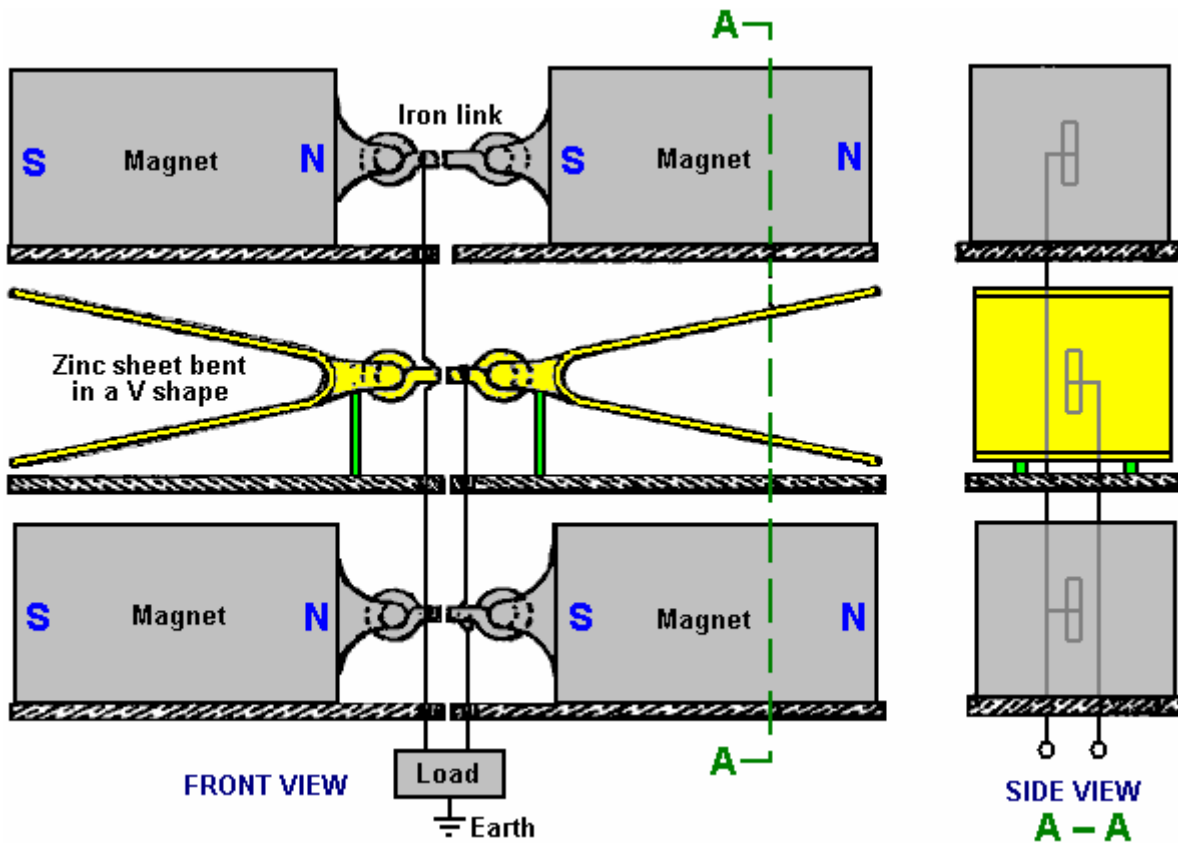
The zinc acts more effectively if installed as sheets bent into a V shape. The magnets and zinc sheets can be stacked vertically and/or horizontally and the greater the number used, the greater the electrical output. A good earth connection is recommended and presumably, the average cold water pipe of any house provides a more than adequate earth connection which is convenient to use, provided the pipework is made of metal.

The Aerial System of Raymond Phillips Senior.
Presents an interesting patent US 4,685,047 of 4th August 1987, entitled "Apparatus for Converting Radio Frequency Energy to Direct Current". While this patent speaks of radio-frequency energy, I can see no particular reason why that would be the only energy which could be picked up by this circuitry. The patent information is as follows:

Abstract:

This patent describes an apparatus and methods for converting radio frequency energy into direct current for generating electric power. It includes a dipolar antenna for receiving radio frequency energy and a circuit for converting the radio frequency energy to direct current. The circuit has a positive output line connected to one pole of the antenna and a negative output line connected to the other pole of the antenna. A positive transmitting diode is in the positive output line and a negative transmitting diode is in the negative output line. First and second bus lines and a pair of tuned circuits of opposite polarity couple the positive output line and negative line to the bus line with one of the bus lines being connected to ground. Each tuned circuit includes a first bridging line connecting the positive output line to the first and second ground lines and a second bridging line connecting the negative output line to the first and second ground lines. Each bridging line has in it, a diode connected with a polarity which is reversed with respect to the input diode. The bridging lines of each tuned circuit are connected to one another by an inductor and have capacitors placed between the diode and the bus lines. A Direct Current device is connected to the positive line of the circuit.

Background of the Invention:

This invention shows an apparatus for converting radio frequency energy to Direct Current of sufficient magnitude to power devices such as battery chargers and electric motors without the use of amplification.

There has long been interest in technology directed to transmitting electrical energy over a distance without using wires. Development of such a technology has enormous potential. This was first recognized by Nikola Tesla who in 1899 constructed a 200 foot Tesla coil rated at 300 kilowatts at 150 kilocycles. Tesla hoped to set up standing waves of electrical energy around the whole surface of the earth, so that receiving antennas set at optimum points could tap the power when needed. Tesla was able to light hundreds of lamps at a distance of about 40 kilometers with his device without using wires. The scheme has generally remained a scientific curiosity but has provided the initial groundwork for current developments wherein attempts are being made to transmit power using microwaves. However, power transmitted by microwaves is envisioned in the form of a beam of very high intensity which is focused from a microwave generator to a receiving antenna. This technology is envisioned as being used for many types of purposes, however, the focused microwave beam is not suitable for many applications because the beam must be directed toward a receiving antenna and cannot be transmitted through most objects, including living objects, without destroying those objects.

This invention relies on converting energy from standing waves which are emitted from radio frequency antennas in the RF range rather than the microwave range. Of particular interest are very low frequencies which are not used in communications and are available for transmitting power. Also of interest are the low frequency waves emitted by the earth due to pulsing of its magnetic field. These low frequency standing "earth" waves can be picked up by receivers tuned to them.

Summary of the Invention:

This invention shows an RF antenna for receiving radio waves. The RF antenna connected to a circuit configured to convert the RF signals to Direct Current. The radio frequency signals received by the antenna are transmitted to two leads, one being rectified to produce positive voltage and the other rectified to produce negative voltage. The positive voltage lead is connected directly to a positive output line and the negative voltage lead is connected directly to a negative output line. The positive output line is connected to a pair of bus lines through a first pair of capacitors, while the negative output line is connected to the pair of bus lines by a second pair of capacitors. Placed between the first bus line and the positive output line is a reverse diode of negative polarity, while placed between the negative output line and first bus line is a reverse diode of positive polarity. The positive and negative output lines are connected to one another through an inductor which is in parallel with the capacitors of the first and second pair connected between the second bus line and the positive and negative output lines.
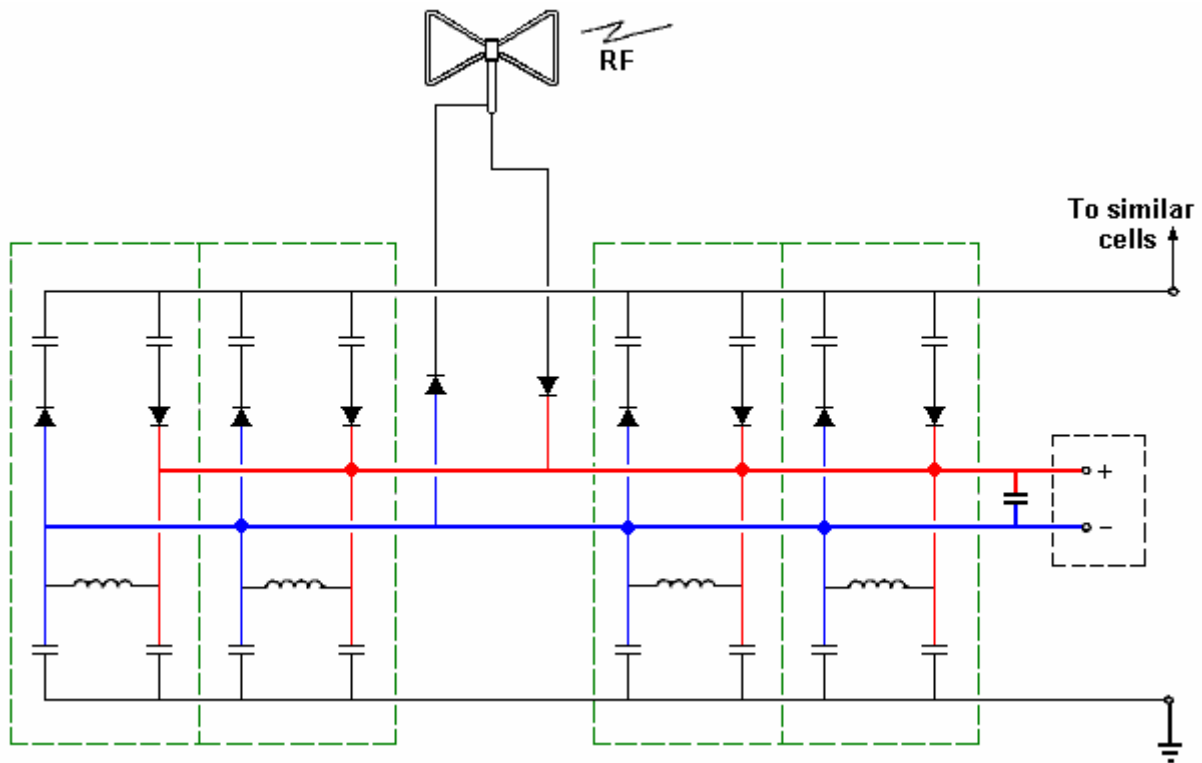
In one implementation of the invention this circuit is duplicated for each positive and negative output line. In another the circuit is coupled to additional identical circuits in order to increase the direct current output of the arrangement. In another implementation, the antenna used is a dipolar antenna of aluminium wire arranged in a "butterfly" configuration.

This invention uses these elements to generate direct current of sufficient power to perform tasks such as charging batteries, lighting lamps and powering direct current electric motors without the use of amplifiers.

Brief description of the drawing:

The reference characters used show the same or similar parts in each views, and what is shown is a diagram of a circuit, a driven device and a dipolar antenna which receives radio frequency waves which are then converted to DC current for powering the driven device.

Description of the preferred embodiment:

Referring now to the drawing below, there is shown a dipolar antenna, designated generally by the numeral **10**, which receives radio frequency waves from an RF transmitter.
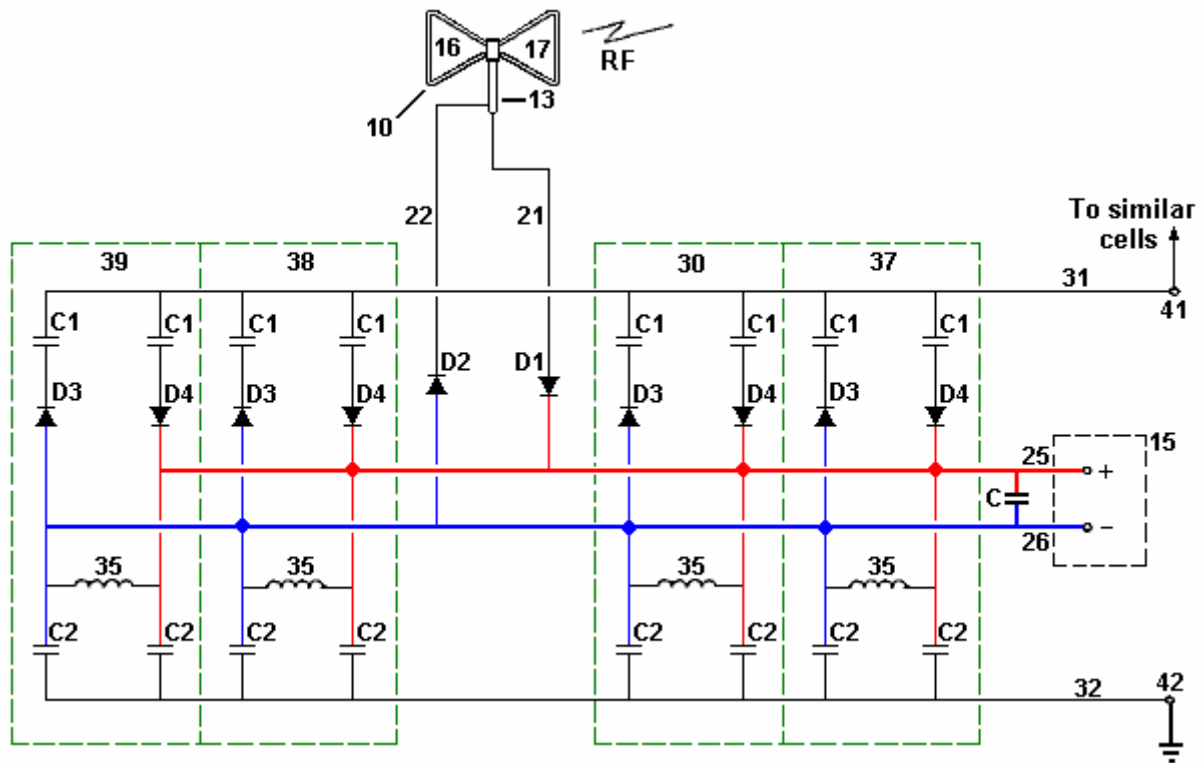
These waves are passed to the conversion circuit through a coaxial cable **13** and the DC output current of the circuit is used to power an output device **15**, which may be, for example, a battery charger, DC motor, or lighting device. The circuit has no other power inputs and so has no amplifiers for boosting the RF energy.

The source of frequencies which can be converted to Direct Current by the circuit shown may include sources of high frequency (HF), low frequency (LF), very low frequency (VLF) and extremely low frequency (ELF) radio waves as well as seismic vibration of the earth's magnetic fields.

Preferably, the dipolar antenna **10** is formed of two triangular loops of aluminium wire **16** and **17**, one of which is connected to the annular conductor **21** of the coaxial cable **13** and the other of which is connected to the centre conductor **22** of the coaxial cable. The size of the bipolar antenna **10** is dependent on the particular application to which it is put. In one embodiment of the invention, the antenna **10** is approximately **12** inches in width and **18** inches in length. Such an antenna is used to receive five watt energy, such as that generated by a walkie-talkie or citizen-band radio.

The outer conductor of the aerial is connected to positive lead **21** and the centre conductor of the coaxial cable is connected to the negative lead **22** of the circuit. A positive transmitting diode **D1** is placed between the lead **21** and the positive output line **25**.   A negative transmitting diode **D2** is placed between the lead **22** and the negative output line **26**.

In order to provide a DC output of sufficient power, a number of inductance-capacitance RF tuned circuits **30**, each forming a positive cell, or a negative cell, are used to connect the positive output line **25** and negative output line **26** to the first and second bus lines **31** and **32**, respectively. Bus line **32** is connected to ground while bus line **31** can be connected to similar circuits. Inductor **35** serves as a radio frequency choke. As is seen of the drawing, the RF tuned circuit cell 30 is repeated a plurality of times. In the specific example shown, the circuit has separate cells **30, 37, 38** and **39**. The cells **30** and **38** are of opposite polarity and balance one another, while the cells **37** and **39** are of opposite polarity and also balance one another. In order for the system to function, a pair of opposite polarised cells must be used. The particular number of cells **30** and the value of the components in it, are determined by the configuration of the dipole antenna **10** and the power and frequency of the RF transmitter.

This radio frequency to direct current conversion circuit may itself be connected to a duplicate circuit via pin **41** so as to provide additional direct current output on lines similar to positive output line **25** and negative output line **26** the output lines may be connected together in order to boost the total output of the system.

An operative embodiment of the invention uses the following elements:

Diodes: D1, D2, D3 and D4 - Germanium Diodes, type **1N34A**,
Inductors: **35-47 millihenry** R. F. Choke
Capacitors: C1 and C2 - **0.47 Pico Farad**s at 200 volts
Coaxial Cable: 13 - 50 ohms
Dipolar Antenna: aluminium wire triangular loops approximately 12 inches by 18 inches.

From the foregoing description, one skilled in the art can easily ascertain the essential characteristics of this invention, and without departing from the spirit and scope of it, can make various changes and modifications of the invention to adapt it to various uses and conditions.

The "Alexkor" Aerial System.

'Alexkor' who provided some of the charging circuits shown in chapter 6, also uses an aerial system for charging batteries in the 1.5V to 6V range. It is a simple system which uses an aerial of the type used by Thomas Henry Moray, that is, the bulk of the aerial is horizontal:
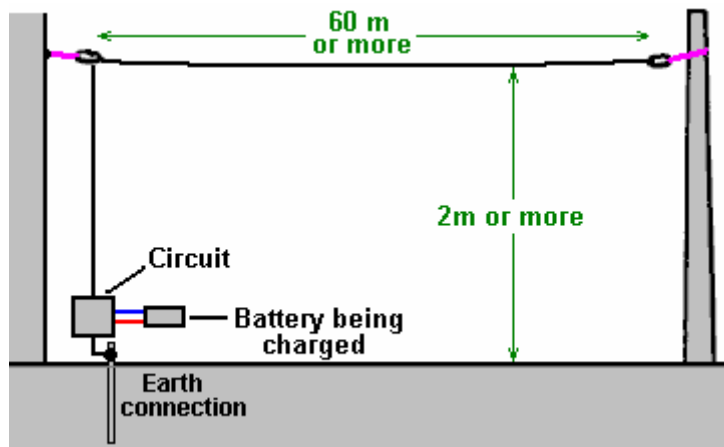
The suggestion is that the aerial is suspended between the eaves of a house and a nearby tree, but I don't know anybody who would be able to do that. The longer the aerial or the greater the number of aerials connected, the greater the charging power available. The aerial wire should be not less than 0.5 mm in diameter and it needs to be insulated from it's supports – plastic cord can be used for that.

