Chapter 3: Motionless Pulsed Systems

Note: If you are not at all familiar with basic electronics, you might find it easier to understand this chapter if you read chapter 12 first.

The pulsed devices mentioned so far have had moving parts but rotating or fluctuating magnetic fields can be created without moving parts. An example of this is Graham Gunderson's solid-state electric generator shown in US Patent Application 2006/0163971 A1 of 27th July 2006 which is shown on page A-1038 of the appendix. Another example is:

Charles Flynn's Magnetic Frame.
Another device of this type comes from Charles Flynn. The technique of applying magnetic variations to the magnetic flux produced by a permanent magnet is covered in detail in the patents of Charles Flynn which are included in the Appendix. In his patent he shows techniques for producing linear motion, reciprocal motion, circular motion and power conversion, and he gives a considerable amount of description and explanation on each, his main patent containing a hundred illustrations. Taking one application at random:

He states that a substantial enhancement of magnetic flux can be obtained from the use of an arrangement like this:
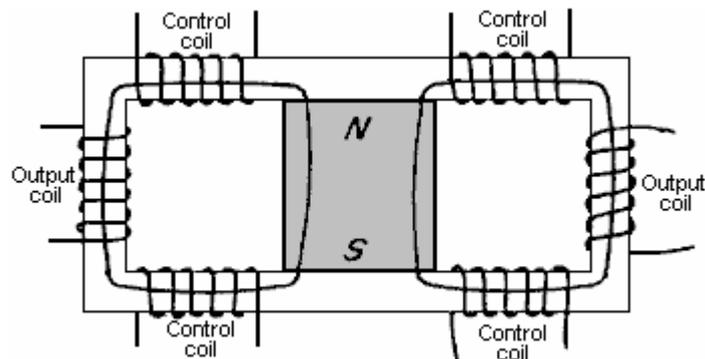
Here, a laminated soft iron frame has a powerful permanent magnet positioned in it's centre and six coils are wound in the positions shown. The magnetic flux from the permanent magnet flows around both sides of the frame.
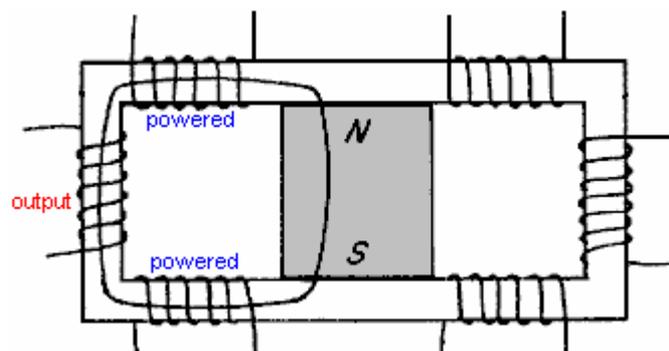

The full patent details of this system from Charles Flynn are in the Appendix.

Lawrence Tseung's Magnetic Frame.
Lawrence Tseung has recently produced a subtle design using very similar principles. He takes a magnetic frame of similar style and inserts a permanent magnet in one of the arms of the frame. He then applies sharp DC pulses to a coils wound on one side of the frame and draws off energy from a coil wound on the other side of the frame.

He shows three separate operating modes for the devices as follows:


(1) No Permanent Magnet,
No Lead-Out Energy,
Maximum COP = 1
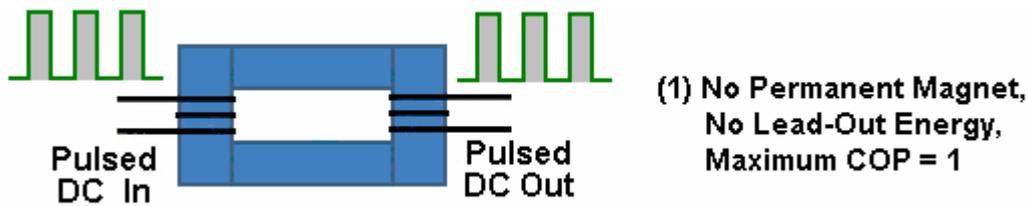
Lawrence comments on three possible arrangements. The first on shown above is the standard commercial transformer arrangement where there is a frame made from insulated iron shims in order to cut down the "eddy" currents which otherwise would circulate around inside the frame at right angles to the useful magnetic pulsing which links the two coils on the opposite sides of the frame. As is very widely known, this type of arrangement never has an output power greater than the input power.

However, that arrangement can be varied in several different ways. Lawrence has chosen to remove a section of the frame and replace it with a permanent magnet as shown in the diagram below. This alters the situation very considerably as the permanent magnet causes a continuous circulation of magnetic flux around the frame before any alternating voltage is applied to the input coil. If the pulsing input power is applied in the wrong direction as shown here, where the input pulses generate magnetic flux which opposes the magnetic flux already flowing in the frame from the permanent magnet, then the output is actually **lower** than it would have been without the permanent magnet.

(2) Permanent Magnet
Opposes Magnetic
Flux: COP < 1
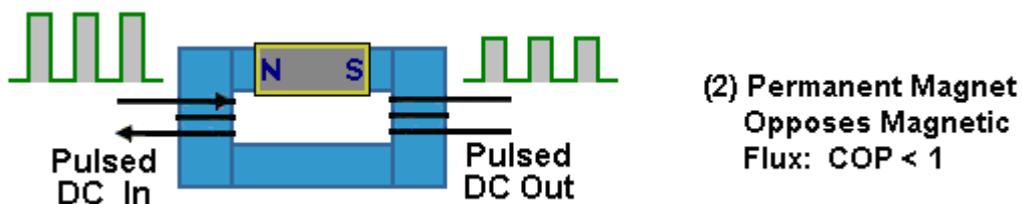
However, if the input coil is pulsed so that the current flowing in the coil produces a magnetic field which reinforces the magnetic field of the permanent magnet then it is possible for the output power to exceed the input power. The "Coefficient of Performance" or "COP" of the device is the amount of output power divided by the amount of input power which the user has to put in to make the device operate. In this instance the COP value can be greater than one:

(3) Permanent Magnet
Enhances Magnetic
Flux: COP > 1
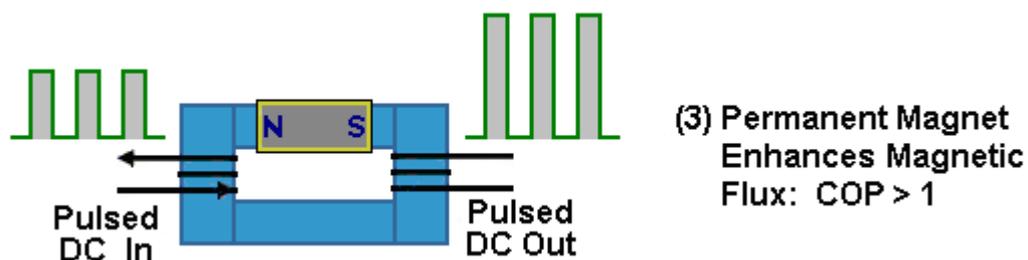
As it upsets some purists, perhaps it should be mentioned that while a square wave input signal is applied to the input of each of the above illustrations, the output will not be a square wave although it is shown that way for clarity. Instead, the input and output coils convert the square wave to a low-quality sine wave which only becomes a pure sine wave when the pulse frequency exactly matches the resonant frequency of the output winding. The oscilloscope display shown here is a typical output power waveform which has nearly 390,000 of these pulses per second.
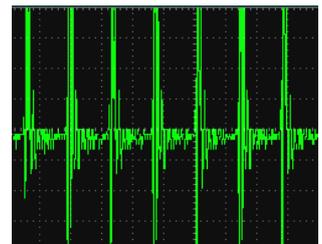
There is a limit to this as the amount of magnetic flux which any particular frame can carry is determined by the material from which it is made. Iron is the most common material for frames of this type and it has a very definite saturation point. If the permanent magnet is so strong that it causes saturation of the frame material before the input pulsing is applied, then there can't be any effect at all from positive DC pulsing as shown. This is just

common sense but it makes it clear that the magnet chosen must not be too strong for the size of the frame, and why that should be.

As an example of this, one of the people replicating Lawrence's design found that he did not get any power gain at all and so he asked Lawrence for advice. Lawrence advised him to omit the magnet and see what happened. He did this and immediately got the standard output, showing that both his input arrangement and his output measuring system both worked perfectly well. It then dawned on him that the stack of three magnets which he was using in the frame were just too strong, so he reduced the stack to just two magnets and immediately got a performance of COP = 1.5 (50% more power output than the input power).

The Transformers of Thane Heins.

Thane has developed, tested and applied for a patent for a transformer arrangement where the output power of his prototype can be thirty times greater than the input power. He achieves this by using a figure-of-eight double toroid transformer core. His Canadian patent CA2594905 is titled "Bi-Toroid Transformer" and dated 18th January 2009. The abstract says: The invention provides a means of increasing transformer efficiency above 100%. The transformer consists of a single primary coil and two secondary coils.

Magnetic flow is a thousand times easier through iron than it is through air. Because of that fact transformers are generally constructed on a frame made of iron or a similarly magnetic material. The operation of a transformer is nothing like as simple as school teaching would suggest. However, leaving parametric excitation aside for the moment, let us consider the effects of magnetic flow.

The way that off-the-shelf transformers work at the moment is like this:
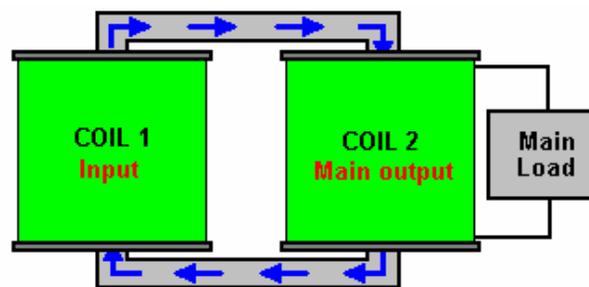
When a pulse of input power is delivered to Coil 1 (called the "Primary winding"), it creates a magnetic wave which passes around the frame or "yoke" of the transformer, passing though Coil 2 (called the "Secondary winding") and back to Coil 1 again as shown by the blue arrows. This magnetic pulse generates an electrical output in Coil 2, which flows through the electrical load (lighting, heating, battery charging, video displays, or whatever) providing it with the power which it needs to operate.

This is all well and good but the catch is that when the pulse in Coil 2 finishes, it also generates a magnetic pulse, and unfortunately, that magnetic pulse runs in the opposite direction, opposing the operation of Coil 1 and causing it to have to boost it's input power in order to overcome this magnetic flow in the opposite direction, shown here by the red arrows:
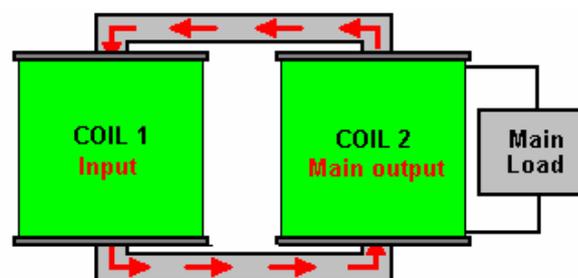
This is what makes current scientific "experts" say that the electrical efficiency of a transformer will always be less than 100%. This effect is caused by the magnetic path being symmetrical. Like the flow of electricity, magnetic flow passes along every possible path. If the magnetic path has low magnetic resistance (generally due to having a large cross-sectional area), then the magnetic flow through that path will be large. So, faced with several paths, magnetic flow will go along all of them in proportion to how good each path is for carrying magnetism.