The circuit used is:
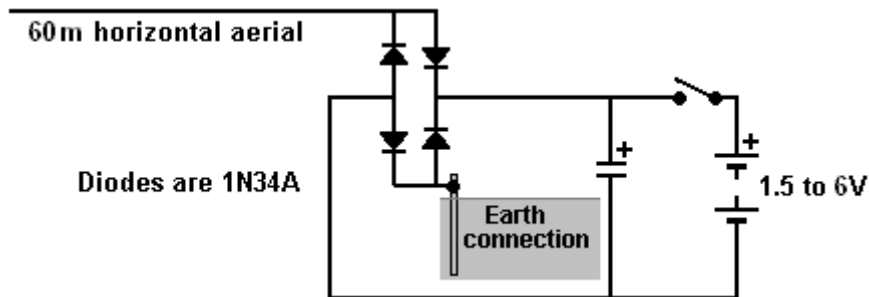
A more powerful version of the circuit is:
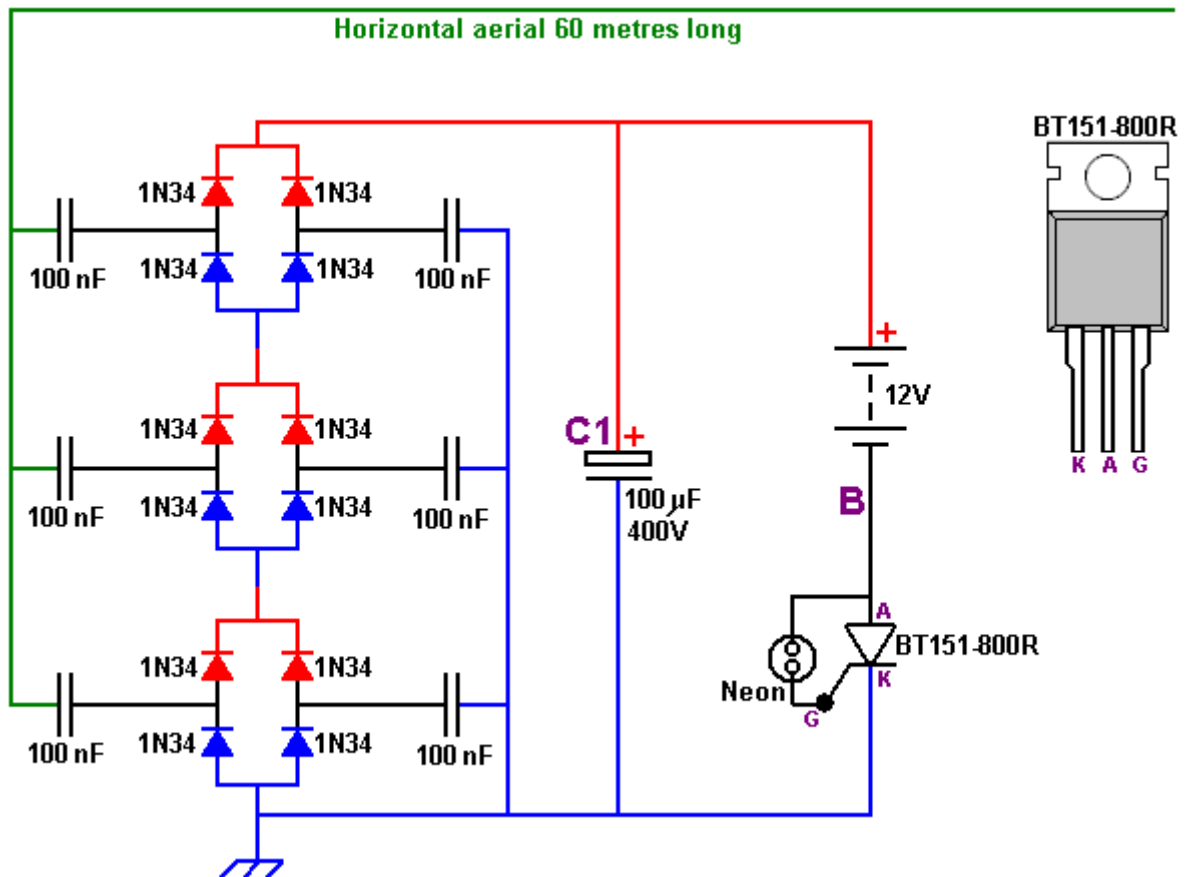
Here, there are three sets of diodes placed between the aerial and the earth. Let me stress again that the earth connection is a thick copper wire connected to a long rod or pipe driven into the ground or a large metal plate buried in dampened ground.

As the circuit operates, the three sets of diodes with their isolation capacitors, build up an increasing voltage on capacitor "C1". The voltage at point "B" will also increase and be about twelve volts less than the voltage on capacitor "C1". Eventually, that voltage will rise high enough to cause a discharge through the tiny neon tube and that current pulse flows through the Gate connection "G" of the thyristor, switching it on. Once switched on, the thyristor stays on until capacitor "C1" has been discharged, after which, the thyristor switches off and the process starts all over again. The amount of power in these pulses is considerable and the thyristor gets quite warm when the circuit is running. The BT151-800R thyristor can handle as much as 800 volts and pass 7.5 amps of current continuously.

An important point to note is that the power available from this circuit increases with additional aerials. With two aerials connected, the power is doubled and with three aerials the power is tripled. That is, each additional aerial provides as much power as the first aerial did and there does not appear to be any limit to the number of aerials which can be connected.


The TREC

There is a powerful aerial system which has been developed by Lawrence Rayburn of Canada. Initially, Lawrence intended to market kits to make it easy for people to replicate his aerial design which was providing him with ten kilowatts of power. However, Lawrence shelved that idea as he decided that the risk to users was just too high. He was also concerned that the aerial/earth combination might attract lightning strikes, causing considerable local damage. So, it is VERY important that you understand that this is a dangerous and potentially LETHAL aerial system which is quite capable of killing you if you are careless. If you are not already experienced in working with high-voltage/high-current devices, then this is NOT something for you to experiment with, and anyone who does fool around with this design does so wholly at his own risk as this material is presented "for

information purposes only" and there is **no** recommendation whatsoever that you should actually construct one of these aerial systems.

The technique used is quite different from the other aerial systems mentioned earlier in this chapter. Here, the objective is to create a tuned, resonant cavity reaching up to the ionosphere where there is a massive amount of excess energy supplied by the sun.

The tuning mechanism consists of two spirals of 3/4-inch (20 mm) copper pipe wound so that they cover a four foot (1220 mm) diameter area. These spirals are covered above and below with a sheet of Lexan plastic. The diameter of the copper pipe is important and smaller diameter should not be used even though it would be much easier to bend into shape. Actually, bending the large-diameter copper pipe is unlikely to be an easy task. Presumably, a pipe-bending machine would be used and a conical spiral produced and then the cone flattened to form the flat spiral. The spiral has even spaces between the turns, at all points along it's length.
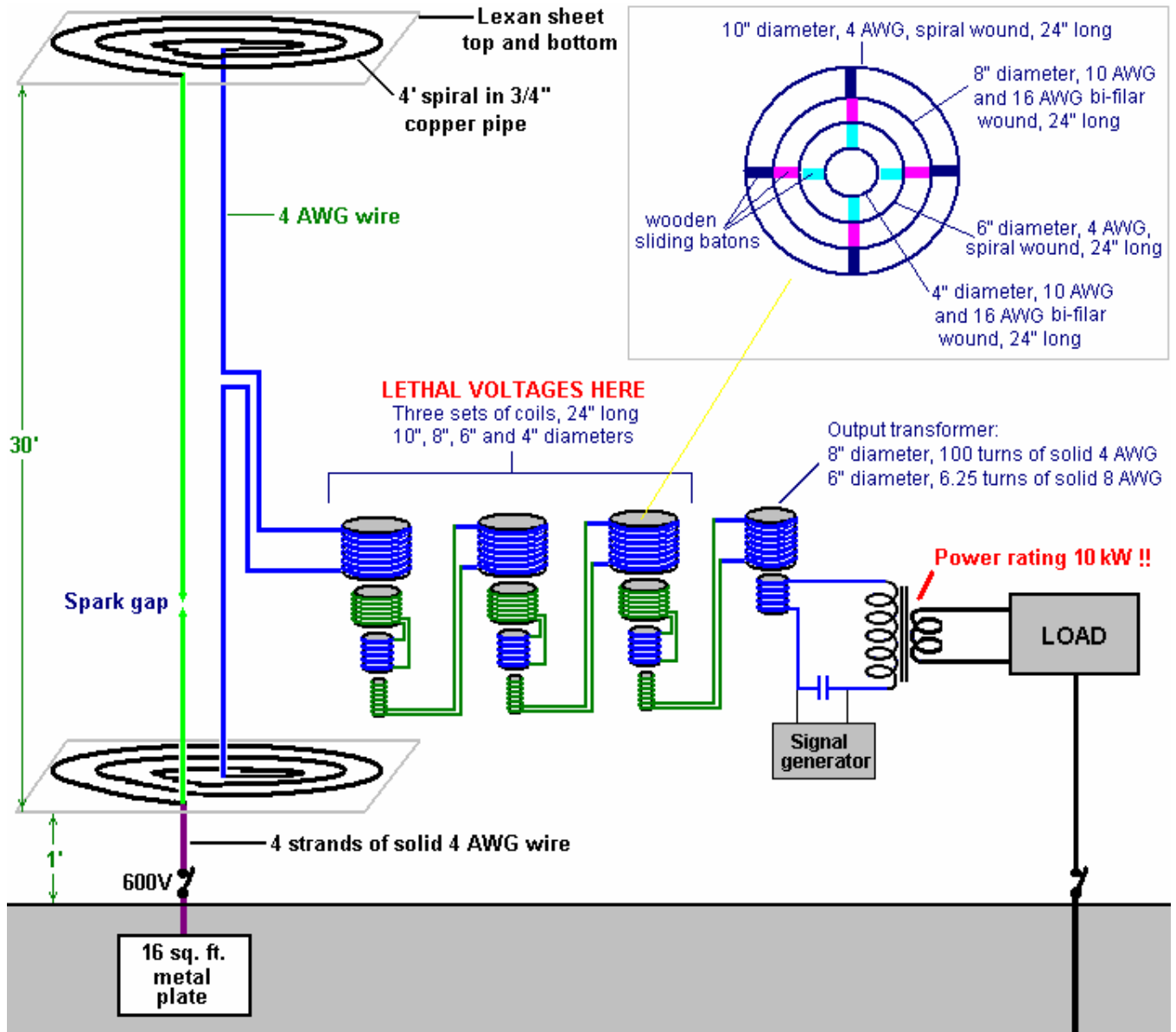
The two spirals are mounted, one vertically above the other with thirty feet (9145 mm) between them and the lower spiral being one foot (305 mm) above the ground. This means that this aerial system is only suited to people who can erect a structure of this height without inconveniencing neighbours or contravening local planning regulations.

The tuneable cavity is created by connecting the innermost ends of the two spirals together using 4 AWG wire which has a 5.19 mm diameter copper core. The outer end of the lower spiral is then connected to a large ground plate buried two feet (600 mm) below the surface of the ground, with four separate strands of the 4 AWG wire.

An adjustable spark gap is used. It can be positioned in the vertical wire between the two spirals, or in the middle of an extra 4 AWG wire run vertically between the outer ends of the two spirals. The power take-off is from the middle of the central vertical wire.

The cavity is tuned by sliding coils inside each other. This arrangement not only tunes the cavity but it also steps down the very high aerial voltage and raises the available current at the same time. This is where the danger comes in. The intermediate parts of this step-down tuning arrangement can have voltages of 600 volts at high current, and those voltages can easily kill you, which is why this is NOT a system for beginners and why Lawrence did not go ahead with selling kits for this aerial system.

The aerial output is fed into a final step-down transformer and a 50 Hz (cycles per second) or 60Hz signal from a signal generator is used to modulate the incoming power and allow it to be used with normal mains equipment which may need that frequency of AC. Resistive heaters and lights don't need AC or care about the frequency of any AC which they are fed.

The tuning of the system is very sharp and whatever is being used as the load affects the tuning. The wire used for the tuning array is insulated, single solid-core copper wire. 4 AWG has a core diameter of 5.19 mm, 8 AWG has a core diameter of 3.26 mm, 10 AWG has a core diameter of 2.59 mm and 16 AWG has a core diameter of 1.29 mm. Page 1 of the Appendix shows other characteristics for these wires. These heavy wires are an essential part of this design.

You will notice that two separate earth connections are needed for this aerial system. The second earth connection should be a long copper rod driven deep into the ground and some distance away from the buried plate earth. For the separation of two earth connections, ten metres (eleven yards) is generally considered to be a reasonable distance between them. The main earth is a 4-foot x 4-foot plate buried exactly under the lower spiral and the connection runs to the centre of that plate.

It is suggested that the spark-gap be constructed using copper-clad carbon welding rods, mounted in a nylon housing which allows the gap to be adjusted with a **nylon** screw. Remember that this is not a connection which you can disconnect from the power supply when making connections or adjustments. Also, on one occasion when a 500-watt light bulb was connected across the spark gap, it burned out instantly with a bright flash of light. This system is not a toy so thick rubber gloves and rubber footwear should be used.

The 4 AWG copper wires can be connected to the copper rods forming the spark electrodes, using copper pipe clamps. A tapered nylon rod could be used to adjust the spark gap screw while keeping well away from the copper. The spark gap should start at a one-inch (25 mm) gap and adjusted to no less than a half-inch gap. The spark gap and it's adjusting gear should be enclosed in a weather-proofing container and it has been suggested that it could be and advantage to fill that container with helium gas.

Please remember that coils, such as those in the tuning section of this system, have capacitance as well as inductance. The coil insulation is a dielectric and you standing on the ground form a good earth connection, so please don't imagine that you can't get a serious shock from handling an insulated coil carrying high-voltage high-frequency AC current, and in one implementation after modulation in the mixer at 60 hertz the pre-output transformer was measured at 3496 volts!

If you are not experienced in working with high-voltage circuitry, and still decide to try building and using this circuit, then please put your affairs in order and pre-pay your funeral expenses before you start building. (That statement is not intended to be humorous).

It is said that if the upper spiral is positioned at a height of just four feet (1200 mm) then the output is much lower and suited to charging a battery bank. As far as I am aware, this system has not been replicated and so there has been no practical feedback on building or using it.

The TREC appears to be not unlike the Patent Application US 2008/0191580 from Harold Deyo:

Harmonic Energy Exchange Device

Patent application US 2008/0191580   **Inventor: Harold Stanley Deyo**   **14th August 2008**


ABSTRACT

This invention converts inertial impulses into electric currents. Specifically, it converts impulses created by the impacts of high-energy particles from the Sun and other cosmic sources into the Earth's Magnetosphere and the varying D, E, F1 and F2 layers of its Ionosphere to controlled electric currents. This invention presents a new method of utilising energy from the Sun and other sources of high energy articles as a virtually, inexhaustible, alternative-energy source for the world.

BACKGROUND OF THE INVENTION

This invention relates to the conversion of impact energies created by the collision of high-speed cosmic particles and electromagnetic radiations with "Earth's Outer Layers" to produce inertial waves in the dielectric Troposphere which are subsequently converted into electricity by this invention.

The term "Earth's Outer Layers" refers to: Earth's Magnetosphere, Van Allen Belts, Ionosphere, Mesosphere, and Stratosphere as illustrated in Fig.2:

FIGURE 2
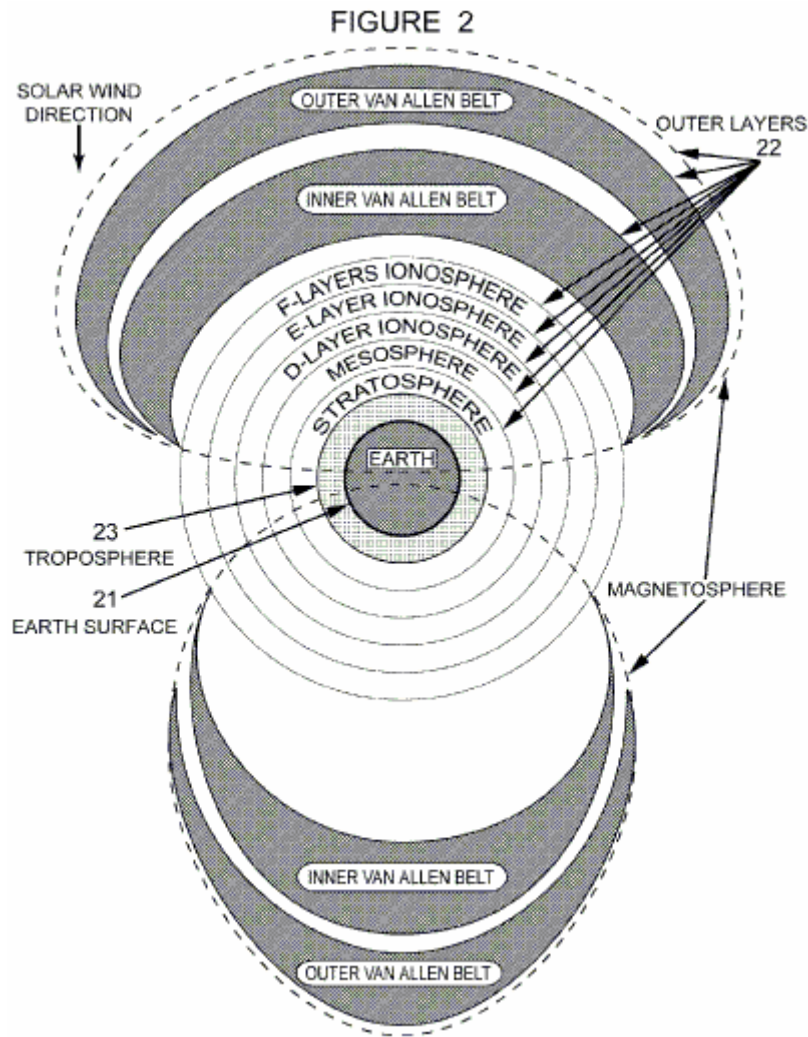
DESCRIPTION OF THE PRIOR ART

One day while reading an old scientific magazine I saw a small article on the research of Dr. John Trump of MIT (the basis for an electrostatic generator patented later by Onezime P. Breaux in U.S. Pat. No. 4,127,804). The article talked about a series of experiments which Dr. Trump had performed with a 2-plate, capacitor in a vacuum dielectric. Briefly, he discovered that by varying the distance between the two plates one could produce current flows in one direction or the other between either of the plates and ground.