Thane Heins has made use of this fact by making a transformer like this:
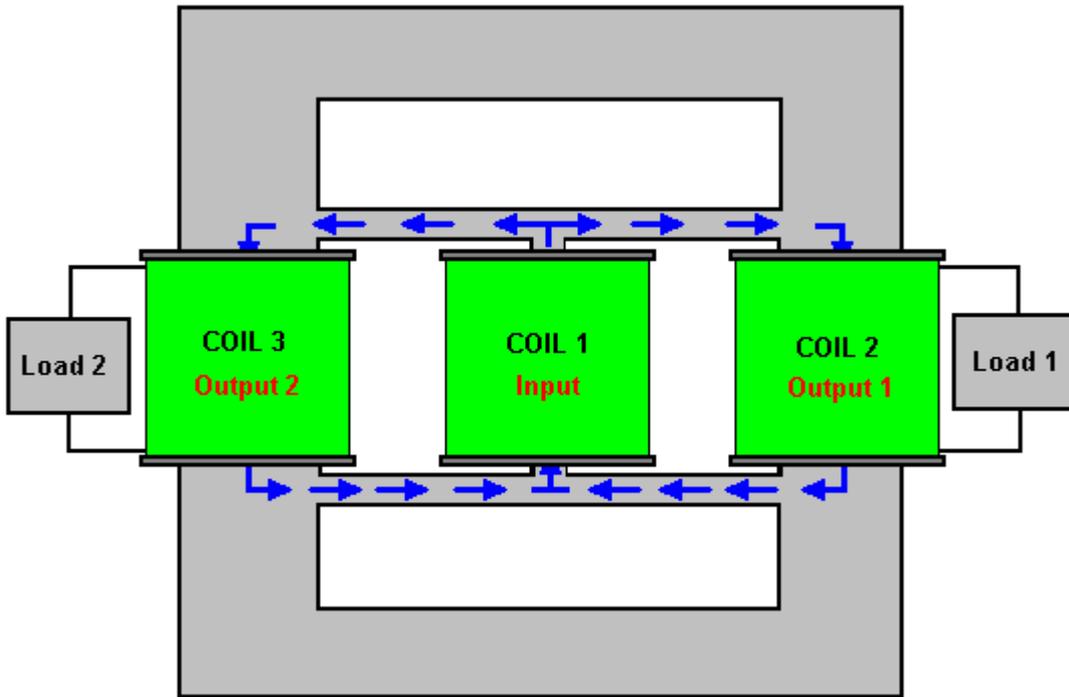
This style of transformer has got quite complicated magnetic flows when it is operating, although the diagram above only shows some of the flow paths generated when the input coil "Coil 1" is pulsed. The really interesting result is seen when that input pulse cuts off and we expect return magnetic flow from coil 2 and coil 3. What happens is this:
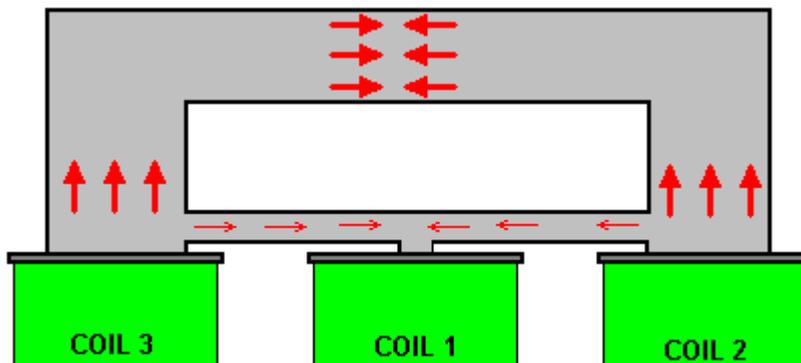
Assume that coil 2 and coil 3 are identical. The reverse magnetic flux coming out of coil 2 immediately encounters a junction with one path being far easier to use than the other. As a result, the vast majority of that magnetic flow follows the broad path, and only a small percentage flows through the narrow path. The broad path flow meets and is opposed by an identical large flow coming from coil 3, and those flows effectively cancel each other out. This produces a major improvement over an ordinary transformer. But, the small flow reaching the entrance to Coil 1 encounters two identical paths, and only one of those paths goes to coil 1, so the flux divides with half going towards coil 3 and half going through coil 1. That halves the strength of the already small percentage of the original, unwanted reverse magnetic flow into coil 1. The other half runs into the reduced flow from coil 3 and those halves cancel each other out. The overall effect is a really major improvement in the performance of the transformer as a whole.

In the patent document, Thane quotes a prototype test which had a primary coil winding with 2.5 ohms resistance, carrying 0.29 watts of power. The secondary coil 1 had a winding with 2.9 ohms resistance, receiving 0.18 watts of power. The Resistive load 1 was 180 ohms, receiving 11.25 watts of power. The secondary coil 2 had a winding with 2.5 ohms resistance, and received 0.06 watts of power. Resistive load 2 was 1 ohm, receiving 0.02 watts of power. Overall, the input power was 0.29 watts and the output power 11.51 watts, which is a COP of 39.6 and while the document does not mention it directly, the primary coil should be driven at it's resonant frequency.

A variation of this arrangement is to attach an outer toroid to the existing bi-toroid arrangement, like this:
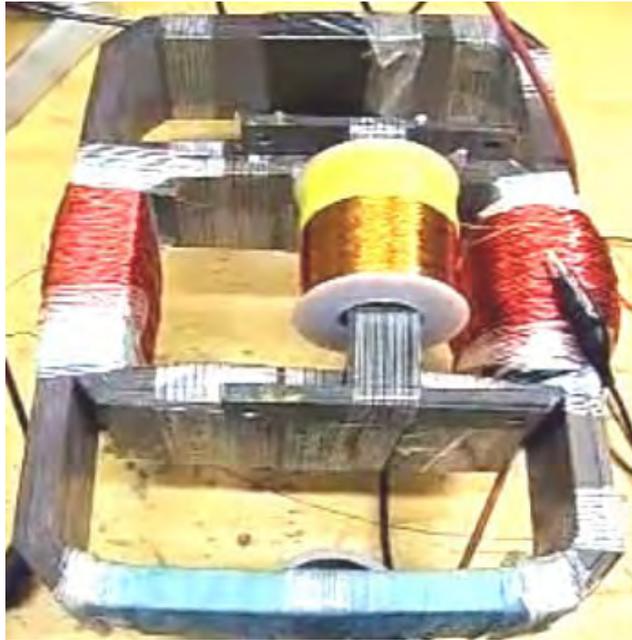

This prototype, as you can see, is fairly simple construction, and yet, given an input power of 106.9 milliwatts, it produces an output power of 403.3 milliwatts, which is 3.77 times greater.

This is something which needs to be considered carefully. Conventional science say that "there is no such thing as a free meal" and with any transformer, you will get less electrical power out of it than you put into it. Well, this simple looking construction demonstrates that this is not the case, which shows that some of the dogmatic statements made by present day scientists are completely wrong.

At https://youtu.be/-LBnnL4v8MQ?list=PLkH1zLdXy1Sy3_St1tUwtY_6qiusDkyG9 Thane shows a video where his bi-toroidal transformer is constructed from three ordinary toroids held together with cable ties:

Thane then goes on to demonstrate the performance of this combination:
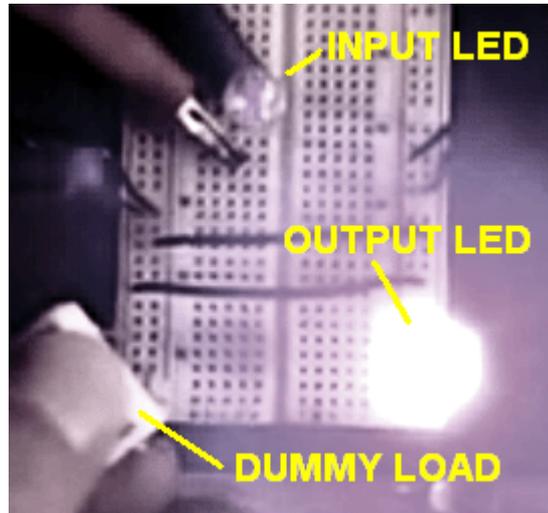
The LED associated with the power being fed to the primary winding is so low that no light is visible. The output LED is lit so powerfully that the camera has difficulty in displaying it. The dummy load is a single resistor placed across the third winding and there is a major performance difference when it is plugged into place. This video demonstrates very clearly, the difference caused by using a bi-toroidal transformer.

This simple and elegant modification of the humble transformer, converts it into a free-energy device which boosts the power used to drive it and outputs much greater power. Congratulations are due to Thane for this technique and for his sharing it openly with anyone who is interested.

### The High-power Motionless Generator of Clemente Figuera

In 2012 a contributor who uses the ID 'Wonju-Bajac' started a forum to investigate the work of Clemente Figuera at http://www.overunity.com/12794/re-inventing-the-wheel-part1-clemente_figuera-the-infinite-energy-achine/#.UXu9gzcQHqU and member 'hanlon1492' contributed enormously by producing English translations of Figuera's patents.

Clemente Figuera of the Canary Islands died in 1908. He was a highly respected individual, an Engineer and University Professor. He was granted several patents and was known to Nikola Tesla. Figuera's design is very simple in outline.

In 1902 the Daily Mail announced that Mr. Figuera, a Forestry Engineer in the Canary Islands, and for many years Professor of Physics at St. Augustine's College, Las Palmas, had invented a generator which required no fuel. Señor Figuera has constructed a rough apparatus by which, in spite of it's small size and it's defects, he obtains 550 volts, which he utilises in his own house for lighting purposes and for driving a 20 horse-power motor.

The Figuera Device looks like a complicated transformer, but in fact, it isn't. Instead, it is two sets of seven opposing electromagnets with an output coil positioned between each opposing pair of electromagnets. The physical position of the electromagnets and output coils is important as they are positioned very close to each other and there are induced magnetic fields between adjacent electromagnets and between the output coils due to their close proximity.

The two sets of electromagnets are wound with very low-resistance, high-current wire or possibly, even with thick foil. The information given in the Figuera patent states that the electromagnets will be referred to in the patent by the letters "N" and "S" and it is now thought that those two letters are deliberately misleading as people tend to think of those letters referring to "North magnetic pole" and "South magnetic pole" while in reality, the electromagnets almost certainly oppose each other, that is, with North poles facing each other or possibly, with South poles facing each other. The arrangement is believed to be like this when seen from above:
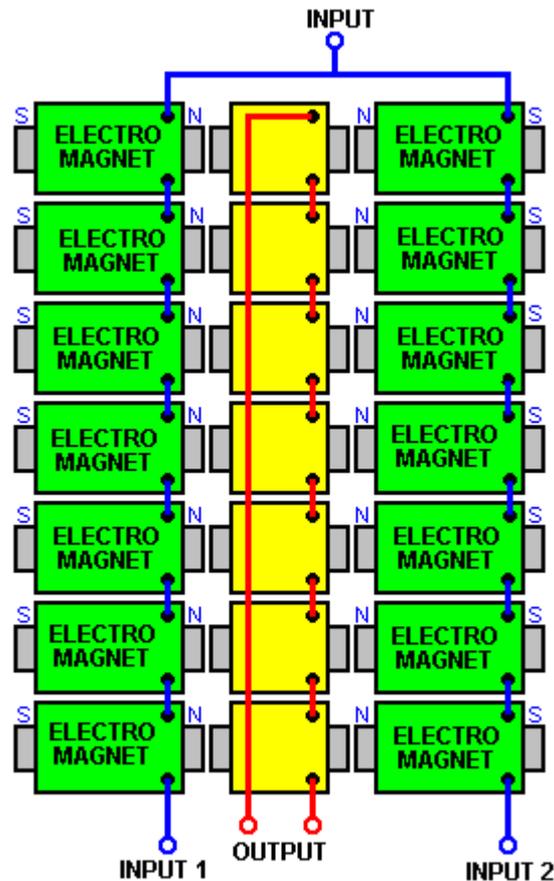
This arrangement creates a magnetic Bloch wall (or magnetically null point) in the centre of the yellow output coils and the position of that magnetic balance point is very easily moved if the power supply to the two sets of electromagnets is altered slightly and any movement of that magnetic balance point creates a substantial electrical output due to the alteration of the magnetic lines cutting the turns of wire in the yellow output coils. While the sketch shown above indicates a small gap between the electromagnets and the output coils, it is by no means certain that any such gap is needed and while winding the three coils is more convenient if they are separate, when wound and being assembled, their cores may well be pushed together to form one continuous magnetic path.

Another thing which has confused people (including me), is the drawing in the patent which looks like an electrical commutator, but which is **not** part of the Figuera generator design. It looks like this:
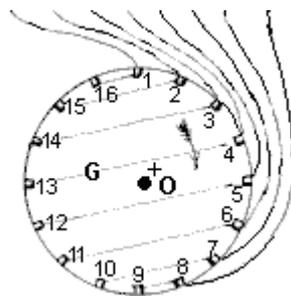
The dotted lines indicate internal electrical connections, so for example, contact 14 is connected to contact 3, but let me stress again that this unit is **not** part of the design and while it is used to "explain" the actual operation, I would not be surprised if it were not intended to misdirect people from the actual operation.