The Solar Wind strikes "Earth's Outer Layers" constantly as do many other cosmic particles. At any given instant of time, the vector product of these impacts produces either a net pressure increase or decrease in the Troposphere. This creates random waves of pressure in the "Earth's Outer Layers" as one charged "plate" moves in relation to the oppositely-charged Earth's surface as the other "plate". This variation of pressure in the "Earth's Outer Layers" is equivalent to moving an outer "plate" back and forth toward the Troposphere and the Earth's surface as the inner "plate" - thus giving rise to variations in voltage on both "plates". In this case the Troposphere (see Fig.2) acts as the dielectric medium instead of the vacuum in the Trump experiments. Furthermore, the

Troposphere, itself, is also compressed and decompressed by these random waves of pressure on the "Earth's Outer Layers". Thus, I reasoned that if one could create a charged envelope or field of sufficient voltage within the Troposphere, one could convert these random pressure waves in the dielectric Troposphere into current flow on the Earth's surface.

As "Earth's Outer Layers" surround the planet, any impact waves propagate throughout all of them when they are present - even to the night-time side of the planet. Thus, I also reasoned that one could extract power from these impacts anywhere on Earth's surface or in it's atmosphere whether it be day or night. The pressure waves on the dark side of Earth would be less energetic than those occurring on the day-time side, because the night-time layers of the Ionosphere are compressed so much that the D-Layer of the Ionosphere disappears at night and the F1 and F2-Layers of the Ionosphere combine into one F-Layer. I calculated that the available energy from these impact waves would be significantly less by 30-45% depending upon one's location on the night side of the planet in respect to the terminator.

Many years ago, around 1900, Dr Nikola Tesla built and tested a device to extract energy from the Sun using an apparatus which forms part of my own invention (see U.S. Pat. Nos. 685,957 an 685,958 dated 5 Nov. 1901).

Subsequently, Dr. Thomas Henry Moray, another inventor and student of these Tesla patents made a device which apparently accessed the same source of energy but with a method different than my own. As Dr. Moray was never granted a patent for his device I cannot be certain that his work is considered prior art but I list it here as part of my due diligence. Apparently, he had trouble explaining to the patent reviewer, the source of energy which his device was converting, and thus, was not granted a patent for his impressive work. Dr. Moray's public disclosure of certain aspects of his invention are public knowledge through his published lectures and his book, "The Sea of Energy in Which the Earth Floats' - published in 1931.

Since the beginning of the 20th century, mankind has been looking for new sources of electric power to feed the ever-increasing energy demands of the human population. In the last half of the 19th century, coal, whale oil, human and animal labour, moving water, wind and wood were the main sources of energy. However, in the first quarter of the 20th century, mankind began to use more electricity produced by hydroelectric generators and generators producing electricity by combustion of hydrocarbon fuels. With increasing use of petrol engines and the increasing use of electrical appliances the demand for electricity accelerated the addition of heat and greenhouse gasses into the Earth's ecosystem.

In the last half of the 20th century, many forward-thinking individuals began looking for alternative energy sources to reduce the emissions of greenhouse gasses. All of the alternative energy systems investigated and/or developed in the last 56 years have had significant drawbacks to their usage as the main energy supply for the needs of humanity.

Some of those alternative energy systems were nowhere near as efficient as the existing systems. Some of the alternative energy systems still introduced extra heat into the environment like the existing fossil fuel and nuclear energy systems. And others produced even more greenhouse gasses than the existing energy systems. Some of the new systems used food resources to produce combustible fuels which, consequently, reduced the food resources of the planet. Among the leaders in the new energy sources was, and is, nuclear energy which produces extra heat, toxic wastes and materials which can be used in nuclear weapons. Hydroelectric energy sources do not add heat to the ecosystem but they are not an inexhaustible resource as they depend upon rainfall which is diminishing as global warming increases. Wind energy resources do not add heat to the ecosystem but they are not constant and require expensive conversion and storage equipment.

The ideal energy source for mankind will not add heat to the planet's ecosystem, will not produce by-product green house gasses; will not deplete our food and water resources; will not produce toxic wastes; however, it will be portable, self-replenishing and constantly available in real time anywhere on Earth and in useful quantities.

Our major source of natural energy on Earth is the Sun. Energy from the Sun enters the Earth's ecosphere by particle bombardment, radiated electromagnetic energy, gravitational variations and magnetic processes. Mankind has developed various methods of capturing energy from the Sun already. Silicon-based solar cells convert light in a narrow bandwidth into electron flows. These cells are, at most, only 50% efficient and only work when the Sun is shining on them at an optimum angle. Wind turbines only work when there is wind to power them and are, for the most part, not portable. Devices to convert wave action in the oceans only work when there are waves created by the wind and tidal effects caused by gravitational variations; and they are not portable enough to be used in common transportation devices.

I concluded therefore, that if mankind could find an inexpensive method of obtaining electricity from the Sun in some form which worked both day and night and which was already flowing into the Earth's ecosystem, we might be able to develop a clean and self-replenishing energy source which would add no extra heat to our ecosystem, would not alter our planetary albedo and might well be made in a portable form.

SUMMARY OF THE INVENTION

The Harmonic Energy Exchange Device (or "HEED") offers an interim solution to Earth's fossil fuel resources. It utilises a previously untapped energy resource which exists throughout the known Universe. By the very nature of the invention, it only interrupts the flow of energy from the Sun and all the other cosmic sources of high-energy particles on their normal journey to the Earth by way of The Outer Layers.

The invention does not add energy to the normal thermodynamic equilibrium of the planet and its associated outer layers. The invention does not produce wastes - toxic or otherwise. It does not produce harmful gasses; and in some embodiments it could even assist in the rebuilding of our thinning ozone shield. Use of this invention will eventually remove mankind's dependence on fossil fuels and create new occupations. It will be cheap enough that homeowners will be able to install their own HEED and sell back energy to the grid until such time as every home has their own HEED and civilization has completely weaned itself from the use of fossil fuels and nuclear energy in its current form.

BRIEF DESCRIPTION OF DRAWINGS

FIGURE 1
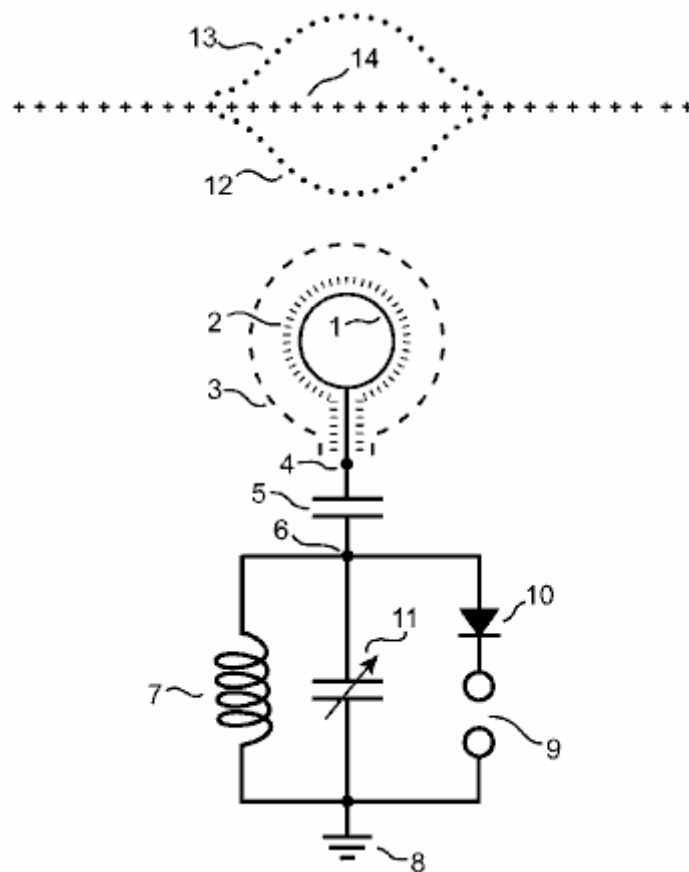
Fig.1: Is the preferred embodiment of the circuit diagram of my invention incorporating references to external stimuli which are used to activate the circuit. It represents a parallel tuned circuit to store the energy.

FIGURE 2
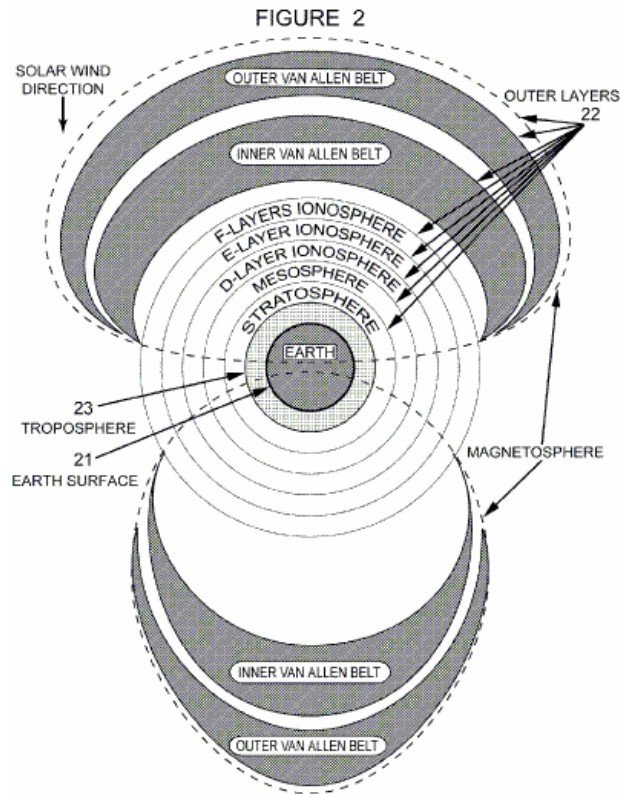
Fig.2: Is an illustration of the Earth and it immediate environment as a global capacitor where The Outer Layers form one plate and the Earth's surface form the other plate and both are separated by the Troposphere as a dielectric medium.
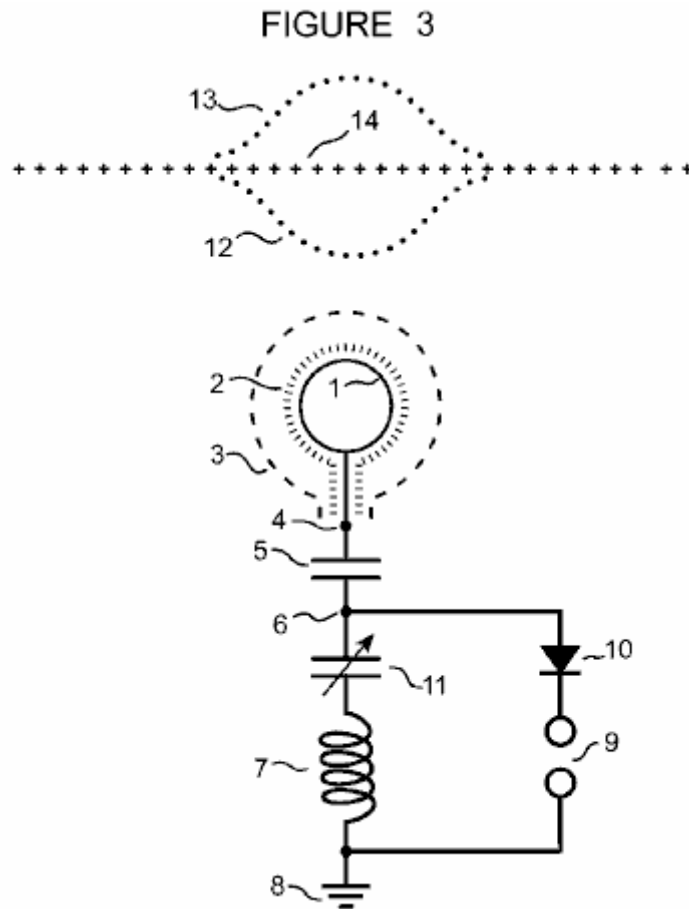

FIGURE 3

Fig.3: Is an alternative embodiment of the circuit diagram of my invention incorporating references to external stimuli which are used to activate the circuit. It represents the use of a series tuned circuit to store the energy.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

Be it known that I, Harold Stanley Deyo, Jr, a citizen of both The United States of America and The Commonwealth of Australia, residing in the community of Pueblo West in Pueblo County, Colorado have invented a Harmonic Energy Exchange Device which converts dynamic pressures in the ambient media around Earth into controlled electric currents.

FIGURE 1
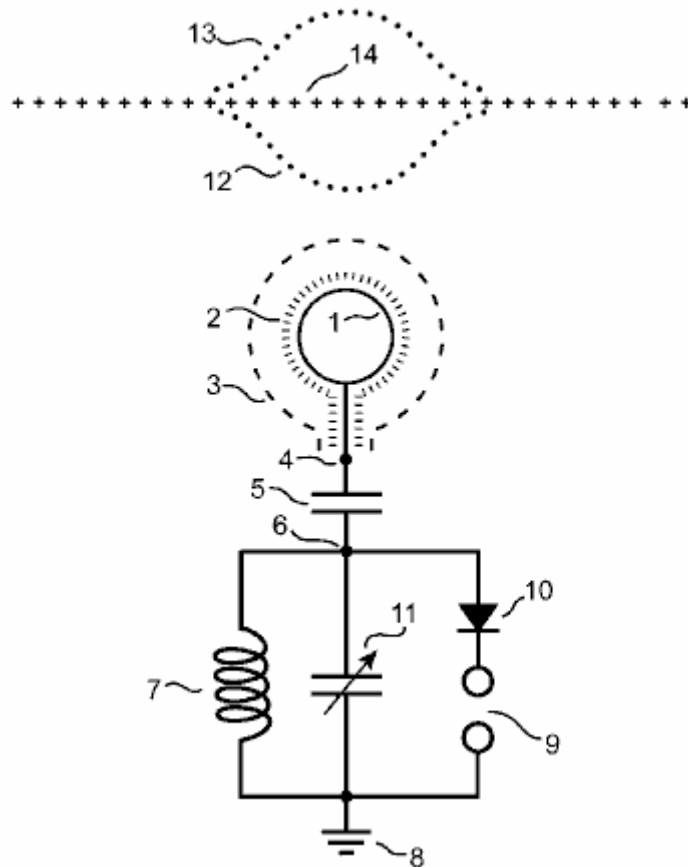
This invention as represented in **Fig.1** is unique in that it is designed to extract electricity from random pressure waves propagated in the Troposphere **14** by impacts of the solar wind and other cosmic particles with the Earth's "The Outer Layers" **22** of **Fig. 2**.

In **Fig.1**, the Troposphere **14** in its rest state is represented by the line of "+" marks **14**. The convergent or compression state **12** of the random waves in the Troposphere **14** is represented by the lower line of dots while the divergent or decompression state **13** of the random waves in the Troposphere **14** is represented by the upper line of dots. The preferred embodiment of my invention **Fig.1** is a method of coupling a parallel, resonant, electrical circuit to these random pressure waves to extract electricity from them.

As Dr John Trump's research and Onezime P. Breaux's U.S. Pat. No. 4,127,804 show, when one plate of a charged capacitor is moved closer to or farther from the other plate of that capacitor a voltage change appears on both plates of that capacitor. Furthermore, the electric field gradient between those plates changes as the plates are moved in this manner. Thus they have described a method of converting mechanical energy into electrical current by simply varying the plate spacing over time which can be expressed as ds/dt where "ds" is the change in spacing and "dt" is the change in time.

As illustrated in **Fig.2**, The Outer Layers can be viewed as one plate of a capacitor comprised of the Earth's surface itself as one plate **21** and Earth's outer layers as the other plate **22** where the Earth's Troposphere **23** serves as the dielectric medium separating the two plates. There is a charge between these plates which varies extremely rapidly but not with a constant period. At any given instant, the vector product of all the impacts by the cosmic particles with The Outer Layers **22** will create a pressure wave in The Outer Layers **22** which will manifest in the Troposphere **23**. Whatever that vector product is, it will alter the field gradient in the dielectric Troposphere **23**. That alteration will either increase or decrease the effective spacing between "plates" **22** and **23**.

In order to capture and convert the resulting voltage variations produced at or near the Earth's surface **21** of **Fig.2**, this invention creates its own, localised stress field **3** of **Fig.1** established in the Troposphere **23** of **Fig.2** with a charged, conductive surface **1** of **Fig.1** which is encased in high-voltage insulation **2** of **Fig.1** and extending into the Troposphere **23** of **Fig.2**.

In **Fig.1**, a series of high-voltage, starting pulses is applied across points **4** and **6** on opposite sides of a capacitor **5** to create the localised stress field **3**. As these high-voltage starting pulses are applied, the parallel resonant circuit formed by inductor coil **7** and variable capacitor **11** both referenced to ground **8** is stimulated into resonance within the bandwidth determined by the values of these circuit components. Tuning of this circuit is effected through variable capacitor **11**. The high voltage charge on conductive surface **1** of **Fig.1** is maintained by the parallel tuned circuit formed by inductor coil **7** and variable capacitor **11**.

Then as the random, pressure waves propagate throughout the Troposphere **23** of **Fig.2**, the localised stress field **3** of **Fig.1** is oscillated by the compression wave front **12** and the decompression wave front **13** (both in **Fig.1**) which creates voltage changes on capacitor **5**.

In **Fig.1**, the resulting voltages changes on capacitor **5** will add energy to the parallel resonant circuit formed by inductor coil **7** and variable capacitor **11** which acts as a tank circuit to store the energy which has been passed to it. As energy builds in the parallel circuit the voltage of the circuit rises until a spark discharge occurs across the gap **9** also referenced to ground **8**. The current will only discharge in one direction as determined by diode **10**. The circuit will work without diode **10** but a diode is used here as one method to keep from draining all the energy from the tank circuit when a discharge occurs.

This resonant circuit can be tuned to various bandwidths to maximise the efficiency of the conversion process depending upon the location of the device, the time of day, temperature variations, relative humidity and other variables in the ambient Troposphere **23** of **Fig.2** around the conductive surface **1** of **Fig.1**. A resistive load to extract power from the resonant circuit can be used instead of the spark gap **9** of **Fig.1**.

This preferred embodiment uses a parallel, tuned circuit to access a wide range of frequencies usually to be found in the range of 4.5 to 7 MHz. This range encompasses the major, naturally-occurring, resonant frequencies found in the ionosphere.
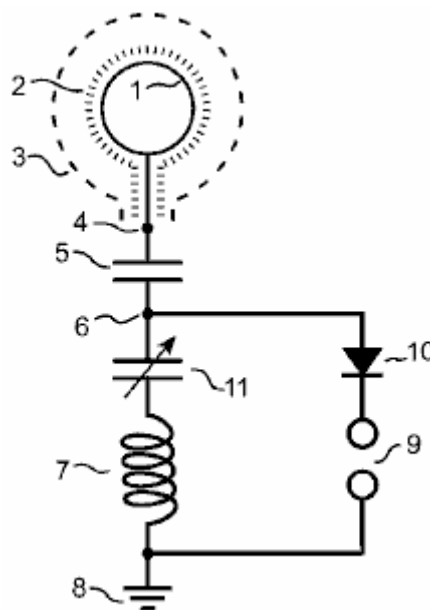
A second embodiment of this invention as shown in **Fig.3** replaces the parallel tuned circuit formed by inductor coil **7** and variable capacitor **11** in **Fig.1** placed in parallel to each other and referenced to ground **8**. This second embodiment forms a series-tuned circuit formed by inductor coil **7** and variable capacitor **11** in **Fig.3** placed in series to each other and referenced to ground **8**. It differs from the preferred embodiment only in the placement of variable capacitor **11** so that it is in series with coil **7**.

This embodiment limits the frequency range and, hence, the energy which the system will store when compared to the preferred embodiment. It produces higher voltages across the spark gap **9** than those produced in the preferred embodiment across the spark gap **9** of **Fig.1**.

*****

What is said in this patent application adds some interesting factors to the TREC design of Lawrence Rayburn which pre-dates the Deyo patent by some years. His comment about replacing the spark gap with a resistive load suggests some alternative arrangements which might be tried out with the TREC system.

Also, somewhat along the same lines:

Translated from a Spanish-language original:

Many people think that it is not possible get power from the Earth magnetic field because that field intensity is too low and so the energy levels aren't high enough for any form of useful application. this is not the case. I have built many coils and I get many kilowatts for useful purposes from Earth's magnetic field and here I present the basic concept and some formulas fundamental to all of this.

The influence of the Earth's magnetic field should not be ignored. In times of strong sun activity, the Earth's magnetic field oscillates and in any long power transmission line there are voltage surges and over-voltages which can cause technical troubles, breakdowns and stoppages of the electrical sources. The Faraday law for that induction is given for the following:

V = **2** x **pi** x **f** x **B** x **A**

Where:

> **B** is the Earth's magnetic field,
>
> **f** the frequency of the fluctuations, and
>
> **A** the surface area across which the field flows.

For calculation purposes we can approximate the Earth's magnetic field as being 1 Gauss (or 10^{-4} Teslas)

If we consider an ordinary, long transmission line of about 10 Km in length with the power lines spaced 1 metre apart, then we have:

V = 6.28 x 10^{-4} x 10^{4} x f   which equals 6.28 x f

If the fluctuations are f = 10 Hz, that produces an over-voltage of 63 V. If the fluctuations are 100 Hz then the over-voltage is 630 V, etc.....

So if the Earth's magnetic field is lower in intensity, the effect is considerable in a great surface and volume range.

For energy and power considerations, we can see that the Earth's magnetic field is lower than common permanent magnets, but the volume of space which it covers is very large. The energy in a magnetic field is not just the field intensity alone, but it depends also on the volume across which that field acts.

The energy stored in a magnetic field **B** across a space volume **V** is:

U = 1 / (2**muo**) x **B**^{2} x **V** .... (1)

 Where **muo** is the magnetic permittivity of the vacuum.

Common permanent magnets channel energy. If we can use them to get unlimited power like the Bearden's MEG, then the Earth's magnetic field across an air core coil can achieve the same result.

Now we can do a comparison between a permanent magnet and a coil oriented to the Earth's magnetic field to get the same energy levels.

Let's consider a powerful permanent magnet, as used in a MEG, of 5,000 gauss and dimensions of 50 mm x 20 mm x 10 mm. According to the equation (1) above, the energy stored in the permanent magnet will be:

U = 1 / (8 x **pi** x 10^{-7}) x (0.5)^{2} x (5 x 10^{-2}) x (2 x 10^{-2}) x (10^{-2}), so

 U = 0.995 Joules - that is to say, roughly 1 Joule of energy.

Devices like the MEG with permanent magnets don't get too many kilowatts, the reason is because that magnetic energy is constant. If we close that magnetic field in a core or magnetic circuit and we pulse that field we get 1

joule of energy at any desired time rate because the permanent magnet stores that energy unlimited and so if we want a power output of 1 KW as the power **P** we calculate:

P = **dU**/dt

For P = 1 KW , we need pulse 1 joule of energy for only 1 millisecond.

In the same way, if we can get power of the same levels from Earth's magnetic field, we must calculate the volume of the air core coil. By using the same equation, we see that

$(0.5)^2$ x (5×10^{-2}) x (2×10^{-2}) x (10^{-2}) = $(10^{-4})^2$ x **V**

V is the volume of the coil we need for get the same magnetic energy levels, and in this case, V = 250 m^3

That is to say, a coil of 6.3 m diameter and 6.3 m length, placed parallel to the Earth's magnetic field, can store the same energy as that little 5,000 gauss permanent magnet which we considered for a MEG device.

But it is not necessary build a huge coil, we can use a smaller coil. The enclosed magnetic energy will be lower, but as P = dU/dt we must raise the frequency of the pulses to obtain the same power level coming from a bigger coil. For example, an air core coil of 1 meter diameter and 1 meter length according to equation (1), stores an energy of:

U = 1 / (8 x **pi** x 10^{-7}) x (10^{-4})^2 x **pi** x 1 / 4 x 1 = 0.003 Joules

If we pulse that energy level at 330 kHz, then we will get 1 kW, and at 660 kHz, 2 kW, etc., thus a higher frequency yields more power.

Then the question becomes, how can we pulse the constant magnetic field inside the coil? The answer is simple: by using an external source, we can cancel the Earth's magnetic field inside the coil. There must be power and energy amplification with respect to the external input source. To realise that power amplification, we must do the following:

Let the magnetic field variation inside the air coil be given by:

B(t) = **Bo** + **Bf** x Sin(**w** x t)

Where
    Bo is the constant of Earth's magnetic field,
    Bf is the magnetic field in the coil created by the external power source, and
    w is the angular frequency of the external source.

Replacing B(t) from equation (1) we get the energy variation with time, U(t), and then we can calculate the power as P = dU/dt resulting in:

P(t) = **Bf** x **w** x **V** x (**Bo** + **Bf** x Sin(**w** x t) x Cos(**w** x t)) / **muo** .... (2)

Remember that V is the volume inside the coil.

We see here that the output power depends on Bo, the Earth's magnetic field, just as in the case of Bearden's MEG it depends on the magnetic field intensity of the permanent magnet in the circuit.

So we can now calculate a COP value with Bo and without Bo, or Bo = 0

Calculating the RMS power for both cases (not reproduced here because it corresponds to a case of basic differential calculus) and using the ratio, the result for the COP is:

COP = (1 + (2 x **Bo** / **Bf**)^2)$^{0.5}$

We see then power amplification, and of course if Bo=0 and not a permanent magnetic field, the maximum COP is 1, input and output powers are equal. In the case of Bearden's MEG, the condition is Bo = Bf for not degaussing the permanent magnet and in that case we have a COP = square root of (5), which is a value between 2 and 3 which corresponds to the practical results for this classic calculation.

But for the Earth's magnetic field, we can get higher values because we can never cause a demagnetisation of the Earth's magnetic field.

How many turns on the coil, pulsing frequency, coil diameter, coil length, etc., do we need?

The input power to cancel the Earth's magnetic field inside the coil, or the condition $B_f = B_o$, we calculate using the RMS component of equation (2) above, setting $B_o = 0$, so we have:

P = 0.05 x **f** x **A** x **L** , (where P is in watts).

 A is the section of the coil in m^2,
 f the frequency in Hertz,
 L the coil former length in metres

To cancel the Earth's magnetic field inside the coil, the condition based on Ampere's law is:

N x **i** / **L** = 100

Where **N** is the number of turns on the coil and
i is the current in amperes.

Finally, the induced voltage in the coil will be:

V = 2 x **pi** x **f** x **N** x **Bo** x **A**

So, with the following values, we have for example:

 N = 1000 turns,
 f = 100 kHz,
 Coil diameter = 1 m,
 Coil length **L** = 1 m,
 i = 100 mA or 0.1 A,
 Bo = Earth's magnetic field

This gives V = approximately 4,000 Volts.

The input power for this example is about 4 kW, the output power for the COP factor will be a maximum of 12 kW. In closed-loop operation we provide the input 4 kW from the generated output and we get a self-powered generator producing 8 kW of output power. My practical results match these calculations.

How is a practical device built?

Using a large plastic pipe, we wind the primary input coil for use with the external source. For extracting the output power, we use another pipe placed inside the first pipe, and of approximately the same diameter and length with an adequate number of turns and wire size to step down the voltage, to, for example, 110 VAC. For the high voltage oscillator of the input source I use a resonant LC circuit taken from a ferrite power transformer.

It is very interesting to see this device work, and on days of geomagnetic storms, power levels go too high and I must use protective devices to prevent damage to the system and the loads connected to it.

Any questions to the following email: enertec2200@yahoo.es (which may not still be operational as this information is quite old).

Electrostatic Generators

Electrostatic generators are not at all unlike aerial systems in that a conversion to ordinary current is needed. The Swiss device designed by Paul Baumann (chapter 13) which has kilowatts of conventional electricity output power and which is self-powered demonstrates that very useful systems can utilise electrostatic charge. Paul's design is built around a Wimshurst machine which is self-revolving due to the sloping charge-collection strips which form an electrostatic motor as well as collecting the charge which is passed on to the remainder of the circuit.

Quite a number of electrostatic generators have been designed and used. They generally use a small, low-power motor to repeatedly alter the capacitance between a series of metal plates and so, create alternating current flow. Some of these designs are really clever in the way in which they operate. For example, the following patent from Charles Goldie has an input voltage source which is generated by the device itself and the voltage used can be adjusted by the user, while the device provides two separate DC outputs in series, which can be used as a single higher voltage if desired.

The Le May patent shown below has useful techniques which raise the output power to more than five times what it would have been without the use of those techniques. The general impression of electrostatic generators is that they are cumbersome and generally ineffective. That may be the case for some of them, but it is certainly not the case for all of them. For example, the electrostatic generator design of William Hyde, shown in chapter 11, has a COP=10 performance where the electrical output is ten times greater than the mechanical power needed to make it operate, and I'm told that the generator output can be 10 kilowatts which is a more than respectable output.

A particularly clever design comes from Onezime Breaux (US 4,127,804) where a high-voltage charge is generated briefly, and then that same charge is shuttled backwards and forwards through the output load, without that charge ever being 'used up' (to put it in layman's terms). As no system is ever 100% perfect, every ten minutes or so, the high-voltage charge is very briefly reinforced. A system of that type has to be capable of being a self-sustained generator. In a minimal prototype which was not perfectly constructed by any means, the power needed to spin the rotor was 0.8 watts, while the electrical output was 20 watts. This shows clearly, that electrostatic generators can be seriously useful, especially if built in the larger sizes.

The Charles Goldie Electrostatic Generator

US Patent 3,013,201   12th December 1961   Inventor: Charles H. Goldie

SELF-EXCITED VARIABLE CAPACITANCE ELECTROSTATIC GENERATOR

This invention relates to electrostatic generators wherein the charge transfer mechanism makes use of capacitive effects between charged bodies and electrodes upon which charge is to be induced, and in particular, to the self-excitation of such generators.

The invention may best be understood from the following detailed description, having reference to the accompanying drawings in which:
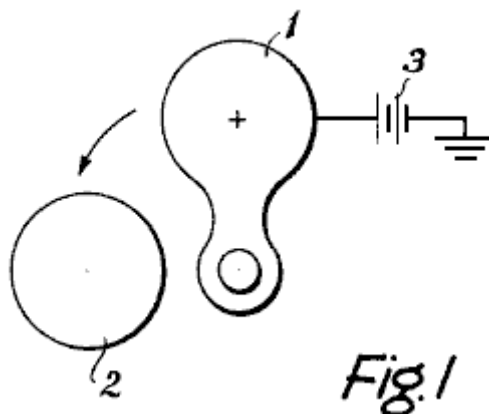

Fig.1 is a diagram illustrating one form of a variable-capacitance electrostatic generator;
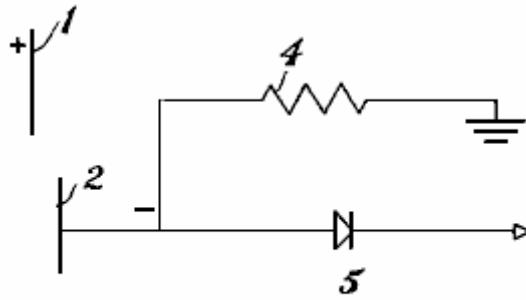
Fig.2

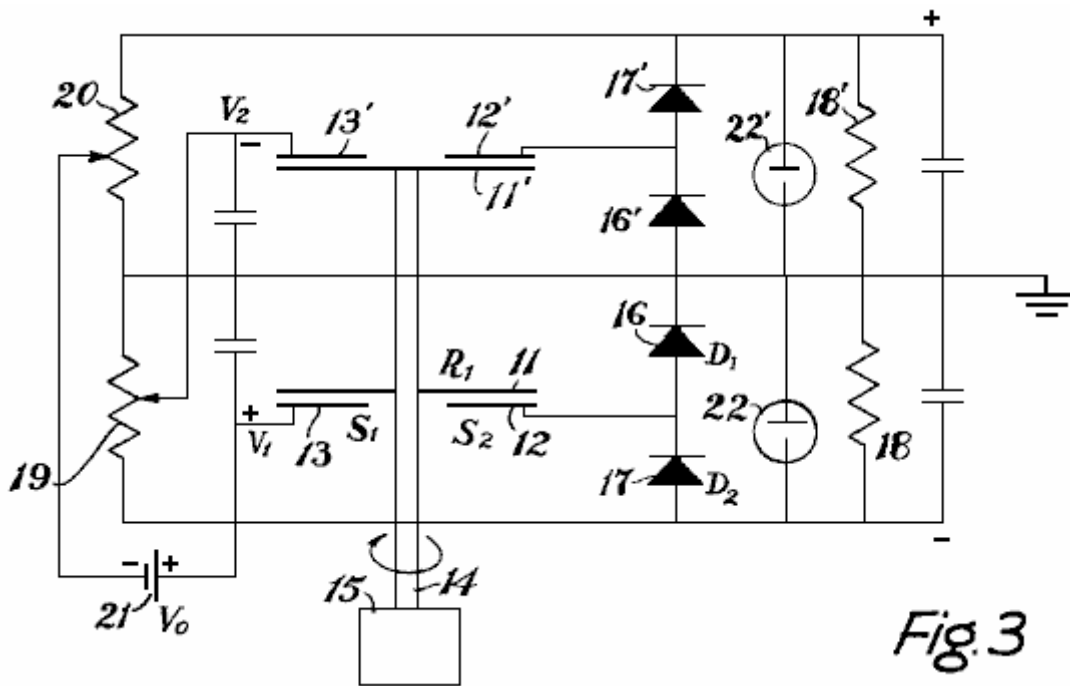**Fig.2** is another diagram further illustrating the arrangement of **Fig.1**;

Fig.3

Fig.3 is a diagram illustrating a modification of the apparatus of **Fig.1** and embodying the invention; and
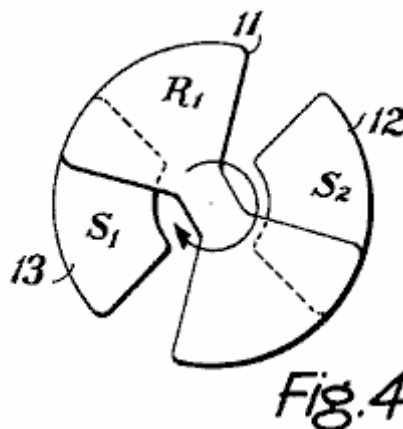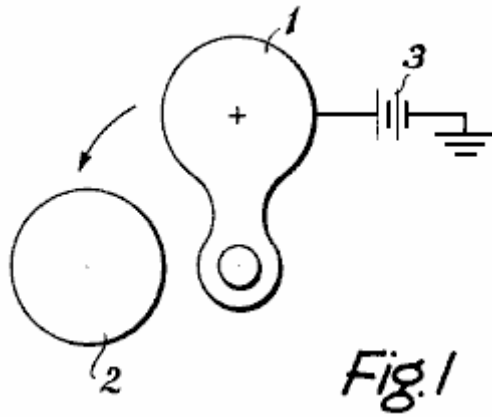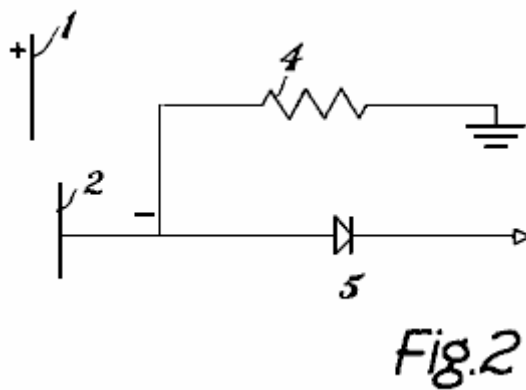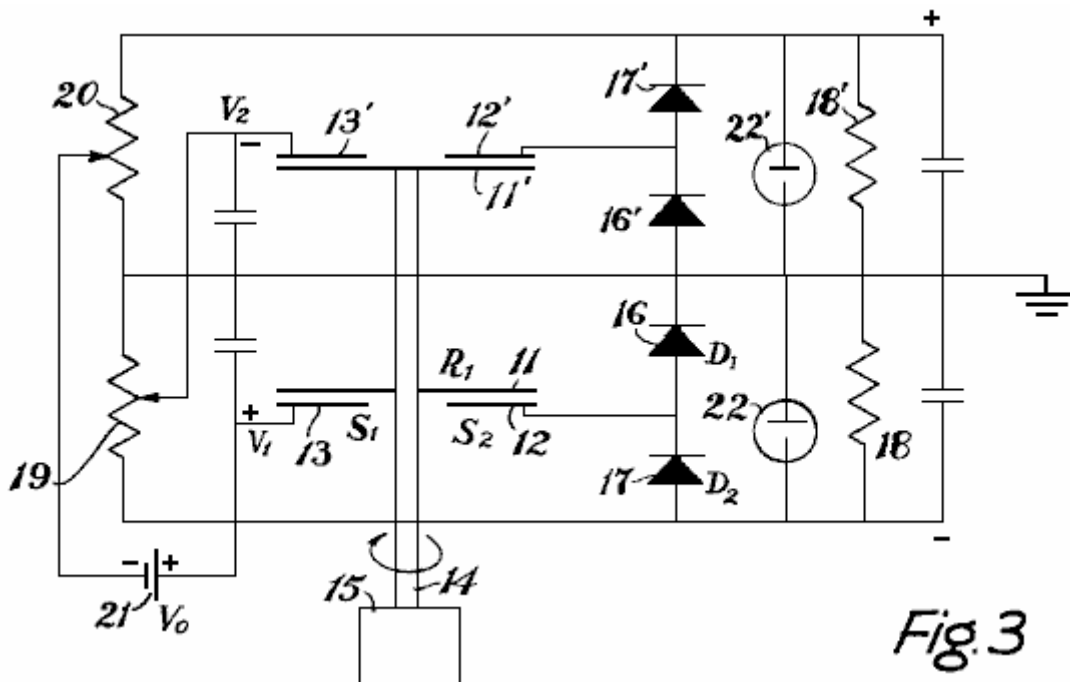

Fig.4

Fig.4 is a diagram illustrating a portion of the apparatus of **Fig.3**.