This point has been stressed and it has been suggested that the actual working device is magnetic in nature and could be constructed like this:
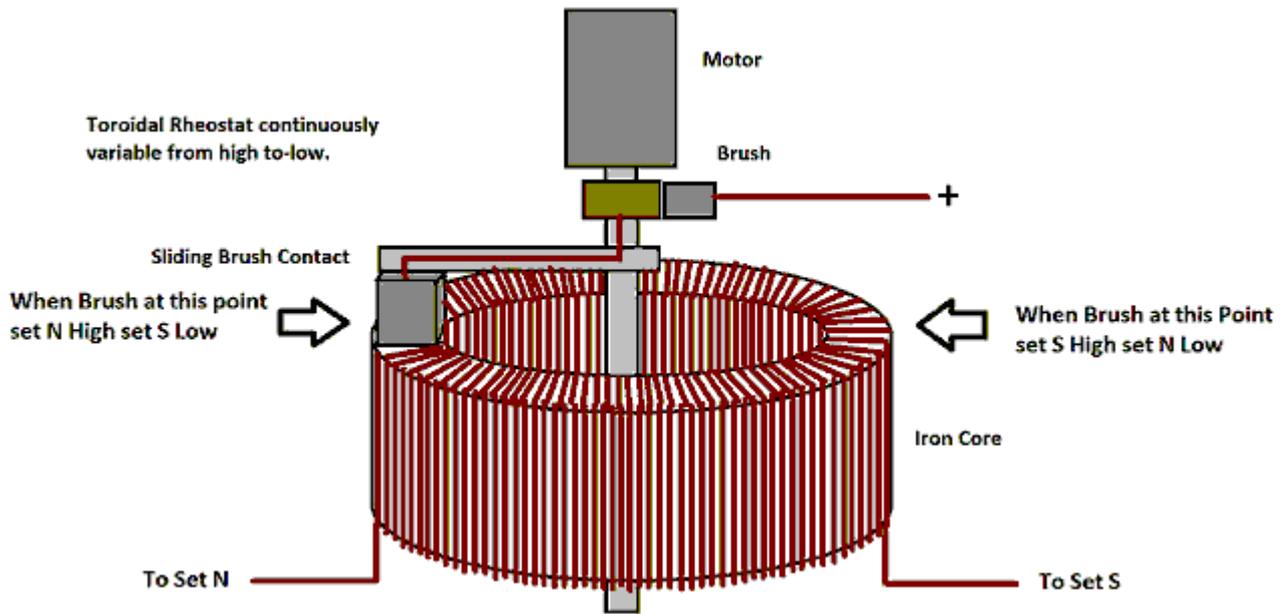
This looks like a very simple device but it is an item of major importance in the Figuera design. First, the core is solid iron (sometimes called "soft iron" but if you were beaten with a bar of it you certainly wouldn't call it "soft"). The most important characteristic of such a core is its magnetic properties as it is able to store energy. Please remember that this switching device is primarily magnetic in nature. It looks like this:
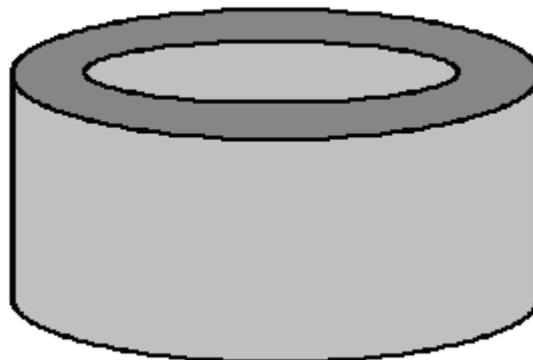
This core is then wound with thick wire – perhaps AWG #10 or 12 SWG (2.3 x 2.3 mm square wire) . The turns of wire should be tight, side by side and sit exactly flat on the top surface as the wire there will be contacted by the sliding brush:
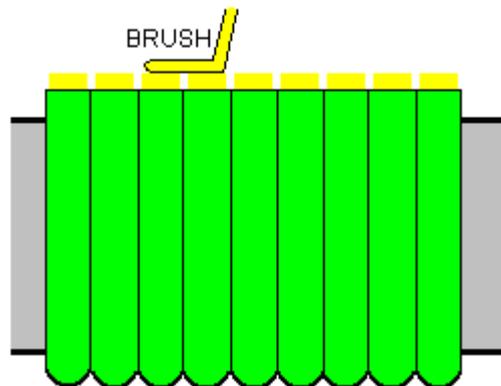
The sliding brass contact or "brush" is dimensioned so that it connects across two adjacent wires so that there is never any sparking as the brush contact slides around the circle of wires. The brush is driven by a small DC motor. In order for the sliding brush to contact the wire, the plastic insulation needs to be removed from the top half of the wire with the remaining insulation keeping the turns from short-circuiting together. The wire is wound half of the way around the iron core and a short length of wire is left to make an electrical connection. An additional winding is then made to cover the remaining half of the core and again, a length for connection is left before cutting the wire. This gives you two windings each covering 180 degrees around the core. The wire turns

are strapped tightly with tape or cord wound around the side of the core as that holds the wires securely in place. The two wire ends on each side are connected together, giving a 360 degree winding with good electrical connections 180 degrees apart.

There are many ways to arrange the small DC motor so that it drives the brush slider. The motor could be mounted on a strip passing over the core, or on the baseboard, or to one side using a belt or gearwheel drive link. It does not matter which direction the brush moves around the core. The speed of rotation is not critical either although it does determine the alternating frequency of the output. In most cases, the output will power a heating element or will be converted to DC to give the local mains frequency and voltage.

When we first look at a device like this, we immediately think of the flow of electric current passing through the wire wound around the iron core. It appears as if the current is limited by the overall length of the wire between the brush position and the two outputs, but the reality is that while that is correct to a certain extent, the main control of the current flow is the magnetic field inside the circular iron core, and that field causes reluctance (resistance to current flow) proportional to the number of coil turns between the brush and each output. This alters the current flow to the set of "N" electromagnets compared to the current flow to the set of "S" electromagnets.

As the magnetic intensity generated by the set of "N" electromagnets increases, the magnetic intensity generated by the set of "S" electromagnets decreases. But, as the magnetic power of the set of "N" electromagnets overcomes the magnetic field of the set of "S" electromagnets, that magnetic field gets pushed back into the soft iron core of the commutator device, essentially storing energy in that core. When the system needs to replace the energy lost in heating, it can use that stored magnetic energy in the commutator core, raising the overall efficiency. In this design, the current flowing through the electromagnets is always in the same direction and never drops to zero, merely oscillating in its intensity.

The overall arrangement is like this:
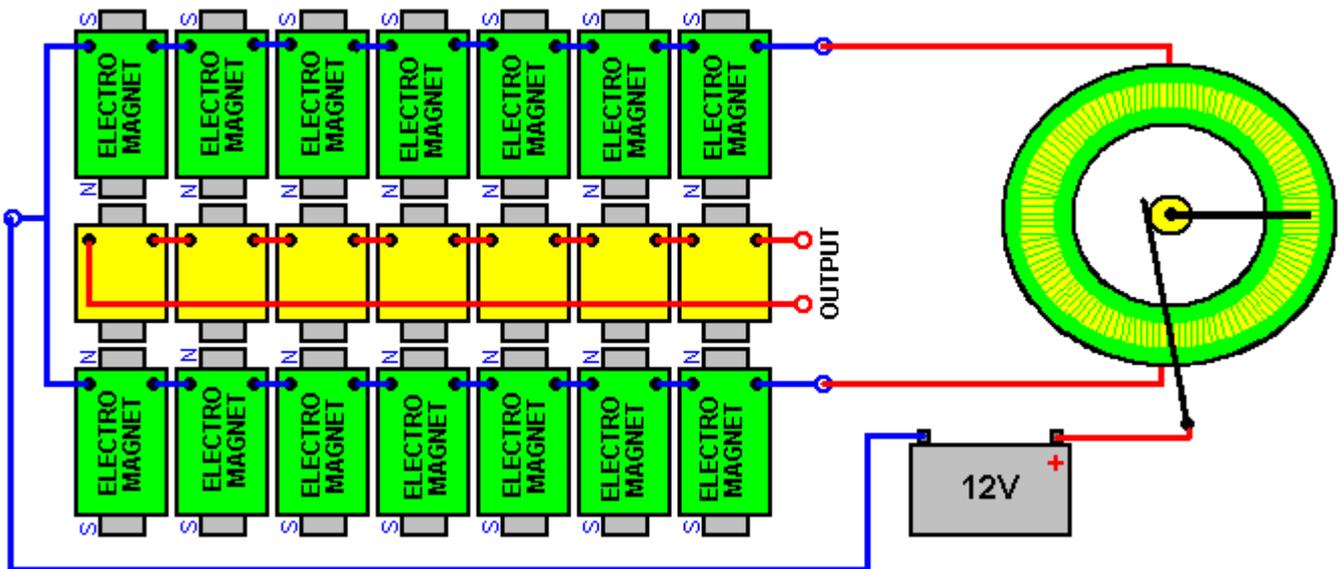
While the sketch above shows a 12-volt battery, there is no great reason why it should not be 24-volt or higher, especially if the wire used to wind the electromagnets is smaller diameter. The amount of power needed to create a magnetic field is not related to strength of the magnetic field and a larger number of turns of thinner wire with a small current flowing through the wire can create a stronger magnetic field than few turns of thick wire with a large current flowing through those turns.

The Alexkor Zero-Back-EMF Coils

Alex in Russia who has shared several of his motionless pulse-charging systems for batteries, now shares his design which does not appear to have any back-EMF effect on the primary coil. If that is the case, then any increase in output current draw does not have a corresponding increase in the current flowing through the primary coil. That is completely different to the way in which a conventional transformer operates.

The arrangement is somewhat like the Transmitter / Receiver arrangement of Don Smith and while it looks to be a simple arrangement, is isn't. Alex draws his coil configuration like this:
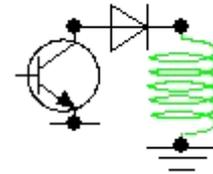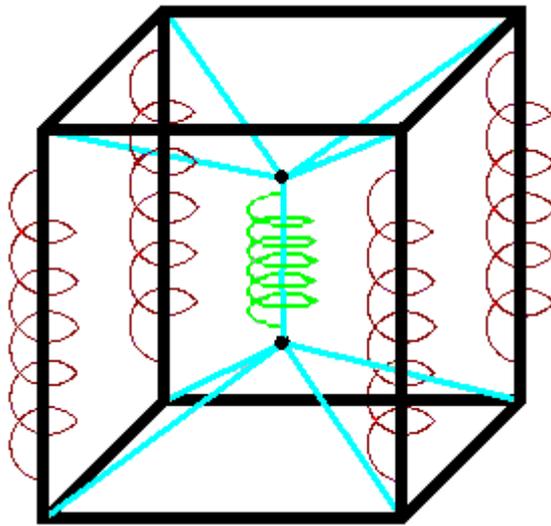
Here, his chosen form of construction is a frame of twelve lengths of 20 mm diameter plastic pipes – four at the top, four at the bottom and four verticals. Each pipe is filled with ferrite powder and there is an output coil wound on each of the four vertical pipes. Suspended in the centre is the primary coil which is 15 mm in diameter. All five coils are wound using 0.5 mm diameter enamelled copper wire (swg 25 or AWG #24). While Alex's drawing shows a single strand of wire, the actual arrangement for the four output coils is that they are wound as a single layer bi-filar coil:
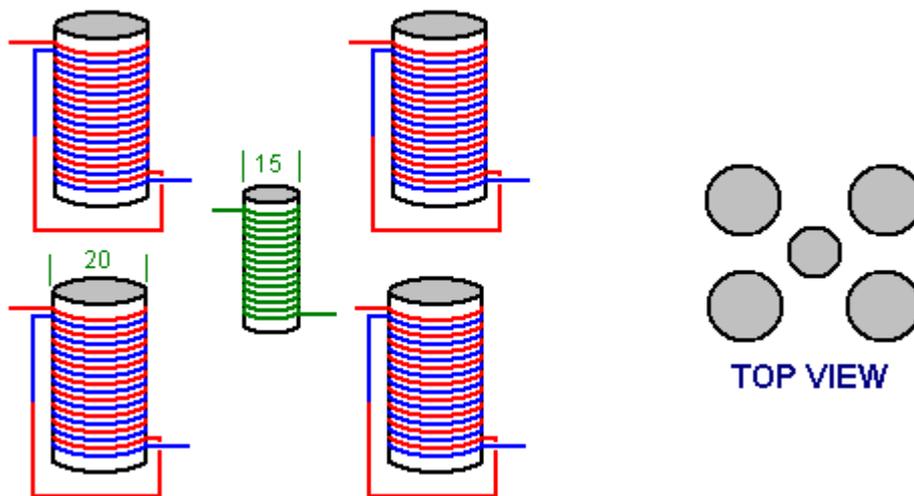
For this, the output coils are wound with two strands of wire side by side, in a single layer along the length of the plastic pipe. Then, the start of one wire is connected to the end of the other wire. As the coils are filled with ferrite, they can operate at high frequency, when the 15 mm primary coil is fed with either DC pulses or an AC sine wave. Each output coil can provide a separate output or the output coils can be connected in series to give a higher voltage or connected in parallel to give a higher output current.

Alex also shows how ferrite toroids can be used, even with 220V mains, to give back-EMF-free transformer operation. If the input frequency is as low as the mains, then the toroids may be iron-dust types or they can be constructed from iron shims in the same way that ordinary mains transformers are constructed. However, please understand clearly that the current flowing through any coil connected across a high voltage source such as 110V or 220V and using any of the following configurations, is limited by the impedance of the coil itself. 'Impedance' is effectively 'AC resistance' at the frequency of the AC voltage supply. If the coil impedance is low, then the current flowing through the coil will be high and since the power dissipated by the current flow is Voltage x Current, the power dissipation with increased current goes up very quickly when the voltage level is as high as 220 volts. The power dissipation is in the form of heat which means that with excessive power dissipation, the wire in the coil is liable to melt or 'burn out' in an impressive flash of flame, smoke and blackened wire. Consequently, the coil winding needs to have many turns and the wire diameter needs to be sufficient to carry the current flow – the wire table on page 1 of the Appendix shows the current which can be carried by each size of wire when wound into a

coil. If there is no back-EMF effect with the following configurations, then the current in the primary winding connected across the mains will not be affected by the other coils, so remember that when preparing the primary coil.

The first arrangement uses three toroids to give four separate outputs. The amount of current which can be drawn from any secondary depends on the amount of magnetic flux which can be carried by the magnetic core or cores between the primary coil and that particular secondary coil. Obviously, the output current draw will also be limited by the current-carrying capacity of the wire used in the secondary coil. If that level of current is exceeded for any length of time, then the insulation of the wire will fail, turns will short-circuit together, the coil impedance will drop, the current increase further and the coil will burn out – so, common sense is called for.
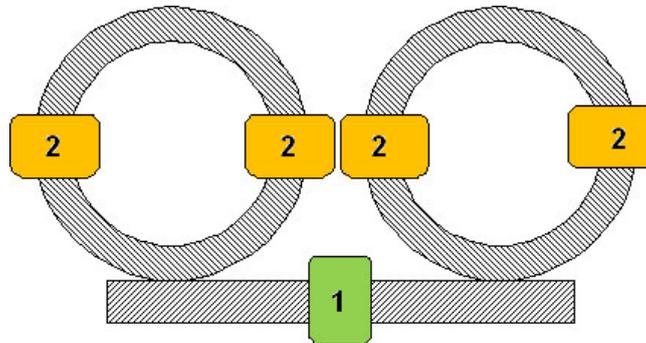
Here, the primary coil "**1**" is wound on a toroid which is horizontal in the picture above, and the secondary coils "**2**" are wound on toroids which are shown as vertical in the drawing. The important point here is that the toroids with the secondary coils, touch the primary coil toroid at right angles, that is, at 90-degrees. For convenience of winding the coils, any toroid can be assembled from two half toroids which allows the coil to be wound separately and when completed, slid on to one of the C-shaped half toroids before the two halves are placed together to form the complete toroid.

The second arrangement three toroids:
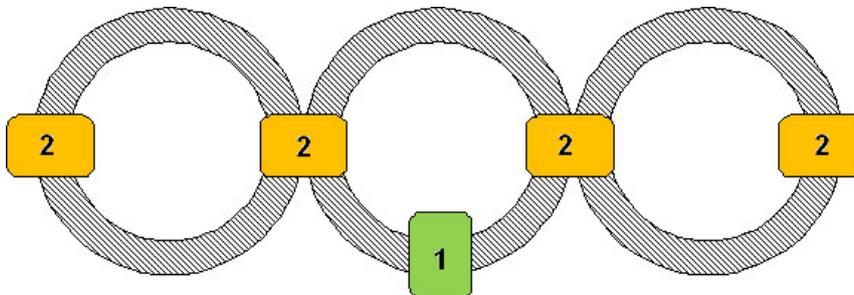
The third arrangement uses four toroids, in a more powerful arrangement where the magnetic flux carrying capacity of the transformer is doubled as the cross sectional area of the toroids inside each coil is doubled. This is a more difficult arrangement to construct and if the coils are to be wound on a separate coil winder, then the toroids each need to be made from one half-toroid plus two quarter toroids so that the coils can be slipped on to two separate quarter-toroid sections which are curving in opposite directions, unless of course, the inside diameter of the coils is a good deal larger than the toroid cross section (which reduces the number of turns for any given length of coil wire):
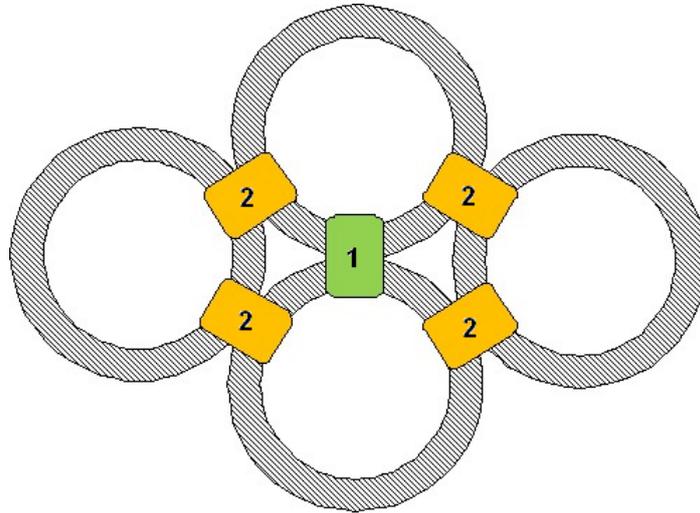
If these simple transformer arrangements operate as back-EMF-free devices as claimed, then the current draw from any, or all, of the secondary windings does not have any effect on the current flowing through the primary coil. This is quite unlike present day commercial transformers which are wound symmetrically, which in turn causes the current draw in the secondary coil to force an increased current in the primary winding.

Alex (http://www.radiant4you.net/) also shows another arrangement which uses seven toroids. He states that this arrangement is also free from the energy-wasting back-EMF designs used at present in most commercial items of equipment. He specifies that the intended operating frequency is 50 Hz which is the frequency of the mains as the difference between 50 Hz and the 60 Hz used in America is not significant in any way. This frequency suggests that the toroids could readily be made of iron as in commercial transformers. The prototype was wound with 0.5 mm diameter wire and aimed at a power level of 100 watts. The capacitors are high-power oil filled with capacitances up to 40 microfarad and rated at 450V when using 220V mains input. The tuning is very much like that of the RotoVerter shown in chapter 2. The physical layout is:
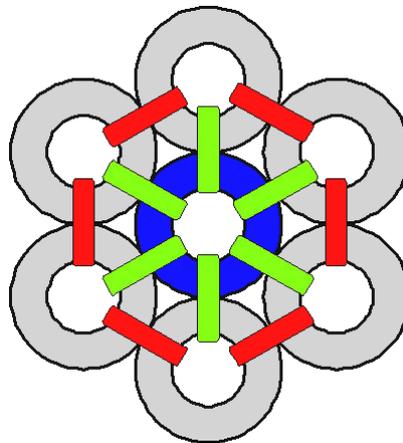
The central toroid is wound all around its circumference as indicated by the blue colour. This winding is fed directly with the input current source which would normally be from the mains or from a mains transformer, probably at a lower voltage.

There are then twelve output coils, six shown here in green and six shown in red. For best operation, each of these output coils need to be 'tuned' to the central coil and that needs to be done by altering the capacitor size by experiment to get the best performance from each coil. When properly set up, increasing the current draw from any of the output coils does not increase the power flowing into the central input coil. This contradicts what is normally taught in schools and universities as they are only familiar with symmetrically wound transformers and motors where increased output current does indeed oppose the input power, causing increased input current and heat waste. The circuit is:
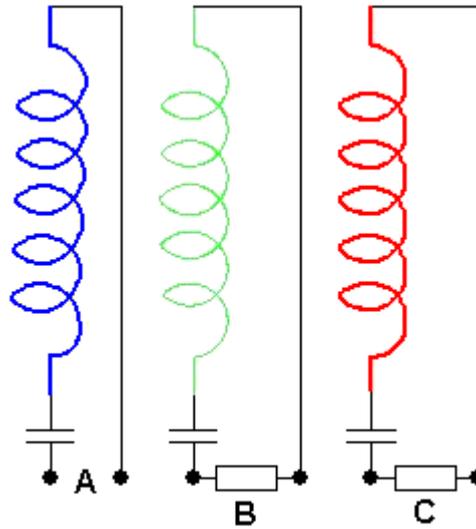
The blue coil has the power input at "A" and the capacitor in series with each coil is there to get all of the windings to resonate at the same frequency. The items "B" and "C" represent the useful load being powered by each coil, although, obviously, only two of the twelve output coils are shown in the circuit diagram above, and there are an additional five green and five red coils which are not shown in the circuit diagram.
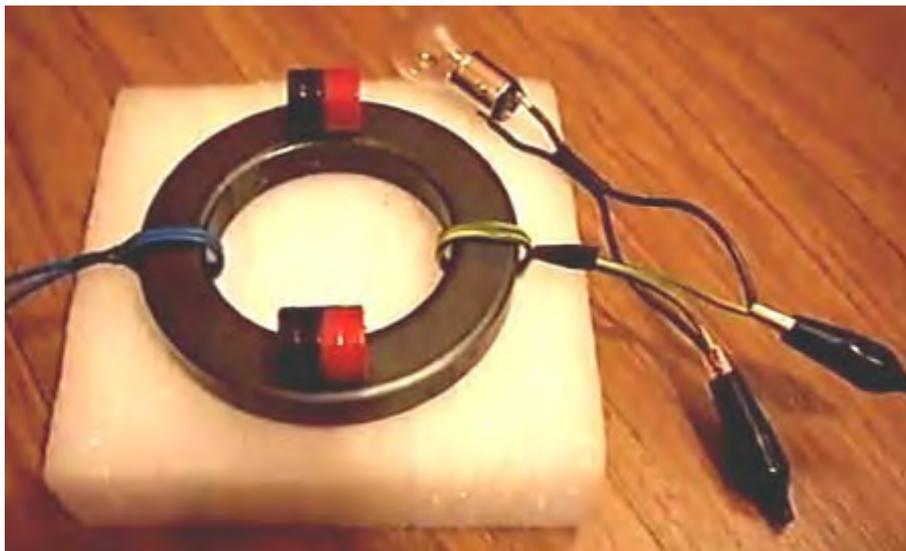
It is probably worth remembering that adding a magnet to a toroid or closed-loop core transformer can boost the output provided that the permanent magnet is not strong enough to saturate the core completely and prevent oscillation of the magnetic flux. This has been shown by Lawrence Tseung, Graham Gunderson and others, and so it might be worth while to experiment further with these configurations along the lines shown in the video at https://www.youtube.com/watch?v=sTb5q9o8F8c&list=UUaKHAdY13gp-un2hn_HJehg&index=1&feature=plcp.

The Easiest Version:

Alexkor has produced a simplified Lenz-law-free design, using commercial toroids already wound as step-down mains transformers. One supplier is http://www.electro-mpo.ru/card8524.html#.VXsfKIIon7s with transformers of this type on offer:

Sono destinati ad uso dei diversi strumenti e dispositivi elettrici (alimentatori, filtri, dispositivo di disaccoppiamento), così come un'applicazione separata.
Grado di protezione: IP 20.
Produttore: Trasformatori Tulskij Zavod.

* È ordine fornito.

Mark	Potenza, kVA	Tensione primaria,	Tensione secondaria,	Dimensioni d'ingombro, mm	Massa, kg	N. p/l
OSM t 220/12-0, 025	0.025	220	12	65 × 40	0.45	B3806
OSM t 220/24-0, 025	0.025	220	24	65 × 40	0.45	B3807
OSM t 220/36-0, 025	0.025	220	36	65 × 40	0.45	B3808
OSM t 220/12-0, 04	0,04	220	12	90 × 35	0,7	B3809
OSM t 220/24-0, 04	0,04	220	24	90 × 35	0,7	B3810
OSM t 220/36-0, 04	0,04	220	36	90 × 35	0,7	B3811 *
OSM t 220/110-0, 04	0,04	220	110	90 × 35	0,7	B3812
OSM t 220/12-0, 063	0,063	220	12	90 × 45	0.9	B3816
OSM t 220/24-0, 063	0,063	220	24	90 × 45	0.9	B3817
OSM t 220/36-0, 063	0,063	220	36	90 × 45	0.9	B3818
OSM t 220/110-0, 063	0,063	220	110 ←	90 × 45	0.9	B3819
OSM t 220/12-0, 1	0.1	220	12	95 × 50	1.2	B3822
OSM t 220/24-0, 1	0.1	220	24	95 × 50	1.2	B3823
OSM t 220/36-0, 1	0.1	220	36	95 × 50	1.2	B3824
OSM t 220/110-0, 1	0.1	220	110 ←	95 × 50	1.2	B3825
OSM t 380/220, 0-1	0.1	380	220	95 × 50	1.2	B3826
OSM t 220/12-0, 16	0.16	220	12	120 × 60	2.1	B3830
OSM t 220/24-0, 16	0.16	220	24	120 × 60	2.1	B3831
OSM t 220/36-0, 16	0.16	220	36	120 × 60	2.1	B3832

The technique is to remove the plate covering the central opening and connecting the 220V and 110V windings in series. Two of these transformers are used, each of them connected with their 220V and 110V windings wired in series and then the toroids either placed side by side or alternatively stacked on top of one another with a 1 millimetre thick sheet of plastic between them.