Fig.1

Looking at the drawings in more detail, **Fig.1** shows a rotor **1** and a stator **2**. The rotor **1** has a positive charge on it. A power supply **3** maintains the charge on rotor **1**.

Fig.2

In **Fig.2** it can be seen that the stator **2** is connected to ground by a resistive path **4** which is connected in parallel with at least one rectifier **5** so that current can only flow in one direction between the stator **2** and ground.

Fig.3

In the device shown in **Fig.3** and **Fig.4**, the rotor serves as a capacitive link between a stationary charging electrode and a stator. A rotor **11** periodically passes close to a stator **12**. However, instead of carrying it's own charge as in the device shown in **Fig.1** and **Fig.2**, the necessary inducing charge on rotor **11** is itself induced on

rotor 11 by the charging electrode **13**. So, when one end of rotor **11** is near the stator element **12**, and the opposite end of rotor **11** is close to the charging electrode **13**, a negative charge is induced on that portion of rotor **11** which is near the charging electrode **13** with the result that positive charge appears at the opposite end of rotor **11** since rotor **11** must itself be electrically neutral.

The invention will now be described with reference to the apparatus shown in **Fig.3** and **Fig.4**, but it will be clear from the comments above, that the invention could equally well be used with a device of the type shown in **Fig.1** and **Fig.2**. The principle advantage of the device shown in **Fig.3** and **Fig.4** is the fact that it eliminates the necessity of a brush on the rotor to supply it with charge, as the charge on the rotor is induced capacitively.

Referring back briefly to **Fig.1** and **Fig.2**, it will be recalled that the invention is concerned with the construction of a self-excited generator with no external energy other than shaft power supplied. That is to say, the objective is a completely self-charging generator. Referring to **Fig.1** and **Fig.2**, it will be seen that direct feedback of the output to the induction plate is ruled out by the polarity switch inherent in this type of machine. The difficulty is avoided by the two-section unit shown in **Fig.3** and **Fig.4**. Here, a fraction of the output voltage of each section is fed to the induction plate of the other.
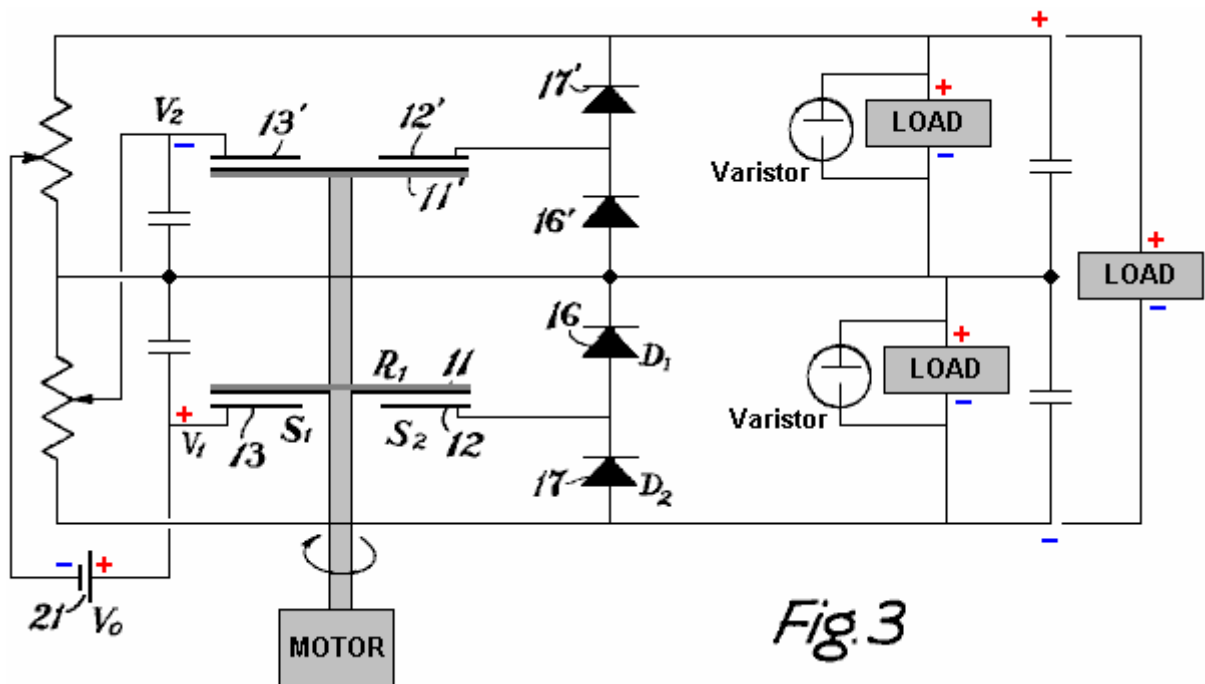

Fig.3

The action of the circuit is best understood by looking first at the lower section only. Rotor **11** is an electrically isolated, flat fan-like rotor mounted on an insulating shaft **14** which is driven by a suitable motor **15**. As rotor **11** rotates, it periodically covers stator **2** and the charging electrode **13**, both of which are insulated and sector-shaped. Charging electrode **13** is maintained at a positive DC voltage with respect to ground. As rotor **11** rotates into a position where it covers both the charging electrode **13** and the stator **12**, the capacitance between the charging electrode **13** and stator **12** increases and negative charge is induced from the ground through diode **16** and on to stator **12**. As rotor **11** rotates away from stator **12** and charging electrode **13**, the capacitive coupling decreases and the voltage on stator **12** rises, negative with respect to ground. Diode **16** blocks any flow of negative charge from stator **12** and as the negative potential of stator **12** rises, current flows through a second diode **17** to the load **18**. A fraction "**V2**" of this negative load voltage is applied to the charging electrode or induction plate **13'** of the second or upper section by means of the variable resistor **19**. The charging action of this second section is identical to that in the first section except for reversed polarities, and the output of the second section is correspondingly fed back to induction plate **13** of the first section via a second variable resistor **20**. Variable resistors **19** and **20**, control the output voltage and power by adjusting the feedback ratios.

The circuit is regenerative and so it is only necessary to supply a small reference voltage to start in the right direction. The use of stator and rotor materials with suitable contact potentials is one solution. Another solution is using a small battery **21** in one induction line. Suitable voltage-limiting devices **22** would be added either across induction plate **13**, or across the load **18** to prevent excessive voltage build-up.

A number of features in this circuit are of interest. The usual slip rings and brushes are eliminated by the use of stator **12** and charging electrode **13** and an isolated rotor **11** rather than a single stator **2** and a rotor **1** maintained at constant induction potential as shown in **Fig.1** and **Fig.2**.

In spite of the fact that the second section was added for the purpose of self-excitation, both output voltages are added together across the load **18**, **18'**. The arrangement shown in **Fig.3** is merely for explanation of the self-excitation principle. The ground shown, for example, is not required and for higher voltages, the units may be cascaded with a common insulating drive shaft **14**. For a given total voltage output, the number of rotor/stator sets is the same for this self-charge generator as for a generator requiring auxiliary charging supplies.

Two poles are shown for simplicity. In an actual machine a greater number would be more practical. The system applies equally well to other geometrical arrangements, such as the concentric or segmented drum design mentioned in US Patent application 829,823.

The Le May Electrostatic Generator

US Patent 3,094,653   18 June 1963   Inventors: D. B. Le May et al.

ELECTROSTATIC GENERATOR

The present invention relates to an energy conversion machine of the type in which a variable capacitor is cyclically driven while being charged and discharged in synchronism with the cyclic variations in capacitance.

There are several different types of electrostatic machines which, for example, function to generate electrical energy from kinetic energy or kinetic energy from electrical energy. One broad classification for these machines is based on whether conductive or non-conductive apparatus is used to transport electrical charge within the system. The present invention relates to the class of machines in which electrical charge is transported through conductive apparatus. More specifically, the present invention relates to electrostatic systems in which a form of variable capacitor is mechanically driven to provide a cyclically-varying capacitance which is charged during intervals of high capacitance and discharged at intervals of low capacitance, to provide electrical energy.

In general, previously-proposed variable-capacitor electrostatic generators (sometimes called electrostatic induction generators) have been capable of very high efficiencies and could be embodied in relatively light apparatus. These considerations result primarily from the fact that electrostatic fields may be sustained in air, vacuum, or other very light medium, while electromagnetic fields necessitate the use of heavy ferrous material. Further, the electrostatic fields are caused by charges carried on surfaces, rather than by currents in conductors, so that the relatively heavy copper requirements of electromagnetic machines may be avoided. It has been found that electrostatic machines operating in a vacuum, do not have the iron loss, copper loss or windage loss of electromagnetic machines, thereby achieving their extremely high efficiency.

However, other considerations have prevented these machines from coming into widespread use. Specifically, prior electrostatic machines of this class have normally been of large size relative to their power capacity. Furthermore, practical use of prior machines has normally required extremely high voltage operation. Both of these drawbacks result from the nature of the electrostatic field, it's requirement of high potential gradients for field strengths comparable to electromagnetic fields, and the limitations on potential gradients imposed by the breakdown of the dielectric medium. Therefore, considerable insulation and safety equipment has been required in prior electrostatic systems, and operation at moderate voltages has not been practical. Still further, certain forms of electrostatic induction generators have necessitated rather complex switching systems to charge and discharge the capacitors; these systems have not been commercially feasible.

In general, the present invention comprises an efficient electrostatic induction system capable of economical operation which may be embodied in a unit that is small in size relative to power capability. The system includes two sets of rod-like members, one set of which is revolved relative to the other, so that certain of the relatively-moveable rods provide a variable capacitance. The other rods in the structure are then used to shape the electrostatic field in a manner which produces a greater difference between the minimum and maximum capacitance of the apparatus, resulting in increased power conversion capability for the size of the unit. The variable capacitance structure is connected to an electrical system which charges and discharges the capacitance in a cyclically-varying manner. Reactive elements are then coupled to the system to cause voltage phase shifts in the system relative to the variable capacitance, to increase the charge applied to, and taken from, the capacitance structure during the operating cycle, thereby further increasing the power-conversion capabilities of the system.

Another object of the present invention is to provide an improved electrostatic induction system.

Another object of the present invention is to provide an electrostatic induction generator or motor which has a higher power conversion capability relative to it's physical size.

Still another object of the present invention is to provide an electrostatic energy conversion system which may be embodied economically in a relatively small size apparatus.

A further object of the present invention is to provide an electrostatic induction motor or generator in which energy is more effectively converted to another form by improving the shape of the electrostatic fields in the system.

Still a further object of the present invention is to provide an electrostatic induction generator or motor in which energy is effectively transformed to another form by the provision of reactive elements to tune the capacitive elements that are inherent in the system.

One further object of the present invention is to provide an improved system for efficiently converting energy from one form to another, wherein an electrostatic field is used to inter-couple the different forms of energy.

These, and other objects of the present invention will become apparent from a consideration of the following, taken in conjunction with the drawings, wherein:
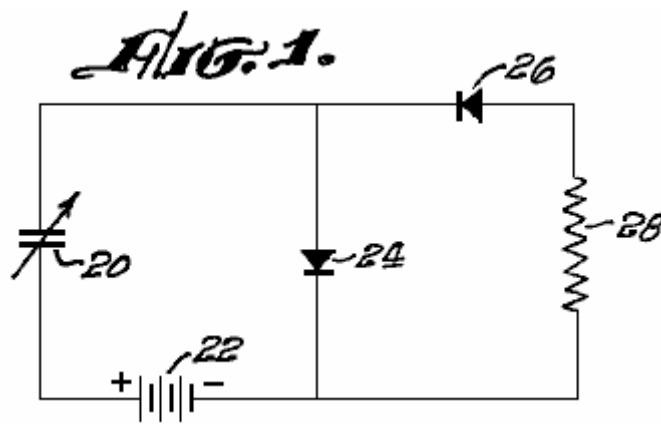
Fig.1 is a schematic diagram illustrating the basic operation of a preliminary system to which the present invention may be applied;
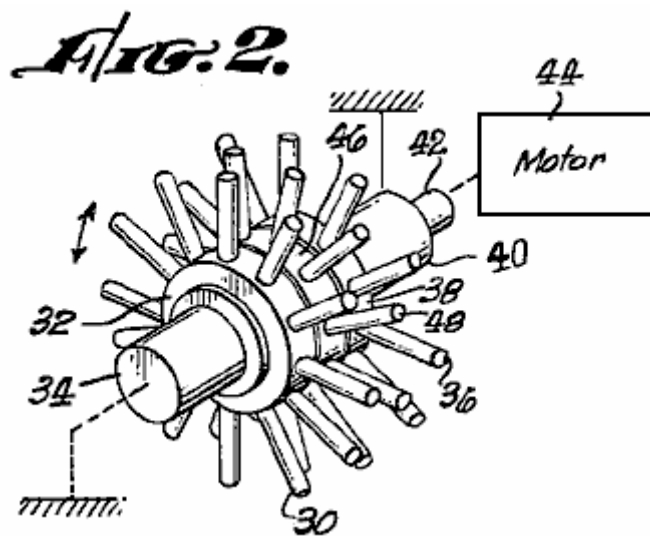
Fig.2 is a perspective and diagrammatic representation of one form of variable capacitor which may be incorporated in an apparatus of the present invention;
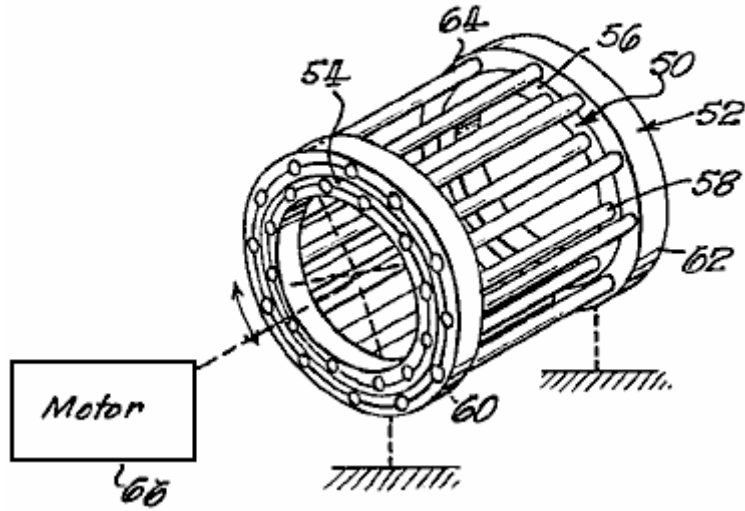
Fig.3 is a perspective view of another form of variable capacitor which may be incorporated in an apparatus of the present invention;