In the configuration where the toroids "A" and "B" are placed side by side, a power extraction winding "D" is wound between them:
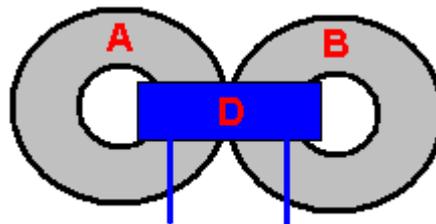
In the case where the toroids "A" and "B" are arranged in a stack with 1 mm plastic sheet between them, the power extraction winding "D" is wound around the two toroids, enclosing them both:
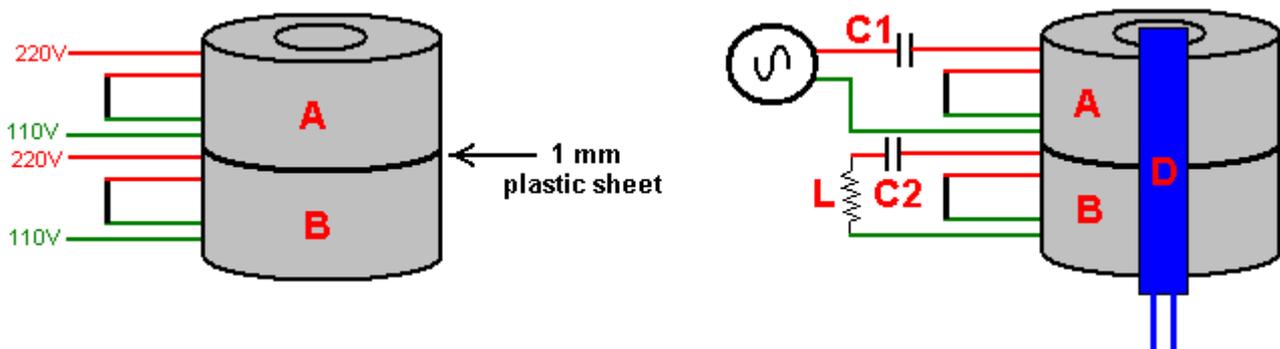
While the winding "D" is shown as a narrow strip in the diagram, that is only to make the drawing easier to understand as in reality, the winding "D" is continued all the way around the whole of the circumference of the toroids and it can be many layers deep to suit the desired output voltage.

Toroid "A" has a tuning capacitor "C1" which is adjusted in value to achieve resonance in that circuit as that minimises the current flowing into toroid "A" from the mains.

Toroid "B" has a capacitor "C2" which is adjusted to give the highest output voltage (typically 600 volts) coming from toroid "B". The purpose of toroid "B" is to divert the reverse magnetic flow in Toroid "A" and so, produce an

efficient working system. The load "L" is in theory, a dummy load, but in reality there is no reason why it should not be considered to be an actual working load if that output is convenient to use.

The output winding "D" is free of the Lenz law effect and the input current from the mains is not affected in any way when the current draw from coil "D" is increased, or even short-circuited. Alexkor stresses the fact that as the toroids are supplied already wound, this is actually a very easy design to replicate.

The Self-Powered Generators of Barbosa and Leal

In July 2013, two Brazilian men, Nilson Barbosa and Cleriston Leal, published a series of patents which appear to be very significant. Their patent WO 2013/104042 published on 18th July 2013, is entitled "Electromagnetic device for Capturing Electrons from the Ground to Generate Electricity" and has some very interesting features. It describes a simple device which they describe as an "electron trap". Their patents are written in Portuguese.

An unusual feature of this design is the fact that it has a continuous conductive loop, in which it is claimed, current flows continuously, even without the need for an applied voltage. Instead, it is the magnetic fields of electromagnets which keep the current flowing. They state that an insignificant amount of input power produces a substantial power output, and they consider a COP of 100 to be about the minimum performance which can be expected from the design. That is a 1 watt input for a 100 watt output. One version of the electron trap looks like this:
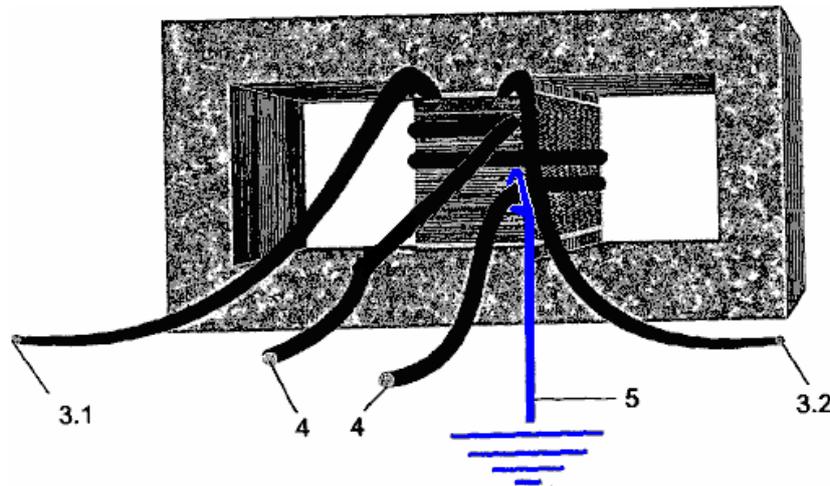
The inventors describe their device like this: "this electromagnetic-field-generating device, powered by a power source, produces an electromagnetic field which induces an electric current in a closed conductive circuit, creating an interaction between the magnetic poles of the equipment and the magnetic poles of the earth - through both electromagnetic attraction and repulsion. An endless supply of electrons is drawn from the earth into the conductive closed loop, which is connected to the ground through a conductive interconnected grid. The attracted electrons add to the current already flowing in the conductive closed loop, making power available for driving high-power loads, although the device itself is supplied with only a small amount of power."

One very interesting feature is that the continuous-loop coil formed by wire **4** in the diagram above, is literally, only two turns of wire. The power-gaining mechanism, amazingly, is the earth wire (shown in blue) which is merely wrapped around wire **4** and not directly connected to it as the electron-transfer link is by induction. With this arrangement, the current circulating in the closed loop wire **4**, attracts more electrons from the ground, flowing through the wrapped connection of wire **5,** into wire **4**, augmenting the current flow there by a major amount. Wire **3** can have an alternating voltage applied to it in order to get alternating current in wire **4**, but please understand

that the current flowing in wire **4** is **not** the result of the current in wire **3**. If the current in wire **3** is DC, then the current in wire **4** will be DC as this is **not** a conventional transformer, but instead, it is an electron trap, operating in an entirely different way.

The electron trap can be connected in an AC circuit of this type:
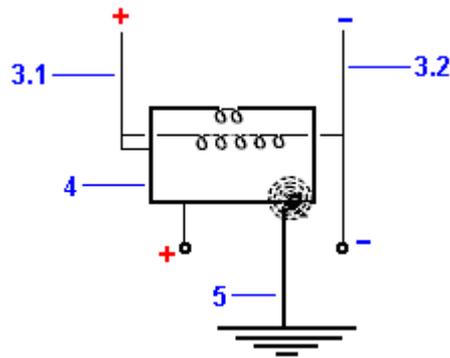
Here, the earth wire **5** is wrapped around the continuous loop wire **4**, feeding it additional electrons captured from the ground. The ends of wire **4** are connected together to form the loop, and that connection also forms the positive side of the output (where a DC output is being produced). The magnetic field produced by the current flowing in wire **3**, acts on the electron flow coming from the earth, but as it does not provide any of the electric power flowing in wire loop **4**, the current flowing in wire **3** can be tiny, without affecting the power output.

In their patent WO 2013/104043, also of 18th July 2013, they show several different ways of connecting their electron trap in a useful circuit. For example, like this:

Fig.1
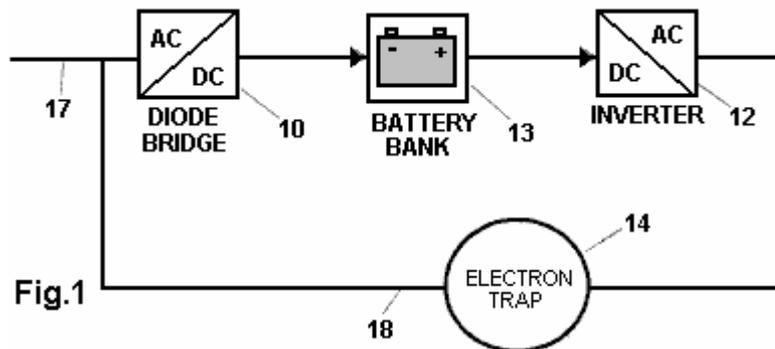
Here, the battery **13**, is used to power an ordinary inverter **12**, which produces a high alternating voltage, in this case, at very low power. That voltage is applied to the wire 3.1 to 3.2 of the electron trap, creating an oscillating magnetic field, which creates an oscillating inflow of electrons into the closed loop wire (4), which creates an amplified electrical output at the same frequency – typically 50 Hz or 60 Hz as those are the common mains frequencies. That amplified power output from the electron trap **14**, is passed along wire **18** to an ordinary diode bridge **10**, and the pulsing DC from the bridge is smoothed and used to replace the battery input to inverter **12**. The battery is now switched out of the circuit and, as well as making the overall circuit self-powered, the power coming from the electron trap is used to recharge the battery if it needs recharging (and/or, perhaps, to charge the batteries of an electric car). Because the electron trap needs almost no input power at all, the input power to the inverter is very small, and so a good deal of additional AC power can be drawn off through cable **17**, and used to drive powerful electrical loads, with no electrical power being needed from the battery. Being self-powered, the COP value for the circuit is infinity.

Just as there are several different ways of using an electron trap in a circuit, there are several ways of constructing and connecting an electron trap. While it is possible to arrange the components so that the power output is 2-phase or 3-phase, here we will just deal with the ordinary, household, single-phase power supply.

The first variation is to use more than one frame. Two frames can be connected like this:
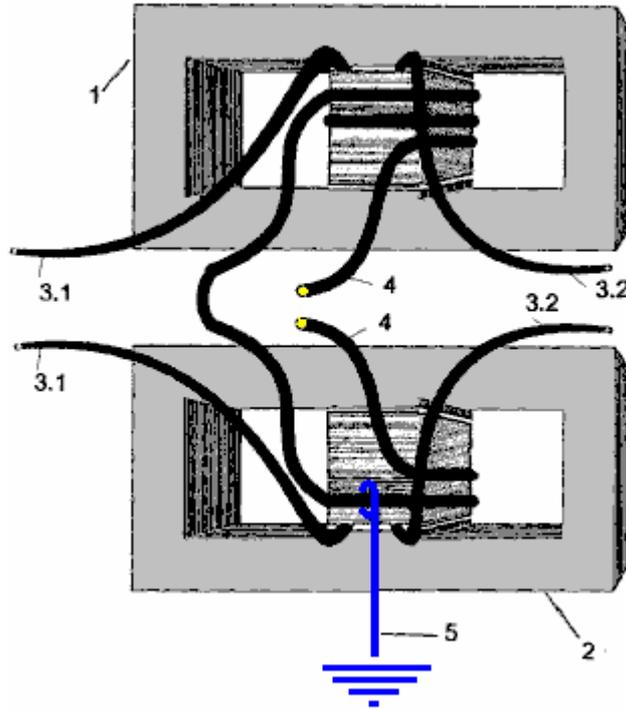
This is the actual drawing from the patent and it presents a slight problem in that it is not physically possible to implement the number **4** wire in the way shown. Each frame will have two complete turns wound on it, although the drawing does not show this. Because of the inaccuracy of the drawing, I am not able to say if the coil turns on frame **2**, are in the same direction as those on frame **1**. There are four possible ways of winding these 2-turn coils when interconnecting them, so perhaps experimentation can be used to determine which method works best.

With this two-frame arrangement, there is just the one earth wire **5**, as before, again, it is wrapped around wire **4** rather than being physically connected to it. The continuous wire loop **4** has two ends as before, but there are now two **3.1** wire ends and two **3.2** wire ends. The Portuguese translation programs produce highly questionable results for this area of the patent, but I gather that the inventors intend the two 3.1 ends to be connected together and the two 3.2 ends to be connected together, and then the joined ends are treated exactly as before, effectively putting the two windings in parallel.

One disadvantage of this design is that it is not portable due to the earth connection. Barbosa and Leal deal with this problem in their patent WO 2013/104041 of the same date where they show a method of constructing an electron trap which collects excess electrons from the air. If you feel that there are no excess electrons in the air, then consider the fact that all of the aerial designs in chapter seven all extract and use those electrons. Also, consider the amount of electricity in a lightning strike, where much of the electrical energy comes from the air, and remember that world wide, there are between 100 and 200 lightning strikes every second.

The free-electrons-in-the-air electron trap is somewhat more complicated than the earth-wire electron trap, with four pairs of coils (**3** and **4**) being mounted inside two aluminium hemispheres (**1**):

Fig. 6
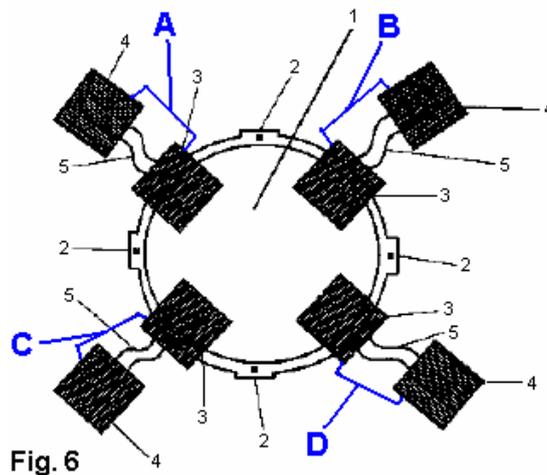
The methods for using the air-electrons trap are the same as those for the earth-wire electron trap.

An earth-wire video demonstration is here: https://www.youtube.com/watch?v=SvcrqODpDY4 with 22 watts producing 6 kilowatts. To further research this invention, try the extensive information available via https://www.youtube.com/results?search_query=Barbosa+e+Leal

An attempted translation of one of the three Barbosa/Leal patents is here:

WO Patent 2013/104043   18th July 2013   Inventors: Nilson Barbosa and Cleriston Leal

ELECTRIC ENERGY GENERATION SYSTEM WITH FEEDBACK

Note: These three patents are in Portuguese and what is shown here is a low-quality attempt at translation into English using a translation program. The originals can be downloaded free from: http://worldwide.espacenet.com/singleLineSearch?locale=en_EP.

Fig 1
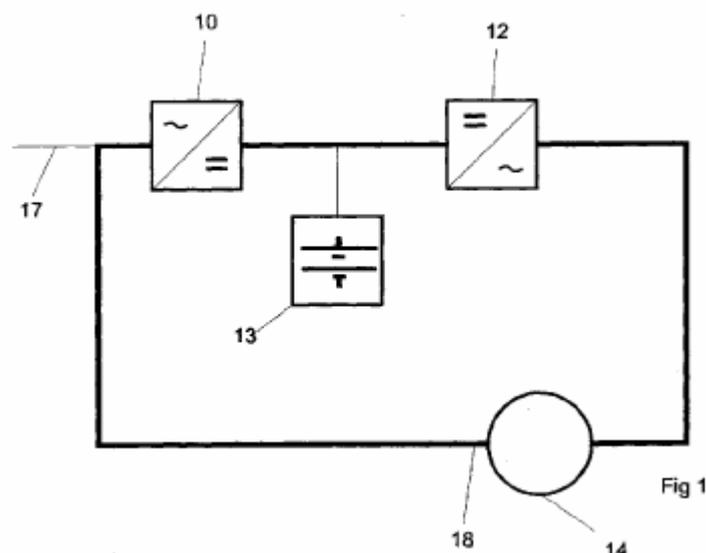
Abstract:
The present invention relates to electric energy generation equipment comprising a basic circuit formed by a rectifier (**10**), for example, an AC/DC converter connected in series to an inverter (**12**), for example, a DC/AC converter, and a bank of batteries (**13**) connected in series between the rectifier (**10**) and the inverter (**12**). An electron-capturing element (**14**), which can be either a free space electron-capturing element or, alternatively, an earth electron-capturing element, is connected in series to the basic circuit formed by the rectifier (**10**), the inverter (**12**) and the battery assembly (**13**). The bank of batteries (**13**) powers the basic circuit because it is

connected to the system. Consequently, the inverter (**12**) converts direct current into alternating current and supplies this current to the electron-capturing element (**14**). After receiving the electric current from the inverter (**12**), the electron-capturing element (**14**) starts capturing electrons from the alternating current and powering the rectifier (**10**), which converts the alternating current into a direct current in order to recharge the bank of batteries (**13**) and power the inverter (**12**) which powers the electron-capturing element, closing the feedback loop, and also providing electric energy for consumption by external loads.

SELF-POWERED ELECTRICITY GENERATOR.

Technical field
The present invention relates to a device for generating electricity, in particular self-powered equipment for generating electricity.

Description of the Related Art
There are many methods for generating electricity using electromagnetism, but all of these are electromechanical devices using magnets and have limited generating capacity and an ecological impact which makes them unsuited to large scale projects.

Objectives of the Invention
The aim of this invention is the sustainable generation of electricity, using a generator which is able to produce large amounts of electricity from an extremely low input current, which initially is supplied by a bank of batteries, but subsequently is supplied by the output from the generator which is also able to power external loads.

The above objective, and other objectives, are achieved by the present invention through the use of a typical Uninterruptible Power Supply circuit comprising of an AC/DC rectifier feeding a battery bank which powers a DC/AC inverter, which is connected to a device to trap electrons from space (as described in Brazilian patent application No. BR1020120008378 of 13th January 2012) or alternatively, a device which extracts electrons from the Earth (as described in Brazilian patent application No. BR1020120008386 of 13th January 2012), which then passes the extracted electrons to the AC/DC rectifier, charging the battery bank, thus closing the loop as well as providing electricity to power external loads.

The self-powered system for generating electricity from the present invention can be fixed or mobile. It is fixed when using electron capture from the earth due to the ground connection, or mobile when using electron capture from space.

The self-powered electricity generating system of this invention may be configured in several different ways, each using the same inventive concept but using different arrangements of components. Different versions include single-phase, two-phase or three-phase versions, producing outputs of any power and voltage.

Brief Description of the Drawings
The present invention will now be described with the aid of drawings, but this patent is not limited to the versions and details shown in these drawings, although they show additional details and advantages of the present invention.

The drawings:
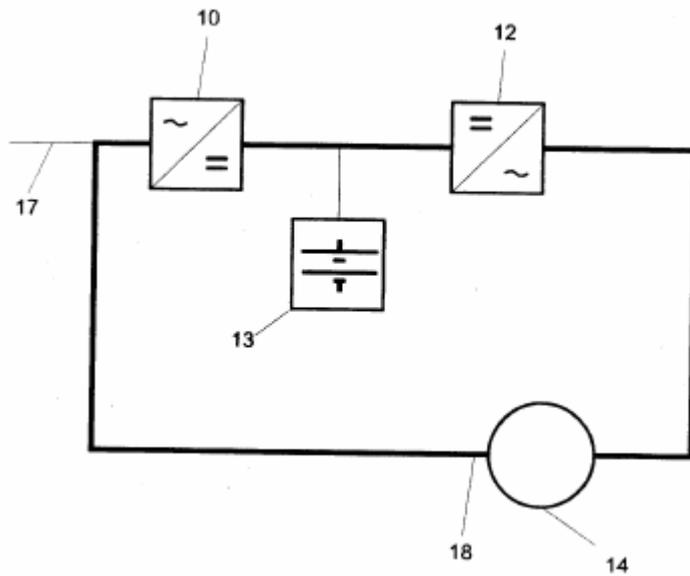
Figure 1 - shows a basic circuit system for self-powered electricity generation of the present invention
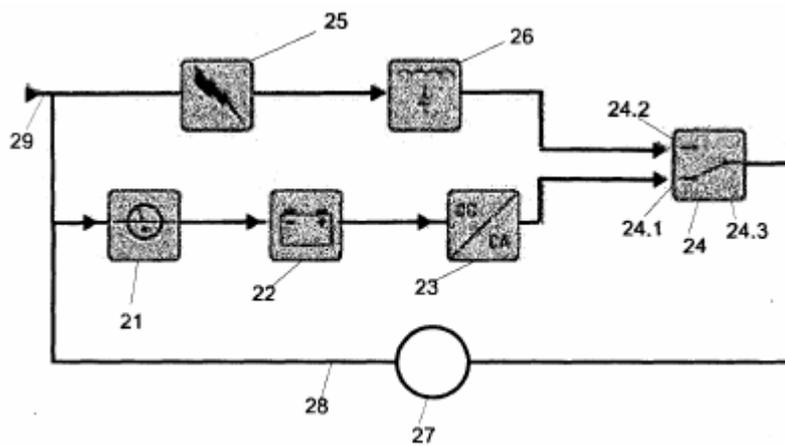
Figure 2 - shows a first embodiment of the constructive system for self-powered electricity generation of the present invention;
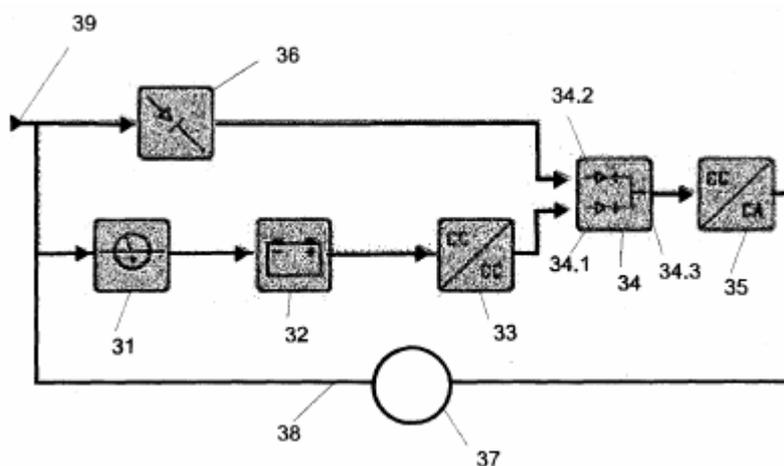
Figure 3 - shows a second embodiment of the self-powered system for generating electricity of the present invention;

3 - 20
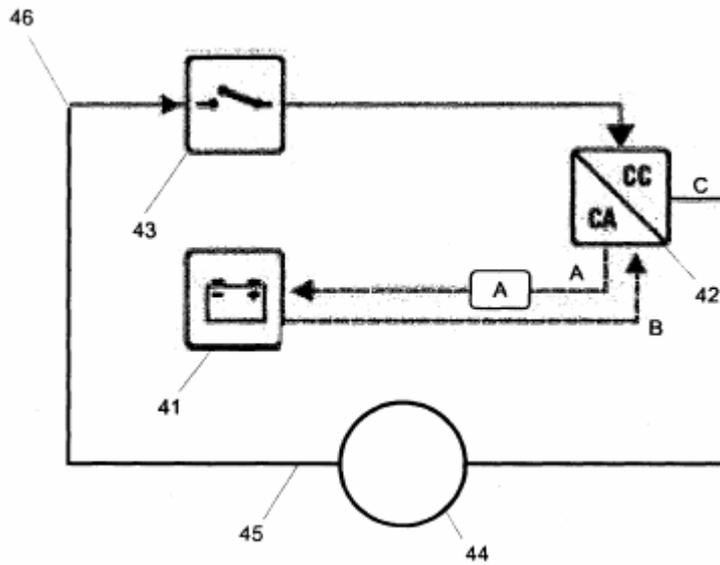
Figure 4 - shows a third embodiment of the self-powered system for generating electricity of the present invention;
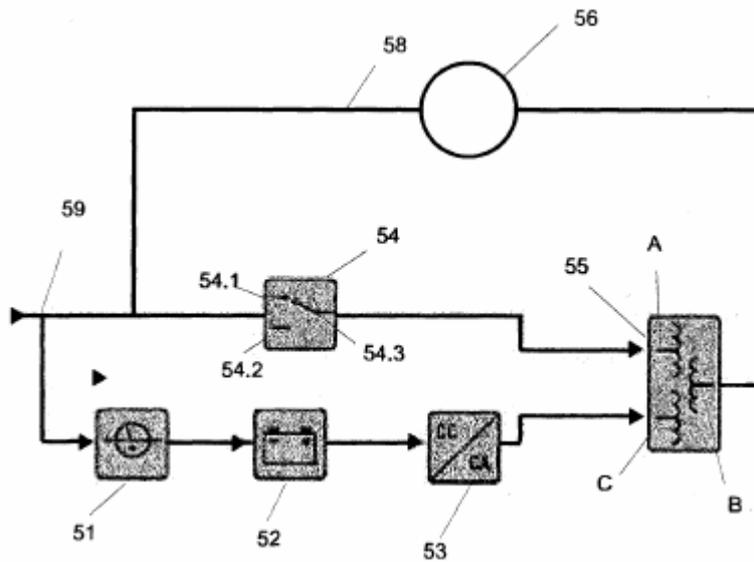
**Figure 5** - shows a fourth embodiment of the self-powered system for generating electricity of the present invention;
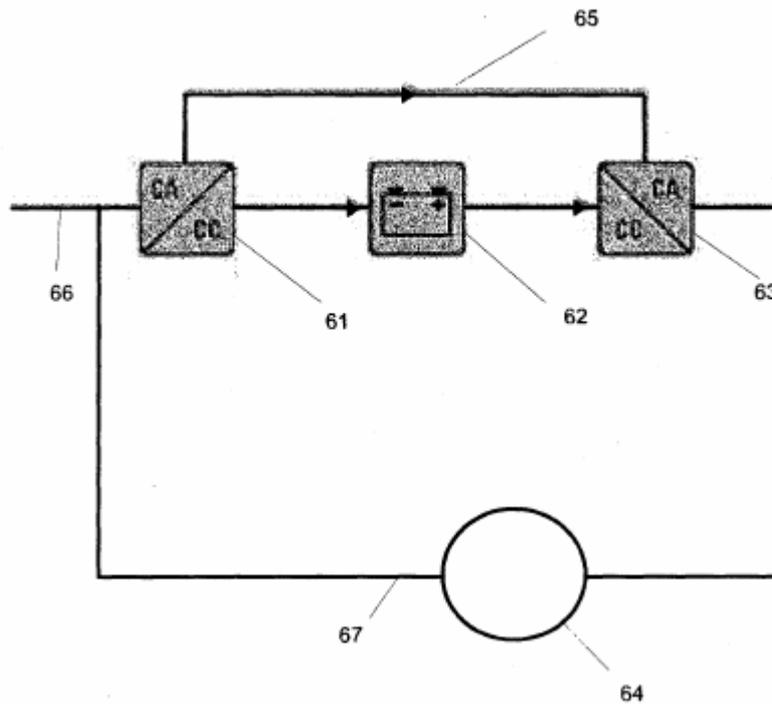
Figure 6 - shows a fifth embodiment of the self-powered system for generating electricity of the present invention;

Detailed description of the Invention:

There are different ways of closing the self-feeding cycle depending on the circuit configuration chosen. Some of these arrangements are shown in **Figures 2** to **6**, wherein the main circuitry continues to oscillate, continuously generating instant electricity.
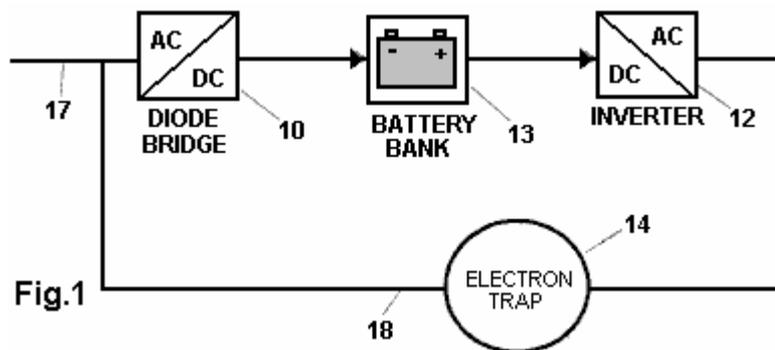
Fig.1

As shown in **Fig.1**, the self-powered system for generating electricity comprises a basic circuit consisting of a rectifier (AC/DC converter) **10** which is connected in series to an inverter (DC/AC) **12**. A bank of batteries **13** is connected between the rectifier **10** and the inverter **12**. The output from the DC/AC inverter **12**, connects to an electron-trap **14** which can extract electrons from space (as described in Brazilian patent application No. BR1020120008378 of 13th January 2012) or alternatively, extracts electrons from the Earth (as described in Brazilian patent application No. BR1020120008386 of 13th January 2012).