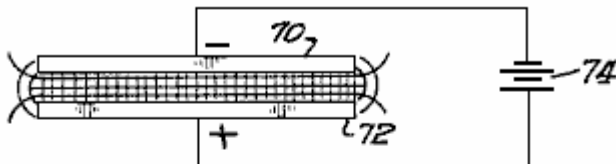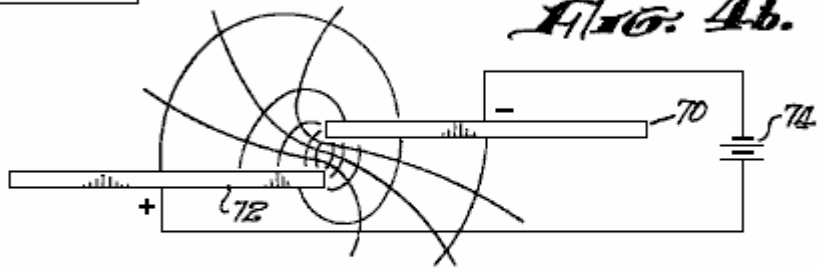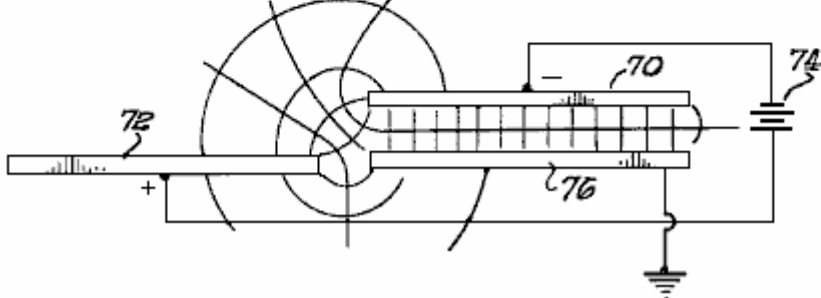**Fig.4a, 4b and 4c** are diagrammatic representations illustrating an aspect of the operation of a system incorporating the present invention;
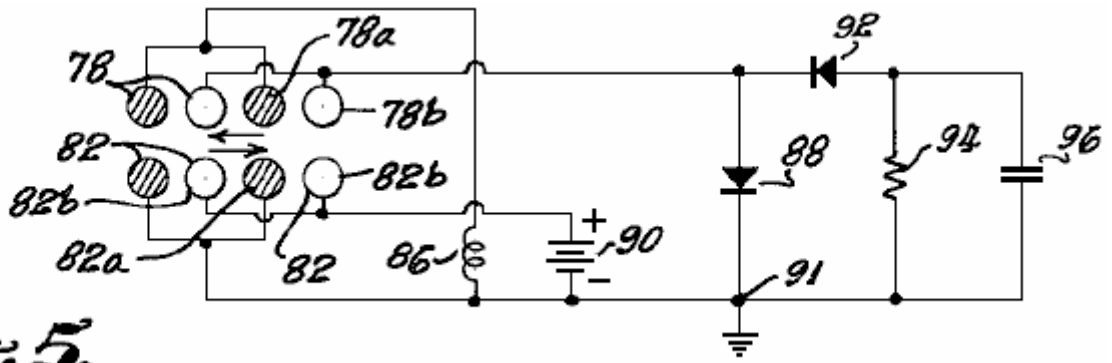
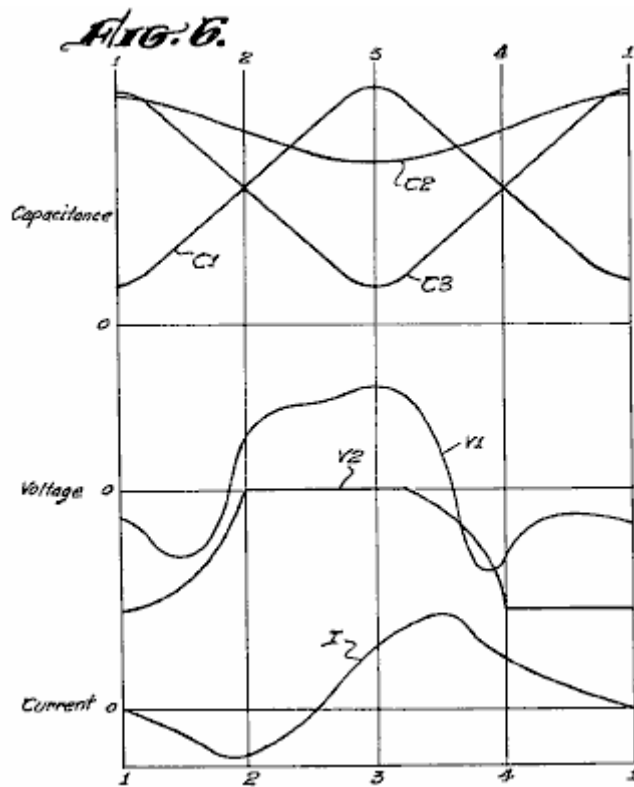**Fig.5** is a circuit diagram incorporating one form of the present invention;

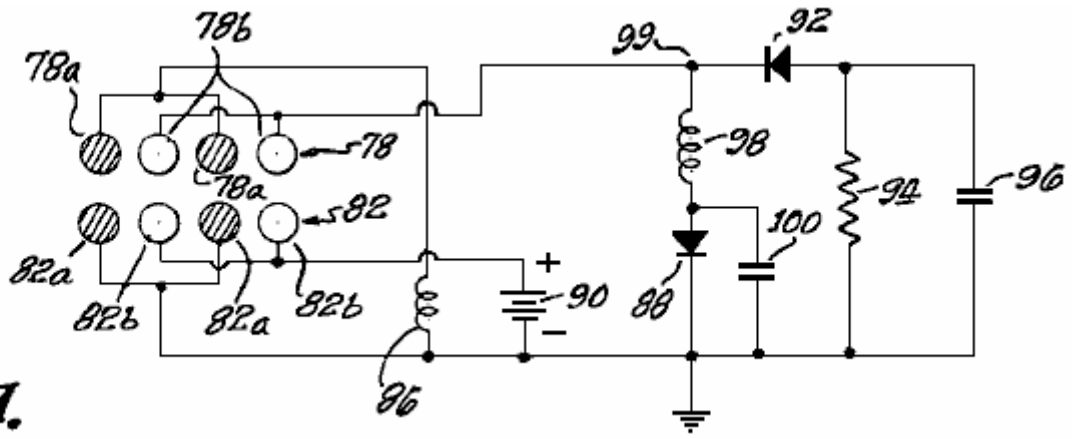**Fig.6** is a set of graphs illustrating the operation of the system shown in **Fig.5**;

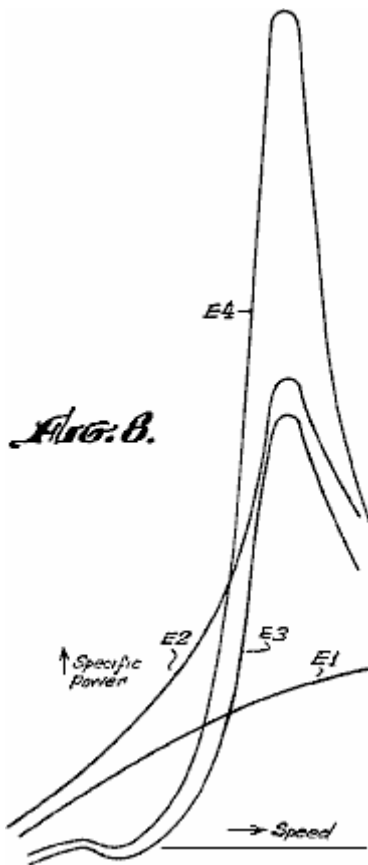**Fig.7** is a circuit diagram of another system incorporating the present invention;

Fig.8 is a series of curves illustrating the effectiveness of systems constructed in accordance with the present invention;
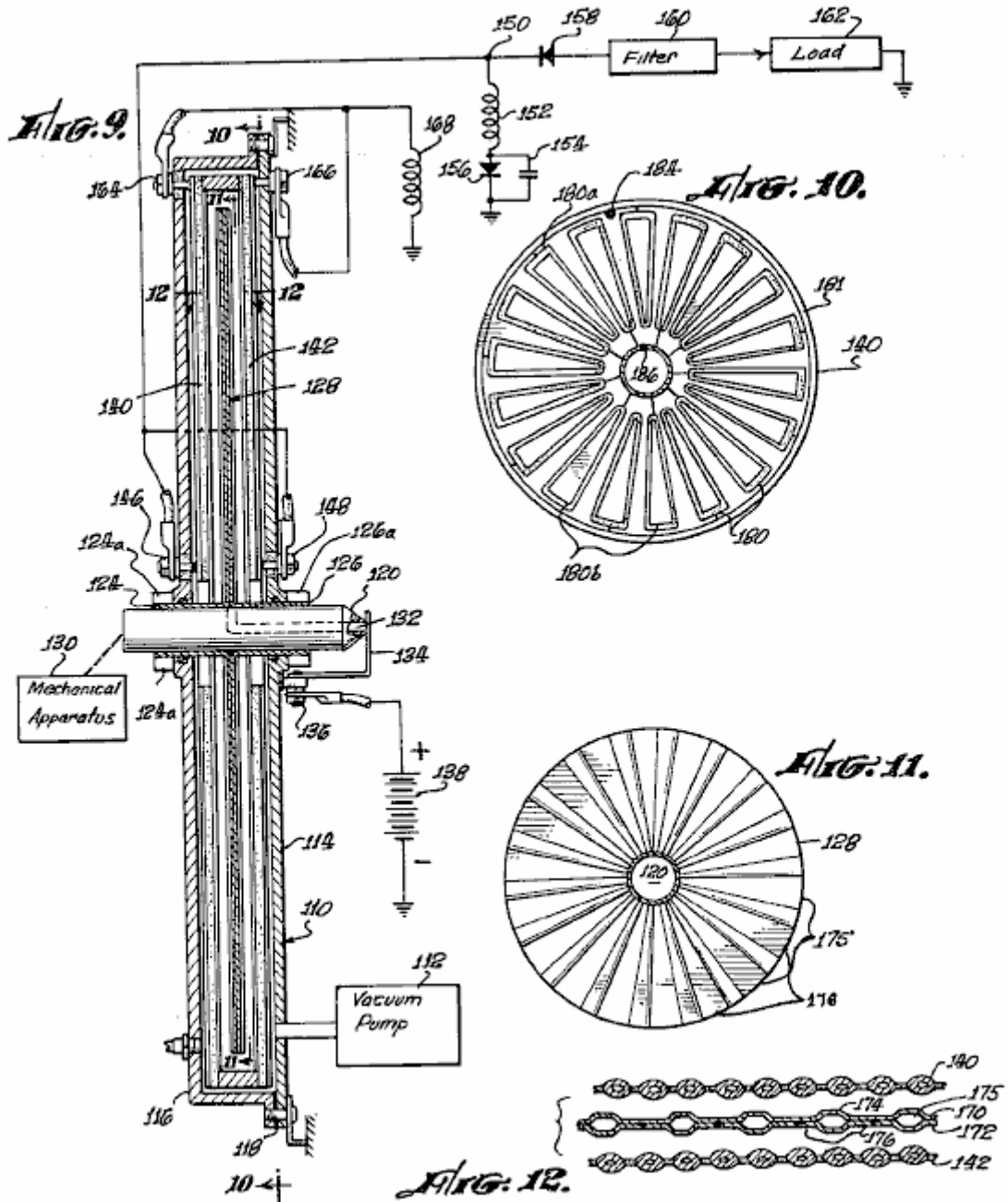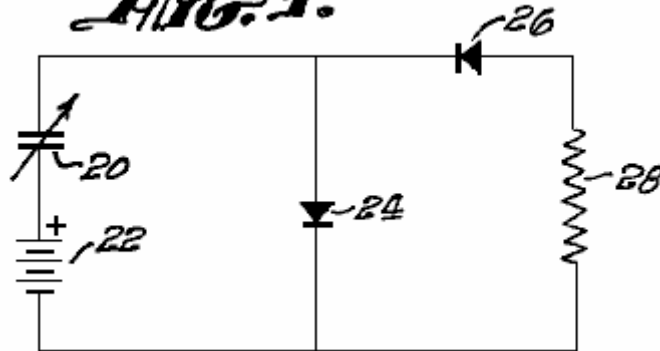
Fig.9 is a vertical sectional view and diagrammatic representation of an apparatus constructed in accordance with the present invention;

Fig.10 is a vertical sectional view along line **10 --- 10** of **Fig.9**;

Fig.11 is a vertical sectional view along line **11 --- 11** of **Fig.9**;

Fig.12 is a horizontal sectional view along line **12 --- 12** of **Fig.9**.

Referring initially to **Fig.1**, there is shown a preliminary form of an electrostatic induction generator. A variable capacitor **20** is connected in a serial loop with a battery (or other source of voltage) **22** and a diode **24**. A series circuit including a diode **26** and a resistor **28** is then connected across the diode **24**. The diodes **24** and **26** are connected in a way which allows current flow in opposite directions through the battery **22**. Variable capacitor **20** is driven by a motor to provide a cyclically-variable capacitance, with the result that the mechanical energy used to drive capacitor **20** is converted to electrical energy supplied to the load resistor **28**.

Considering the operation of the system of **Fig.1** in detail, capacitor **20** is driven to vary between maximum and minimum levels of capacitance. At a maximum level of capacitance, capacitor **20** is charged to a charge level "**Q**" by the battery **22** through diode **24**. The voltage across capacitor **20** then equals Q/C where C is the capacitance of capacitor **20**. Of course, this voltage coincides substantially with the voltage of battery **22** minus the voltage drop across diode **24**.

As the capacitance C of capacitor **20** decreases towards it's minimum value, the charge Q remains constant; therefore the voltage across the capacitor increases to accommodate the decrease in capacitance as V = Q / C. The increased voltage across capacitor **20** produces a current through battery **22**, load resistor **28** and diode **26**. This current tends to recharge battery **22** as well as providing energy to the load resistor **28**.

In this manner, the mechanical energy used to drive capacitor **20** cyclically, is manifest in the form of electrical energy passed to the load resistor **28**. Therefore, in general, this basic operation of the electrostatic generator is similar to an electromagnetic generator, except that the field which couples the mechanical input energy to the electrical output energy is electrostatic rather than electromagnetic.

A wide variety of structures may be used as the variable capacitor in an electrostatic generator. However, in the selected structure, it is normally desirable to reduce the ratio of the peak field voltage gradients to the average gradients by using rounded capacitor elements, e.g. tubes or bars, rather than capacitor plates with sharp corners. Two variable capacitor structures using these conductive bars are shown in **Fig.2** and **Fig.3** and will now be considered in detail.
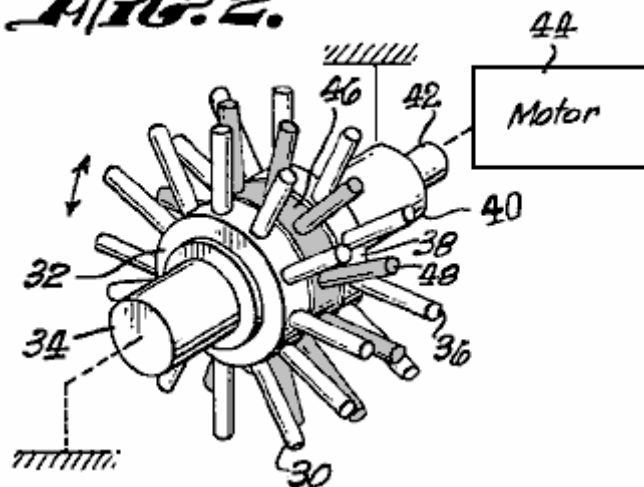
The structure of **Fig.2** is a radial-bar variable capacitor configuration where rows of radially-extending bars are mounted to be relatively moveable and so provide a variable capacitance between the rows. Specifically, a first row of bars **30** is mounted in a hub **32** which is carried on a fixed shaft **34**. Similarly, another row of radially-

extending bars **36** is supported in a hub **38** which is mounted on fixed shaft **40**, which telescopically receives a concentric shaft **42** which is coupled to motor **44** and which carries hub **46** supporting the row of bars **48** which is positioned between rows **30** and **36**. The bars in each of the rows **30, 36** and **48** may be interconnected electrically by a conductor supported in the respective hubs. However, as the individual hubs **32, 38** and **46** are formed of insulating material, the separate rows are not interconnected electrically. Therefore, a variable capacitance exists between the individual rows **30, 36** and **48**. This capacitance is somewhat similar to a common rotating plate capacitive structure, however, in order to reduce the peak field voltage gradients between the rows, the bars or capacitive elements are rounded to avoid sharp corners.

At a time when the row of bars **48** is in angular alignment with the bars in rows **30** and **36**, the bars are closest and there is maximum capacitance. As the row **48** revolves it reaches a position of least alignment of the bars in rows **30** and **36** (as shown in the drawing) and there, the capacitance between the rows is at a minimum. Therefore as motor **44** rotates the bars in row **48**, a cyclically varying capacitance is provided between these bars and the bars in rows **30** and **36**. In the application of this structure to the present invention, certain of the bars may be used to shape the electrostatic field as described below, while the remaining bars provide the desired variable capacitance. Of course, the number of rows provided in a configuration of this type may be varied to increase the capacitance, as may the size of the bars. Of course, these considerations are determined by the particular application of the system.
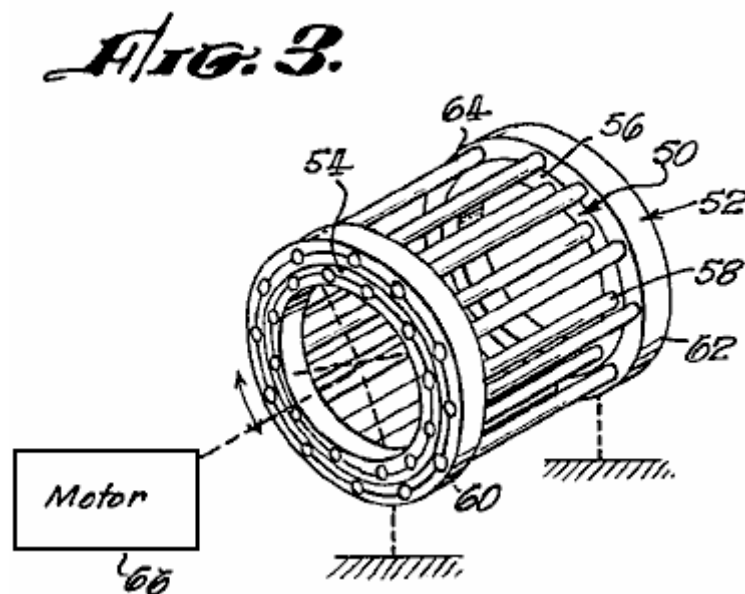

Fig. 3.

Fig.3 shows another form of variable-capacitance structure which may be used in a system of the present invention. The structure shown in **Fig.3** includes two concentric cylindrical structures **50** and **52**, which are mounted so that they rotate relative to each other. These two structures are similar except for their size. The smaller structure **50** is telescopically fitted concentrically into the larger structure **52**. The smaller structure **50** includes a pair of insulating rings **54** and **56** which are held spaced apart by conductive bars **58** and are angularly offset in a circular configuration. A pair of insulating rings **60** and **62** of the structure **52** are concentrically mounted outside the rings **54** and **56** respectively and are held spaced apart by angularly offset conducting bars **64**. The structure **52**, comprising the rings **60** and **62** and the bars **64** is held fixed, while the structure **50**, comprising the rings **54** and **56** and the bars **58**, is revolved making bars **58** and **64** pass each other in parallel relationship. As a result of this movement, a variable capacitance exists between the bars of the two structures. As in the structure shown in **Fig.2**, the individual bars in the separate structures may be interconnected electrically to provide a composite capacitance, or alternatively certain of the bars may be used for field shaping as described below. Thus the structure shown in **Fig.3**, as well as the structure shown in **Fig.2**, may be used as the cyclically-varying capacitance in the system shown in **Fig.1** to provide electrical energy from kinetic energy. In such a system, the energy would be provided by motors **44** or **66**, however, the source of the kinetic energy is not important for the present invention.