When connected, the battery bank **13** provides power to the DC/AC inverter **12** which converts the direct current into alternating current and provides current to the electron-trap **14**. The output of the electron trap **14** is passed through wire **18**, to the AC/DC bridge rectifier **10**, which keeps the battery bank charged as well as powering the DC/AC inverter **12**. Additional power is passed to external equipment through wire **17**.

3 - 22
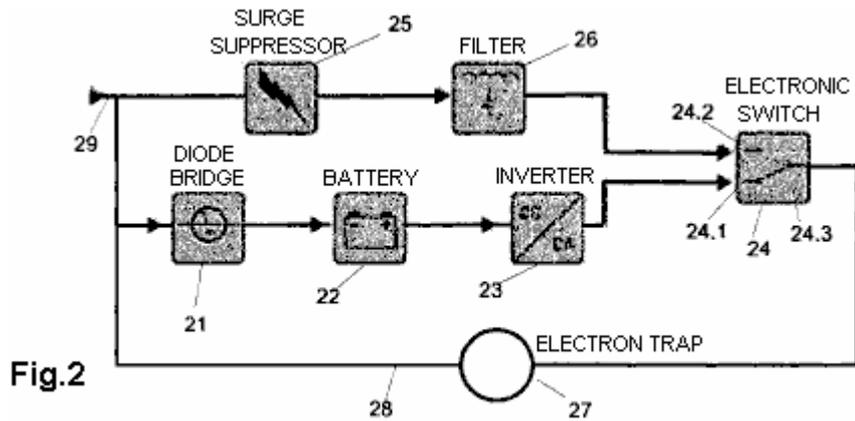
Fig.2, shows another embodiment of the system of this self-powered electric power generation equipment. It comprises a typical Uninterruptible Power Supply circuit of a battery charger (AC/DC converter) **21** connected to a drive device (a DC/AC inverter) **23** and between them, a battery bank **22** forming the basic circuit. Additional devices are an electron-trap **27** which may collect free electrons from space (as defined in Brazilian patent application No. BR1020120008378 of 13th January 2012) or, alternatively, collects electrons from the Earth (as described in Brazilian patent application No. BR1020120008386 of 13th January 2012). The 3-phase electronic switch **24** normally connects **24.1** to **24.3** connecting the electron trap **27** to inverter **23**. Connected in parallel is the surge suppressor **25**, which, when activated, via filter **26**, causes switch **24** to disconnect the **24.3** to **24.1** link and instead, connect **24.3** to **24.2**.

An alternative arrangement for use in emergency situations, is to use the system no longer self-powered. For this, the system is comprised of a power input from an external power source, directly to the interconnection point **29** to provide power to surge suppressor **25**, which provides power to feed the power output point **28** in order to power external loads. When the electron-trap **27** is turned off, the electronic transfer switch **24** reverts to its default position which connects point **24.1** to point **24.3** causing the circuit to function, once again, in its self-feeding mode. As soon as the electron sensor **27** provides sufficient power to the over-voltage sensor **25**, it operates the transfer switch **24** through filter **26**, ending the self-feeding phase and supplying energy directly to the power output point **28**, in order to feed external loads.
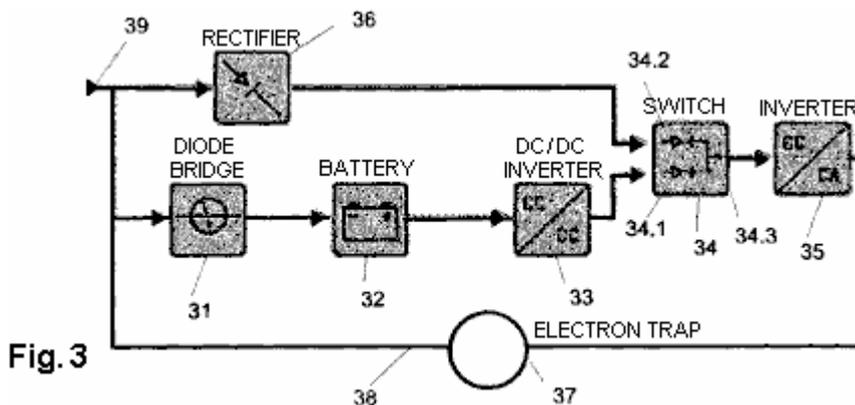
**Fig.3** shows another embodiment of the self-powered system for generating electricity, comprising a device which includes the basic circuit of a typical Uninterruptible Power Supply, consisting of a battery charger (AC/DC converter) **31** connected to a drive device (inverter DC/AC) **35** and attached to them, a battery bank **32**. This basic circuit together with other devices is connected to an electron-trap **37** for collecting free electrons from surrounding space or, alternatively, an Earth-connected electron trap **37**. We have then, a bank of batteries **32** connected to the DC/DC converter **33**, which is connected to the phase transfer switch **34 / 34.1** which is connected to point **34.3**, which connects to the inverter **35**, and so, the electron-trap **37**.
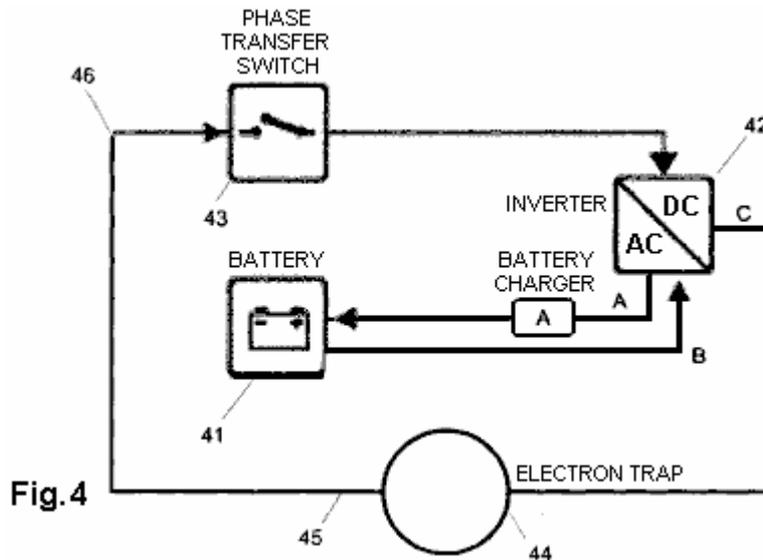
Fig.4

Fig.4 shows another embodiment of the system for self-powered electricity generation which is comprised of a basic circuit of a typical uninterruptible power supply, consisting of a battery charger (AC/DC converter) **A** connected to an inverter (DC/AC) **42** and attached to them, battery bank **41**, and this basic circuit together with other devices are connected to a free space electron-capture device **44** or an earth-connection electron-trap **44**. Comprising thus, a battery charger **A** connected to a battery bank **41**, which is connected in series with inverter **42** at point **B** which is in series with point **C** of inverter **42** which is in series with the electron sensor **44**, which is in series with the phase transfer switch **43** via the three-phase load output connection point **45**. The phase transfer switch **43** is in series with the inverter **42**, which is connected in series the (AC/DC converter) battery charger **A** feeding the battery bank **41**.

An alternative construction for use in emergency situations, in which the system ceases to be self-powered, the system may include power input from an external power source, via the interconnection point **46**, thus providing electricity output **45**, to power external loads. The battery bank **41** provides power to the inverter **42** which converts the direct current into alternating current and feeds the electron trap **44**. The phase transfer switch closes when the batteries need recharging.

Sensor **44** captures electrons, producing alternating current, which feeds the phase transfer switch **43** with alternating current input power. The phase transfer switch **43** feeds the inverter **42** which charges the batteries, closing the self-powering loop which provides power at the output **45**, feeding both the power input and any external loads.
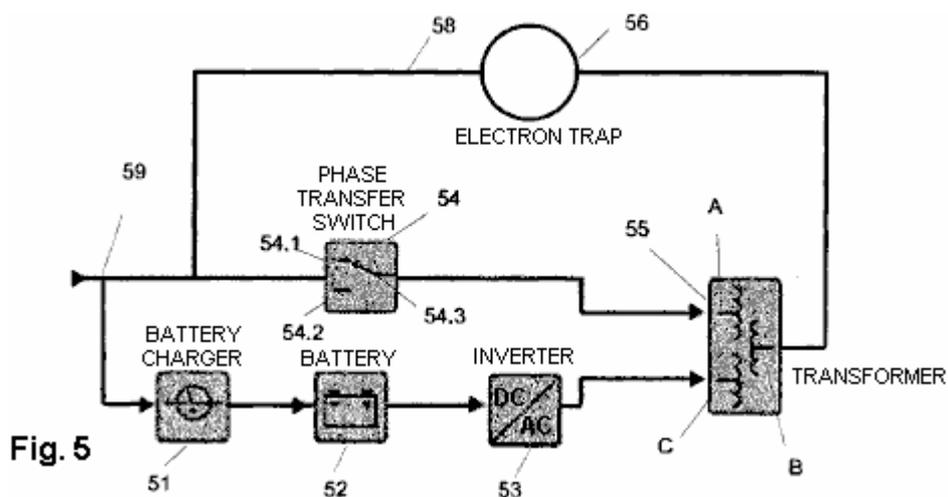
Fig. 5

Fig.5 shows another embodiment of the system for self-powered electric power generation equipment comprising a circuit which includes a typical uninterruptible power supply comprising a battery charger (AC/DC converter) **51** connected to a DC/AC inverter **53** and attached to them, a battery bank **52**. This basic circuit together with other devices are connected to a space free-electron capture device **56** (as defined in Brazilian patent application No. BR1020120008378 of 13/1/12) or, alternatively, an earthed free-electron collector **56** (as defined in Brazilian

patent application No. BR1020120008386 of 13/1/12). This then comprises a battery charger **51** which is connected in series with a battery bank **52**, which is connected in series with the inverter **53**, which is connected in series with the transformer **55** at its point **C**, which is in series with its point **B** which is in series with the electron collector **56**, which is in series with the battery charger **51** which is connected to the load exit point **58**, which is also the circuit entry point **59**, which is in series with the phase transfer switch **54** section **54.1**, which is connected to terminal **54.3**, which is in series with point **A** of the transformer **55** which exits at point **B**. Points **A** and **54.3** as well as the parallel points **54.1** and **54.2**, are all parallel to the battery charger **51**, the battery bank **52**, the inverter **53** and to point **C** of the transformer **55**.

An alternative construction for use in emergency situations, in which the system ceases to be self-powered, the system may include an external power input point **59**, allowing phase transfer switch **54** to provide power output **58**, to feed external loads. Battery bank **52** provides power to the inverter **53**, which converts the direct current into alternating current, feeding point **C** of the transformer, which comes out at points **B** and **A** of the transformer **55**. Point **B** of the transformer feeds the electron-trap **56** producing alternating current which feeds the battery charger **51**, recharging the battery bank **52**.