In the operation of an electrostatic generator as shown above, the ratio of power conversion per unit size (and weight) of machine may be increased by increasing the maximum capacitance, or by decreasing the minimum capacitance of the variable capacitor. Of course, it is apparent that as the energy conversion is accomplished in systems of the present invention by a varying capacitor, the effectiveness of the conversion depends on the range over which the capacitor varies. In general, the efficiency of these systems is quite high even when operating with a small capacitive range, however, in such systems the energy conversion capability or power

rating of the system is low relative to it's physical size. One major aspect of the present invention resides in a structure for increasing the range of capacitive change, and will now be considered in detail. For purposes of illustration, a moveable plate variable capacitor will be considered with reference to **Figures 4a, 4b** and **4c**. The flat plate capacitor provides a good example of the universal principle to be described because of the simple electrostatic field present in such a structure.
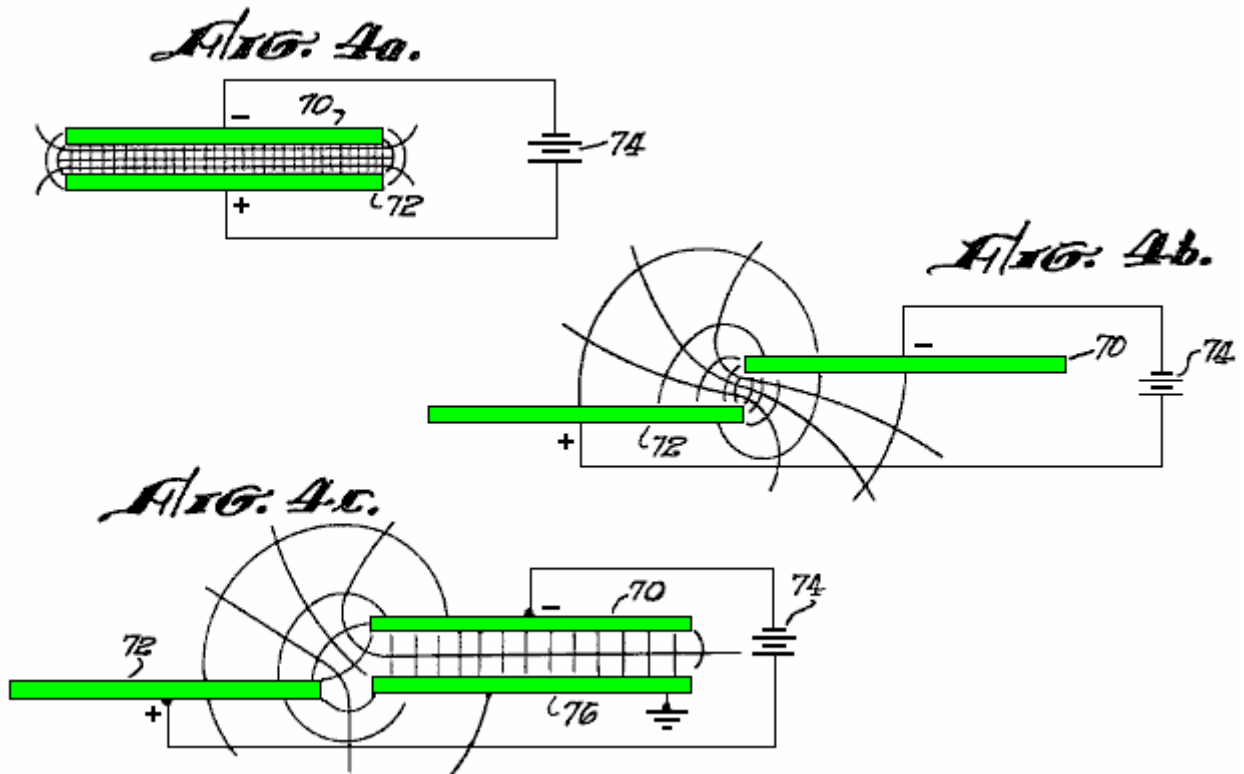

Fig.4a shows a pair of spaced-apart conductive plates **70** and **72** in face-opposing relationship and individually connected to the terminals of a battery **74** or other voltage source. The electrostatic field between plates **70** and **72** is indicated by lines of equal potential, and orthogonal flux lines which indicate the capacitance between the plates. **Fig.4b** shows plates **70** and **72** in an offset position, displaced out of face-opposing relationship to result in reduced capacitance between the plates. Again, the electrostatic field between plates **70** and **72** is indicated by lines of equal potential and the orthogonal flux lines which indicate the capacitance between the plates.

As previously mentioned, any arrangement which can result in greater capacitance for the plates in the configuration shown in **Fig.4a**, or reduced capacitance between the plates in the position shown in **Fig.4b**, results in more effective energy conversion in an electrostatic generator. The system of the present invention includes a structure for shaping the electrostatic field between plates **70** and **72**, to reduce the capacitance between them when these plates are in their position of minimum capacitance. This field-shaping is accomplished by adding extra conductors to influence the field between the plates.

Referring to **Fig.4c**, plates **70** and **72** are again shown in their position of minimum capacitance, however, another plate **76** is shown in face-opposing relationship to plate **70**. Plate **76** is connected to ground or other independent potential. As a result of this, and electrostatic field is provided between plates **70** and **76**, altering the field shape and the potential gradients, as shown in **Fig.4c**. The electric field and the capacitance between plates **70** and **72** is reduced substantially, while the maximum capacitance between these plates (when aligned in face-opposing relationship as shown in **Fig.4a**) remains substantially unchanged.

These same considerations apply in a similar fashion to bar conductors or other configurations of variable capacitors. Of course, the grounded or field-shaping plates as the plate **76** may be provided in both the stator and the rotor of a variable capacitor, or may be carried by only one of these structures.

Referring now to **Fig.5**, there is shown a system incorporating field-shaping electrodes and utilising capacitive structures comprising bars which may take the form generally illustrated in **Fig.2** and **Fig.3**.
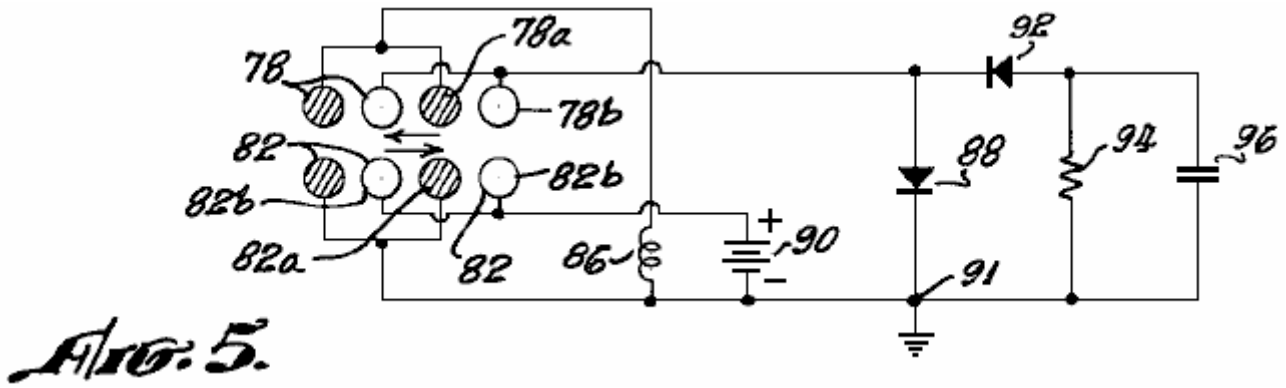
Fig.5.

In **Fig.5**, the stator bars are diagrammatically represented aligned in one row **78** and the rotor bars are similarly shown to be aligned in an adjacent row **82**. Of course, either of the rows **78** and **82** may comprise a stator while the other comprises the rotor since relative motion is all that is necessary. However, in the prior art it has become somewhat common to term the rotor conductors as charge inductors while describing the rotor elements as charge conveyors.

In the system shown in **Fig.5**, grounded field-shaping electrodes or conductors are provided in both the row **78** and the row **82**, and are designated bars **78a** and **82a** shown shaded. The electrodes **82a** are connected directly to ground, however the electrodes **78a** are connected to ground through an inductor **86**. the function of this coil will be discussed later.

The conductive bars serving as capacitance elements in the two rows are designated **78b** and **82b** respectively. The bars **78b** (in the row **78**) and the bars **82b** (in the row **82**) are connected in a circuit configuration somewhat as shown in **Fig.1**. Specifically, the bars **78b** are connected in a serial loop with a diode **88** and a battery **90**. The junction point **91** between diode **88** and battery **90** is grounded, and a diode **92** serially connected with a load resistor **94** is connected across diode **88**. A capacitor **96** is connected across the load resistor **94**, and serves as a filer for the load current.

In the operation of the system, relative movement is provided between row **78** and row **82** producing a cyclically variable capacitance to cause the system to function as the system shown in **Fig.1**. That is, during the interval of high capacitance between the rows **78** and **82** (as shown in **Fig.5**), the capacitive structure is charged by battery **90** through diode **88**. Then, as the bars are separated to reduce the capacitance, the voltage across them increases, causing a current to flow in the opposite direction through battery **90**, the load resistor **94** and diode **92**. As alternate bars in each of the rows **78** and **82** are grounded, the electrostatic field is shaped to reduce the minimum capacitance between the bars **78b** and **82b** as disclosed in **Fig.4**. As a result, the capacitance variation is greater and more charge is transferred through the load during each electrical cycle.

In the operation of the system shown in **Fig.5** to convert mechanical energy into electrical energy, a generally capacitive electrical system is provided. Therefore the phase relationships within the system are generally those of a capacitive apparatus. In view of this, the present invention includes the provision of inductors to produce phase shifts and resonant voltage amplifications which increase the effective power-conversion capabilities of the system. In **Fig.5**, such an inductance **86** is connected between the bars **78a** and ground. The operation of the system of **Fig.5**, including the inductor **86** is graphically illustrated in **Fig.6** which includes plots of capacitance, voltage and electrical current versus the position of the capacitive structure.

Fig. 6.
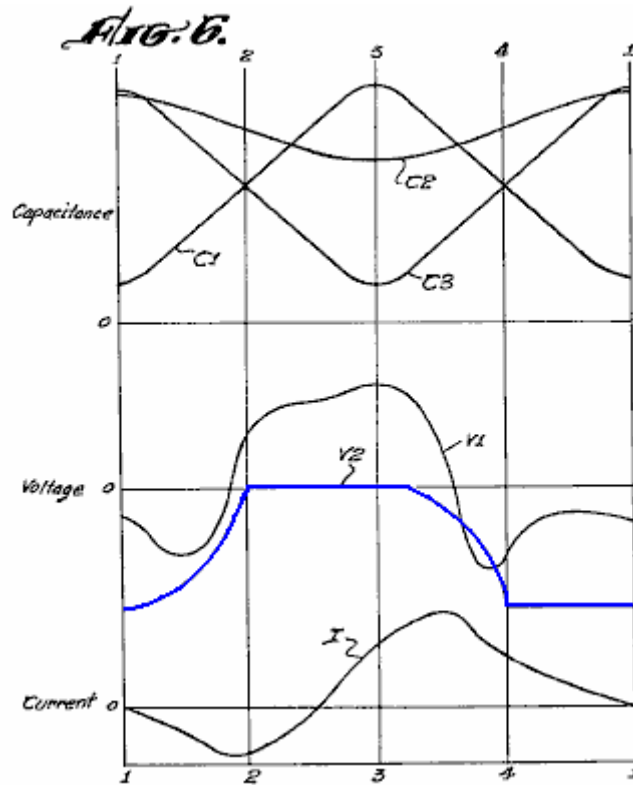
The upper family of curves are capacitance plots, in which, curve **C1** is a plot of varying capacitance between the conductive bars **78b** and **82b**. The curve **C2** is a plot of the capacitance between bars **78a** and **82a**, while the curve C3 is a plot of the capacitance between bars **78a** and bars **82b**. These curves are plotted against a uniform variation in relative positions between row **78** and row **82**, the curves beginning at a point of minimum capacitance for the structure. **Fig.5** illustrates the relative position marked as **3** in **Fig.6**.

The voltage curves in **Fig.6** are plotted on the same base as the capacitance curves, and include a curve **V1** which represents the voltage across coil **86**, and a curve **V2** which represents the voltage on the bars **78b** relative to ground potential. The curve **I**, illustrates electrical current flow through inductor **86**, and it is also plotted with respect to capacitative displacement.

Considering the operation of the inductance **86**; in view of the capacitance between the grounded bars **78a** and the capacitively-charged bars **82b** (connected to battery **90**) a charge is deposited on the bars **78a**. Of course, in the absence of the inductance **86**, this charge would be immediately passed to ground. However, by providing the inductance **86**, the voltage of curve **V1** is developed across this element. This voltage serves to produce further field shaping between the bars and results in more efficient power conversion. That is, the voltage of curve **V1** appears on the bars **78a** in phase with the capacitance **C1** so that the field influence of bars **78a** serves to increase the charge induced at or near the maximum of capacitance **C1** and also serves, by reducing the field strength to reduce the minimum charge held on bars **78b** and **82b** at, or near the instant of minimum capacitance. Thus the variation in the electrostatic field causes the system to absorb more torque, resulting in increased power-conversion capability for the system.

In addition to the provision of inductor **86** as shown in **Fig.5**, other circuit configurations using inductors are to further affect resonant current surges which increase and decrease the field voltages in proper phase relationship with the capacitance variation, and so increase the amplitude of the capacitor alternating current. One such other variation is shown in **Fig.7** which uses bars similar to those of **Fig.5** and in which, like elements are similarly identified.
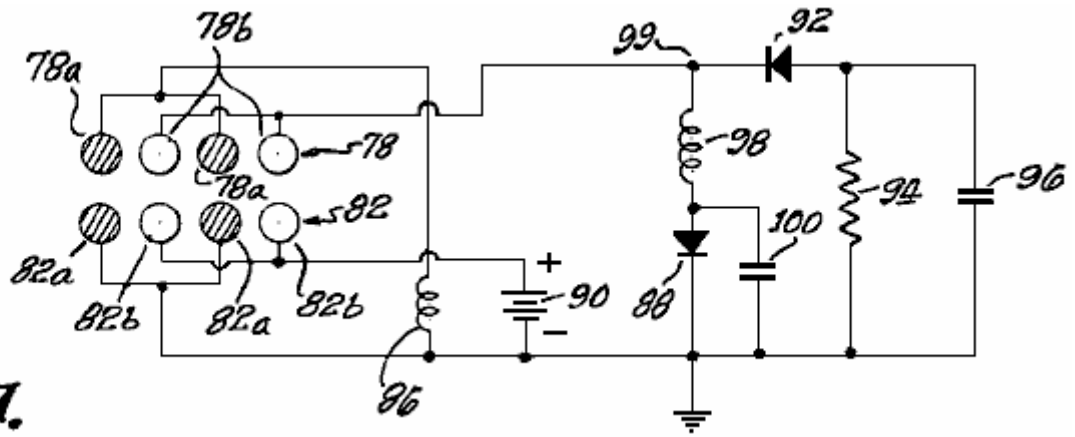
Fig.7.

In the system shown in **Fig.7**, an inductor **98** is connected between diode **88** and the junction point **99** between diode **92** and the bars **78b**. Furthermore, a capacitor **100** is connected across diode **88**. In general, the added resonant circuit provides further current surges in the desired phase relationship with the variation of capacitance. Also, the resonance between inductor **98** and capacitor **100**, tends to produce higher voltages in the electric field of the variable capacitor relative to the voltages across the excitation source **90** and the load **94**. The capability of the machine to achieve high power from a small size of variable capacitor is thereby greatly improved.
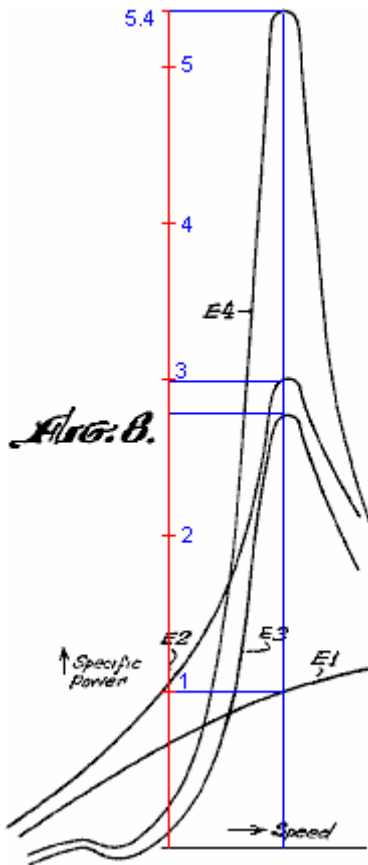

Fig.8.

A graphic indication of the improvement to a system resulting from the application of certain principles of the present invention may be seen in **Fig.8** which includes several curves descriptive of various apparatus, and wherein speed is plotted along the horizontal axis versus specific power which is plotted along the vertical axis. Specific power is herein defined as the power output per unit of excitation voltage squared (P/E_o^2) for a given size and configuration of machine.

The curve **E1** is indicative of the operating characteristic of the simple system shown in **Fig.1**. The curve **E2** (indicating a substantial improvement in performance) is indicative of the system shown in **Fig.5**. The curve **E3** indicates the improvement of the system of **Fig.7** (without the aspect described with respect to **Fig.5**), while the curve **E4** indicates the operation of the system shown in **Fig.7** as illustrated there.

It is apparent that the power conversion capabilities of the system of **Fig.7** (indicated by the curve **E4**) are greatly improved over the simple system which does not include these aspects of the present invention, particularly if the generator is operated at a fixed speed, or if means are provided to adjust the inductance or capacitance values of components **86, 98** and **100** to give the tuned peak power at whatever speed the machine is being operated.
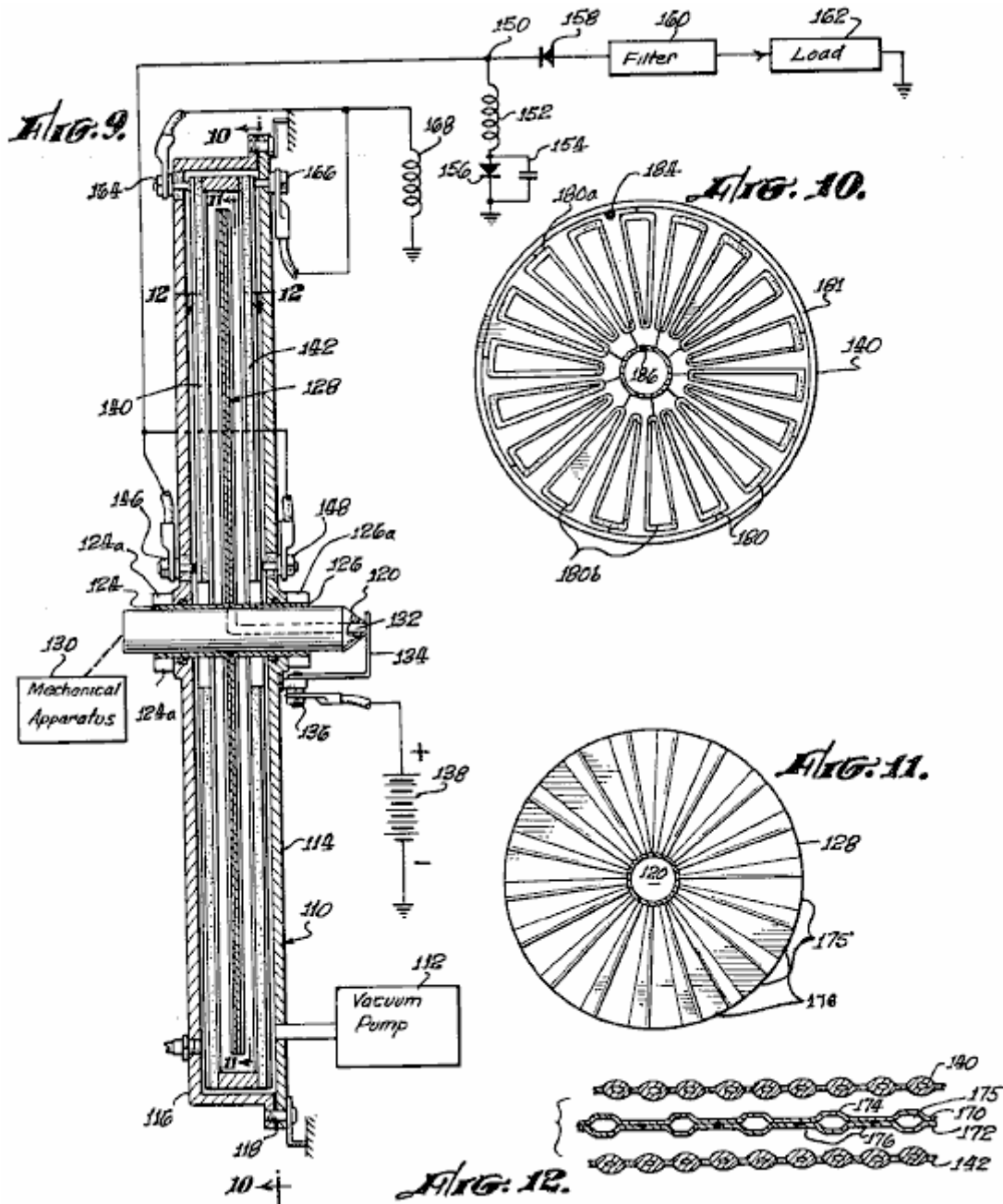
Although various aspects of the present invention may be differently applied to electrostatic machines, to accomplish the desired results, one specific illustration of an operating machine is shown in **Figures 9,10, 11 and 12**, and will now be considered in detail.

The system is mounted in a housing **110** which is sealed and maintained evacuated by a vacuum pump **112**. By operating the cyclically-variable capacitor apparatus in a relatively high vacuum, insulation problems are reduced and windage losses are minimised. The housing **110** has a flat cylindrical form and consists of a circular plate bolted to a cup-shaped member **116** with an annular seal **118** provided at the junction between these members.

A mechanical shaft **120** passes concentrically through housing **110** and is journal led into bearings **124** and **126**, which incorporate vacuum seals **124a** and **126a**. The shaft **120** has a rotor **128** coaxially fixed on it and is connected to a mechanical apparatus **130** by which the shaft is driven. Shaft **120** (made from insulating material) has a conductive section **132** formed in it, which electrically connects rotor **128** through a brush **134** and a lug **136** to one terminal of a battery **138**, the other terminal of which is grounded.

In general, the basic electrical system is similar to that of **Fig.7** with the stator elements being connected by lugs **146** and **148** to a junction point **150** which is connected through an inductor **152** and a capacitor **154** to ground. A diode **156** is connected in parallel with capacitor **154**. The junction point **150** is also connected through diode **158** to a filter **160** which is in turn connected to a load **162**. The field-shaping electrodes in the stator elements **140** and **142**, are connected from lugs **164** and **166** through an inductor **168** to ground.

Considering the cyclically-varying capacitance apparatus in greater detail, the rotor comprises a pair of plates **170** and **172** (**Fig.12**), which are formed with angularly-offset radiating grooves **174** which are interconnected by spot welds **176** so that the grooves **174** essentially form radiating bars **175**. In this structure, the rotor is entirely conductive material, e.g. metal, formed to comprise radiating tubes **175** (**Fig.11**) which are connected through the shaft conductor **132** and the brush **134** to the battery **138**.

The stator components **140** and **142** are similar and comprise a plurality of tubes **180** (**Fig.10**) radiating in a plane from an axial location in the stator element and supported in a circular stator mounting **181** by being imbedded therein. Tubes **180** are formed of metal and the mounting **181** supporting the tubes is formed of insulating material as a casting of epoxy material. Alternate of the tubes **180** are designated **180a** and are connected electrically to a terminal **184** which is contacted by one of the lugs **146** or **148** at a point **186**.

The lugs **164** and **166** are connected to ground through inductor **168**, with the bars **180a** used as field-forming bars while bars **180b** are the actual variable-capacitance elements. In this structure, only the stator is provided with field-shaping electrodes; however, it is to be understood, that in various other embodiments, field-shaping electrodes may be provided in both the stator and the rotor, or in only one structure, as taught with respect to **Fig.5** and **Fig.7**. Also, in the system shown in **Fig.9**, only a single rotor plate is provided; however it is to be clearly understood that a large number of intermeshed rotor and stator plates may be provided in systems of the present invention, depending on the rated power conversion capability of the system.

In the operation of the system shown in **Fig.9**, rotor **128** is revolved relative to the stator elements **140** and **142** by the mechanical apparatus **130**. Therefore, the tubular rotor bars are driven in and out of alignment with the radiating stator bars **180b**. Therefore the connections to these elements (lugs **146** and **148**, and brush **134**) experience a cyclically-varying capacitance. The stator bars **180a** extend the range of this capacitance in the manner described with respect to **Fig.4**.

During intervals of high capacitance, the cyclic capacitive structure is charged by battery **138** through inductor **152** and diode **156**. As the capacitance of the structure decreases, the voltage therein increases, providing a current through diode **158**, and filter **160** to the load **162**. Thus, mechanical energy from the mechanical apparatus **130** is efficiently converted into electrical energy and supplied in that form to the load **162**.

While the previous discussions have pertained primarily to electrostatic generators, it is to be understood that the important features of the present invention apply equally to electrostatic motors.

An important feature of the present invention resides in the structure disclosed in **Fig.9**, which may be economically manufactured and used in practical electrical systems.

Another important feature of the invention resides in the use of field-forming electrodes in the stator or rotor, or both the stator and the rotor to accomplish more effective energy transitions.

One other important feature of the invention resides in the provision of inductance elements to further increase the effectiveness of the system.

The Onezime Breaux Electrostatic Generator

US Patent 4,127,804   28 Nov. 1978   Inventors: Onezime Breaux

ELECTROSTATIC ENERGY CONVERSION SYSTEM

This is an important design, but as the physical details in the patent seem rather limited, instead of reproducing the patent here, I will attempt to provide a description which should be more understandable for the average person.

The Principle

For there to be a greater energy output than the energy input required to make any generator operate, that extra energy must come from somewhere. There is no magic about any of these systems as we ourselves are immersed in a massive energy field. We do not notice this any more than we notice the radio waves which pass by, and through us, all the time. This energy field is very powerful as Thomas Henry Moray demonstrated many times by gaining fifty kilowatts of electrical power from just a simple aerial and a ground connection. We don't know how he did that, but we would very much like to know how. Nevertheless, Moray demonstrated that there is massive power all around us – power which is free for the taking **if** we know how to do it. Unfortunately, most of the large number of people who do know how to extract this energy, refuse to share that information, leaving us to work out from basic principles, how to gain this free-energy. It should be noted in passing, that we already use this free energy when we use "mains electricity" as none of the energy supplied by the local Power Company actually comes out of your mains wall socket since all of the current supplied by the Power Company flows directly back to that company. All the Power Company does is to set up the conditions which cause some of the free-energy in your location to flow through the electrical equipment which you plug into that wall socket. What free-energy devices do, is to set up those same conditions to draw in electricity from our massive surrounding energy field, without the need for any help from the local Power Company.

The Design

When you try to start a car engine, you connect the car battery to an electrical Starter Motor which turns the engine over and causes sparks to be generated inside each of the cylinders of the engine. The current draw from the battery passes through the Starter Motor and is lost for ever. If the car engine starts, then some of the energy stored in the fuel burnt by the engine is used to replace the electrical current taken from the battery. If the car engine does not start, then after a fairly short time, all of the electrical energy stored in the car battery will be fed to the Starter Motor and the battery will no longer be able to supply any more current to turn the engine over.

The generator described here is a very clever design as any output power which it provides, it keeps and does not lose any of it. It is somewhat like that car Starter Motor returning the current to the battery, allowing any number of attempts to start the engine. The way that it operates is to pass current backwards and forwards between two capacitors. That current is made to pass through the primary winding of an output transformer, exactly mimicking the signal which the Power Company charges you for. However, with our generator, that current is never lost and can be used over and over and over again. A battery is used to create that initial current, and when the generator starts operating, it recharges the battery and if desired, the battery can be removed completely and the generator is then self-sustaining. The battery is only used to start the generator running and is not used at any other time.

The outline design is very straightforward and can be visualised as shown here:
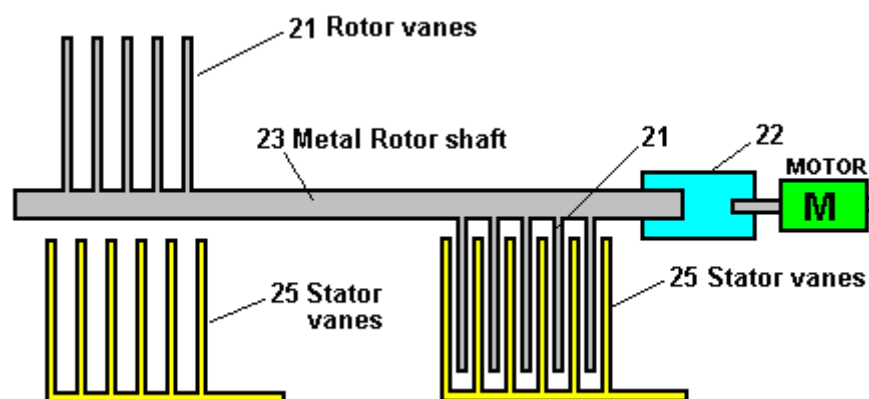
Here, the motor marked **M** in the diagram, spins a metal shaft **23**. The shaft is mounted on ceramic roller bearings (as used on skateboards) and nothing on the shaft touches any other part, which means that the shaft spins very freely and very little power is needed to spin it.

Shaft **23** has metal 'vanes' or plates **21** attached to it and these pass though somewhat similar metal vanes **25** which are fixed in place and do not move. These four sets of metal vanes form two separate variable capacitors.

The vanes **21** are arranged so that when one set reaches it's maximum capacitance (being fully inserted into the non-moving vanes **25** as shown on the right of the diagram) then the other set of vanes is at it's minimum capacitance being as far away as possible from it's matching set of vanes **25**.

Initially, at start-up, both of the sets of vanes marked **25** are fully charged to a high positive voltage by an electrical system (not shown here) and the output transformer is connected between these two sets of vanes, producing this arrangement:
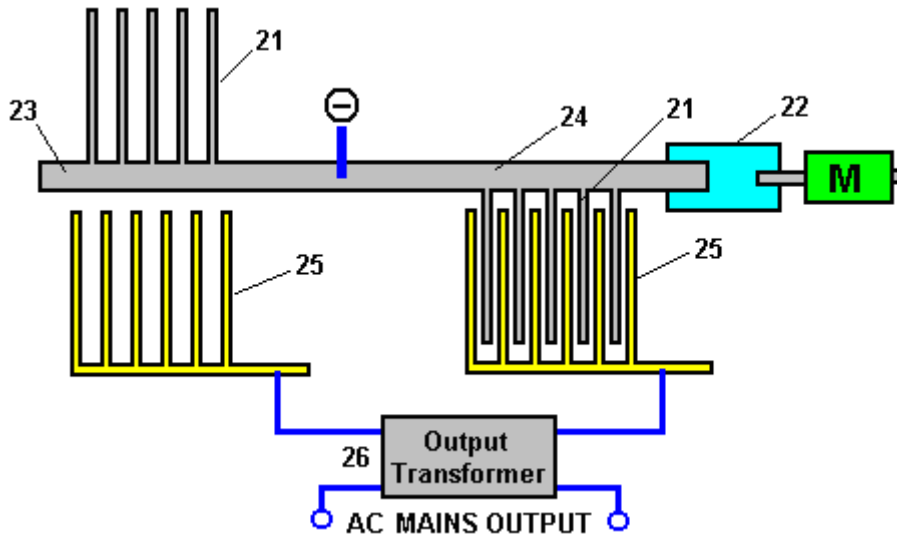
The sets of vanes **21** are connected to a strongly Negative charge, passed to them through the metal shaft **23**. When the negative plates **21** are inserted between the Positively charged plates **25**, all of the positive charge on the unmeshed plates **25** gets sucked towards the negative charge on the meshed plates **21**, but that charge is forced to flow through the output transformer on it's journey. This arrangement causes the positive charge on the fixed plates to shuttle backwards and forwards through the output transformer, never getting 'used up' in the process. This means that the generator has an electrical output of 220 volts at 50 cycles per second and the only input power needed is the tiny amount required to spin the rotor shaft. The force needed to spin the rotor shaft is not affected in any way by the intensity of current drawn from the output transformer, which means that the generator is wholly independent of the load. While this is a very clever design, a number of practical construction details can be altered to improve the performance.

The Breaux patent shows a vane shape which doubles the frequency at which the drive motor spins and which is balanced on the shaft, producing no shaft vibration when spun rapidly. The vane shape is shown here:
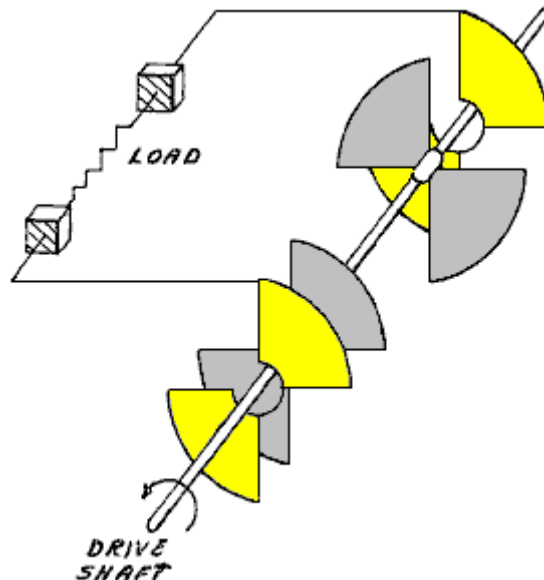
You will notice that the rotor vanes (shown in grey), are positioned ninety degrees apart, providing even better shaft balance. All of the rotor vanes have the same shape and all of the stator vanes have the same shape, which is helpful for mass production. While just two rotor vanes and two stator vanes are shown in this introductory diagram, there can be as many pairs of rotor/stator plates as desired. Each additional pair of plates increases the output power of the generator.

This design calls for the vanes to be in a vacuum, which strongly suggests that this device was never prototyped as operating in a vacuum, unless all conducting surfaces have exceptional insulation, would be a major disaster

as the coronal discharge would be massive – after all, that is how thermionic valves or 'vacuum tubes' are made and they carry large electrical currents through a vacuum. For this design to function properly, it needs to be operated in dry air.

The power output of a device of this nature increases with increasing vane area, and with decreased inter-vane gap and with increased voltage. Consequently, a working voltage considerably higher than 220 volts will be used when charging the vanes. This means that the output voltage will be much higher than is convenient. Generators of this type generally show a resistive load and only a resistive load. A practical implementation would require a step-down transformer on the output in order to reach a working AC voltage of 220V. It is generally thought that the inductive nature of the primary winding of any such transformer would create a major choking effect on the oscillating flow of charge between the vanes, due to the back-EMF of that winding. That is not the case if a Thane Heins style of transformer is used (as shown in chapter 3) as a transformer of that type does not have any significant back-EMF, making this a very interesting design, especially since the output current draw does not affect the input power which is solely used to spin the rotor shaft.

In theory, the static charge initially placed on the capacitor vanes is never depleted. However, in this world, perfect conditions never seem to be encountered. In this instance, there is a **very** slight loss of charge over time, and that charge is boosted very briefly after a substantial time has elapsed. A brief high-voltage pulse once every ten minutes is likely to be sufficient. There is no corona energy loss as corona streamers only form at high frequency and this generator does not exceed an absolute maximum of 60 Hz which is a very low frequency indeed, so there is never any corona discharge at all.

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