The battery charger **51** is connected in parallel with the transfer switch **54** via connection points **54.1** and **54.3**, feeding point **A** of the transformer, which comes out at point **B**. Point **A** of the transformer and the switch transfer points **54.3** and **54.1** are in parallel to the battery charger **51**, the battery **52**, the inverter **53** and point **C** of the transformer **55**.
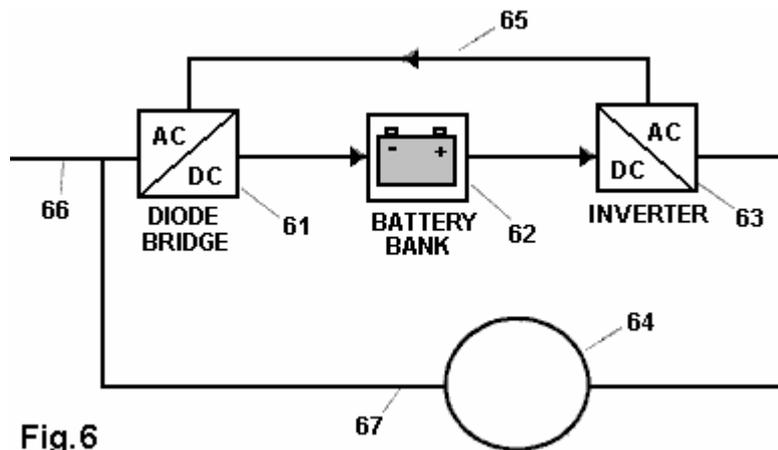
Fig.6

Fig.6 shows another embodiment where a rectifier **61** is connected to an inverter **63** and a battery bank **62**, and to a space free-electron trap **64** or alternatively, an earth electron trap **64** comprising thus, a delta (AC/DC) converter **61**, which is connected in series to a battery bank **62**, which is connected in series with the (DC/AC) inverter **63**, which is in series with the electron collector **64** which is connected in series with the delta converter (AC/DC) **61** whose AC part is in series with the alternating AC current inverter **63** via a connecting wire **65** which is in parallel with the DC part of the delta converter **61** with the battery bank **62** and the DC part of inverter **63**. An alternative construction for use in emergency situations, in which the system ceases to be self-powered, the system may comprise a power input from an external power source, via the interconnection point **66** connected to the delta converter **61**, the output **67** supplying power, to the external loads.

Battery bank **62** provides power to the inverter **63**, which converts the direct current into alternating current, powering the free-electron collector **64**. The captured electrons from collector **64** form an alternating current which feeds the delta converter **61** via an output power load wire **67**.

The alternating part of the three-phase delta converter **61** is fed with alternating current from inverter **63** via connecting wire **65**, which is connected in parallel to the continuous DC delta converter **61**, which feeds the battery bank **62** and with the continuous portion the inverter **63**, closing the cycle of self-feeding and supplying power at the output **67**, which is the output power point.

Having described examples of preferred embodiments, it should be understood that the scope of the present invention encompasses other possible forms of construction, using the electron collectors connected to a basic circuit of a typical uninterruptible power supply of energy, known as a UPS, comprising a rectifier device (an AC/DC converter) **10**, connected to one inverter (DC/AC converter) **12**, and attached between them, an energy storage device (typically, a battery bank).

The First Barbosa and Leal Replication

While many people have tried to replicate the Barbosa and Leal power generator design which draws power from the Earth, and failed. One man whose forum ID is "Clarence" read the relevant patents and knew immediately how the design works and what items in the patents are misdirection by Barbosa and Leal. He has built his own implementation of the circuit and it works perfectly. He has generously shared the relevant details. Please understand that what follows is not a description of where to start experimenting, but instead it is an actual working design. Build it as described and it will work. Build it differently and it won't work. Clarence has this to say:

In the Barbosa and Leal patent they make a vague reference to the Lenz Law. It just so happens that this is the **key** to the whole device. On the overunity forum, a circuit diagram posted by member "ZeroZero" showed the exact and complete method of defeating the Lenz Law, although most forum members did not seem to understand the importance of the circuit. However, I knew immediately that Lenz's Law was just another name for back-EMF. The Lenz Law effect is overcome by winding the single primary coil in a clockwise direction and the AWG #4 2.5 turn windings are wound on the bare core in an anti-clockwise direction and that totally negates the Lenz Law.

What does this achieve? It gets rid of the voltage component in the secondary windings, leaving only the amperage component! When you wind two toroids exactly the same using this method and connect them as shown below, you create a loop similar to a horseshoe magnet with a keeper on it and the amperage in the loop just goes on circulating round and round as shown by Ed Leedskalin. This is the same principle. The loop has the ability within itself to add unlimited amperage, instantaneously to the neutral green Ground Return wire accordingly as the load requires. The only limit to the available amperage is the current-handling capacity of the looped black wire.

You can touch the black wire loop connections with bare hands because as there is no voltage, there is no resulting shock. The connecting of the AWG #10 phase wire to the bottom loop wire only serves to orient the polarisation of the amperage.

The oriented spinning of the amperage in the loop **induces** the amperage needed by the load, into the Captor output. This little toroid can allow the loop to load an AWG #4 wire enough to **melt** it !!

The toroid primary wires Live to Live and Neutral to Neutral should be powered from the inverter by a separate circuit

Another separate circuit should be used with the Live connected to the bottom black looped wire in order to polarise it. The Neutral powers the input to ground.

The return ground rods are linked in a series loop and then, from a convenient ground rod to the green 2.5-turn loop around the black captor loop and then on to serve as the captor Neutral to the load.

You will know that you have enough ground rods when the Captor rms output voltage **matches** the rms voltage of the inverter, and then, you will probably have to add about another ten ground rods in order to keep the rms voltage of the Captor output from dropping. If the Captor rms output voltage drops – simple – add more ground rods. Please understand clearly that without sufficient ground rods, the apparatus just will **not** work. Here is a connection pattern where many 6-foot (1.8 m) long earthing rods are used:
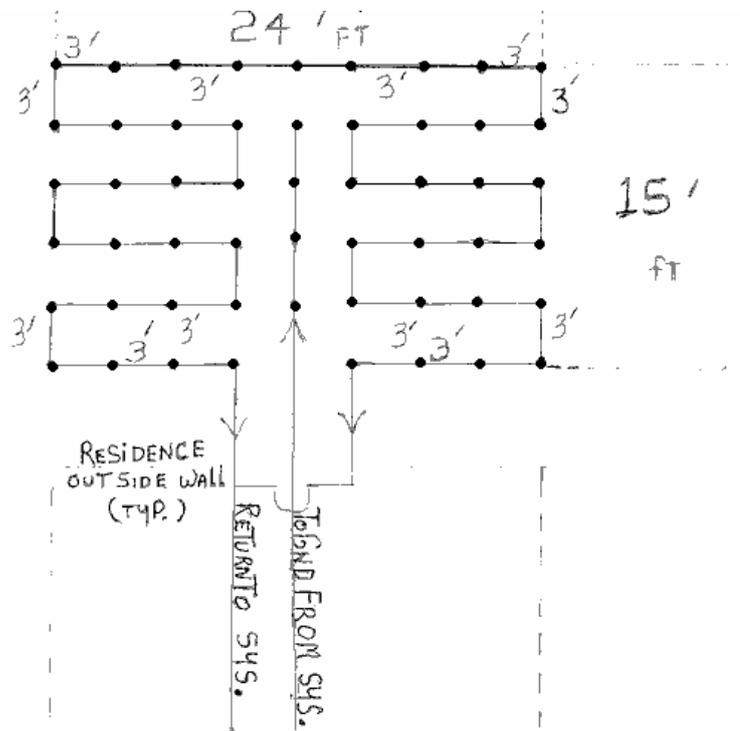
The circuit diagram from ZeroZero shows this arrangement:
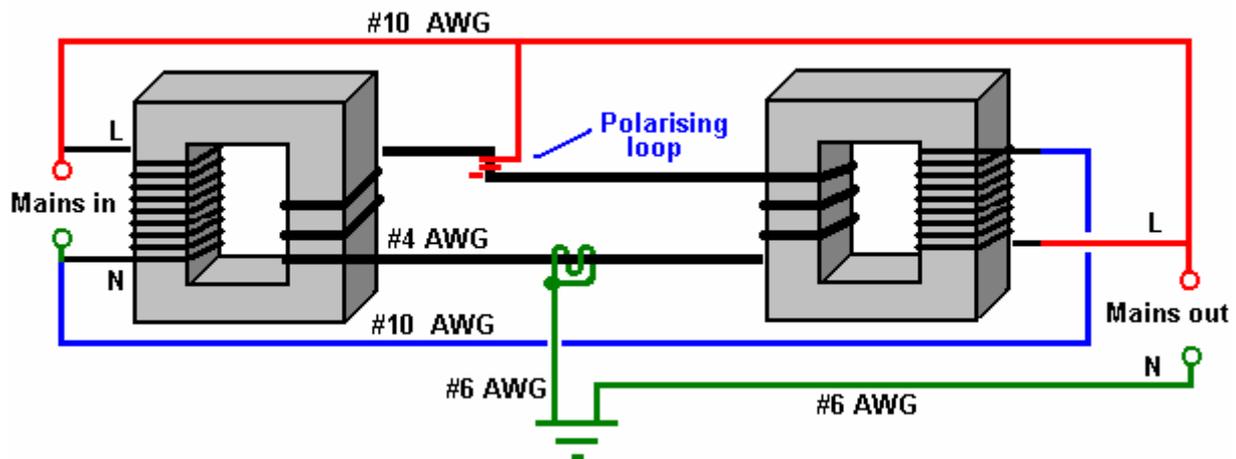
The direction of winding is vitally important as are the wire sizes. You will notice that the windings on the two magnetic frames are in opposite directions, **and**, the thick wire loop windings are both in opposite directions, **and**, the thick wire winds also oppose the thin wire winding on the same frame. Looking from above, the thick wire forms the shape of the numeral 8. The thick wire is AWG #4 with a diameter of 5.19 mm and the other core windings are AWG #10 with a diameter of 2.59 mm. The "polarising loop" is produced by taking a few turns of the AWG #10 wire around the insulation of the AWG #4 wire – the wires inside the cables are **not** actually joined together. The input and output are marked as "mains" as either 110V or 220V can be used, however, not actually fed from the mains as that would create a ground loop, but instead, the input is from an inverter. The earth wire is AWG #6 with a core diameter of 4.11 mm.

While the magnetic frames above are shown as rectangular, they are actually circular toroids (which was what Barbosa and Leal used but failed to mention). The ones used by Clarence are type TD300 1120 toroids with a diameter of 5.2 inches (132 mm) and a thickness of 2.3 inches (58 mm) each weighing 6.2 pounds (2.8 Kg) and available from http://www.tortran.com/standard_isolation_transformers.html. Clarence remarks that building this power generator replication is not cheap and he has spent more than US $2000 on his replication. Mind you, with an output power of 3 kW, this unit meets all of his household electrical requirements.

It is said that all builders should get a global or national Geomagnetic Map of their area before building, but Clarence says that he is in a "dead" area anyway, so there is probably little point in this as the number of earthing rods needed in your area is found by trial anyway, and knowing in advance does not change that number.
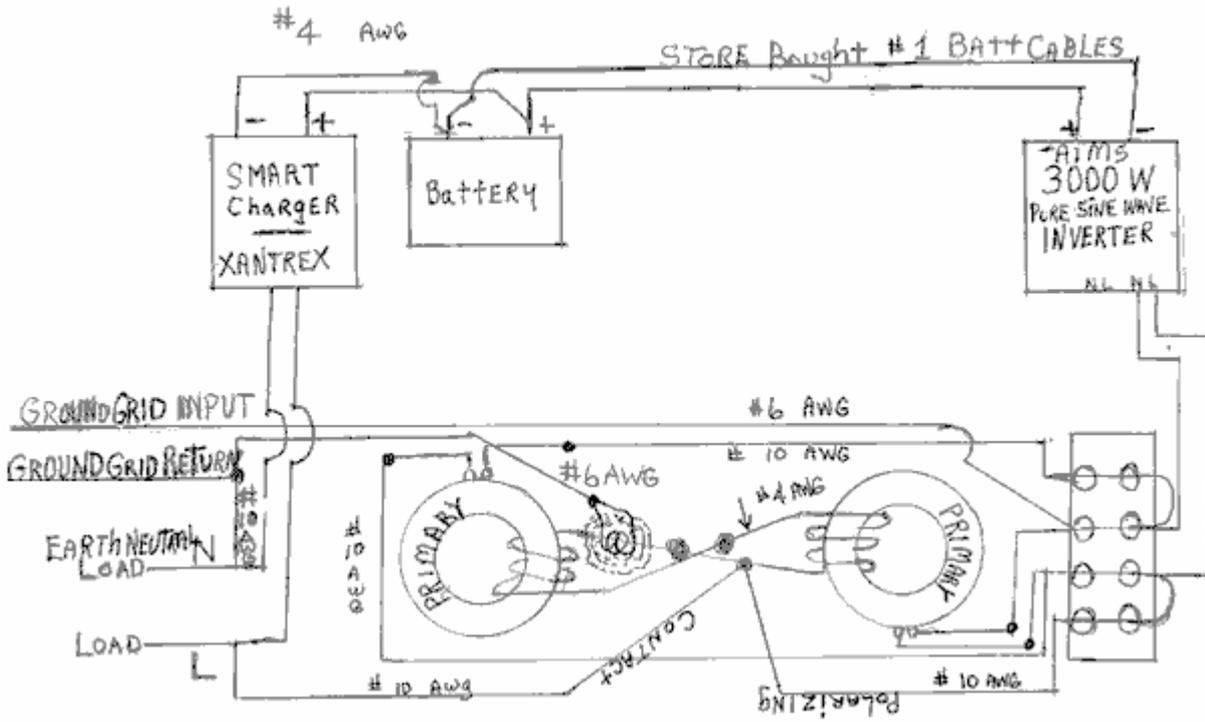
Another edition of the circuit diagram is:
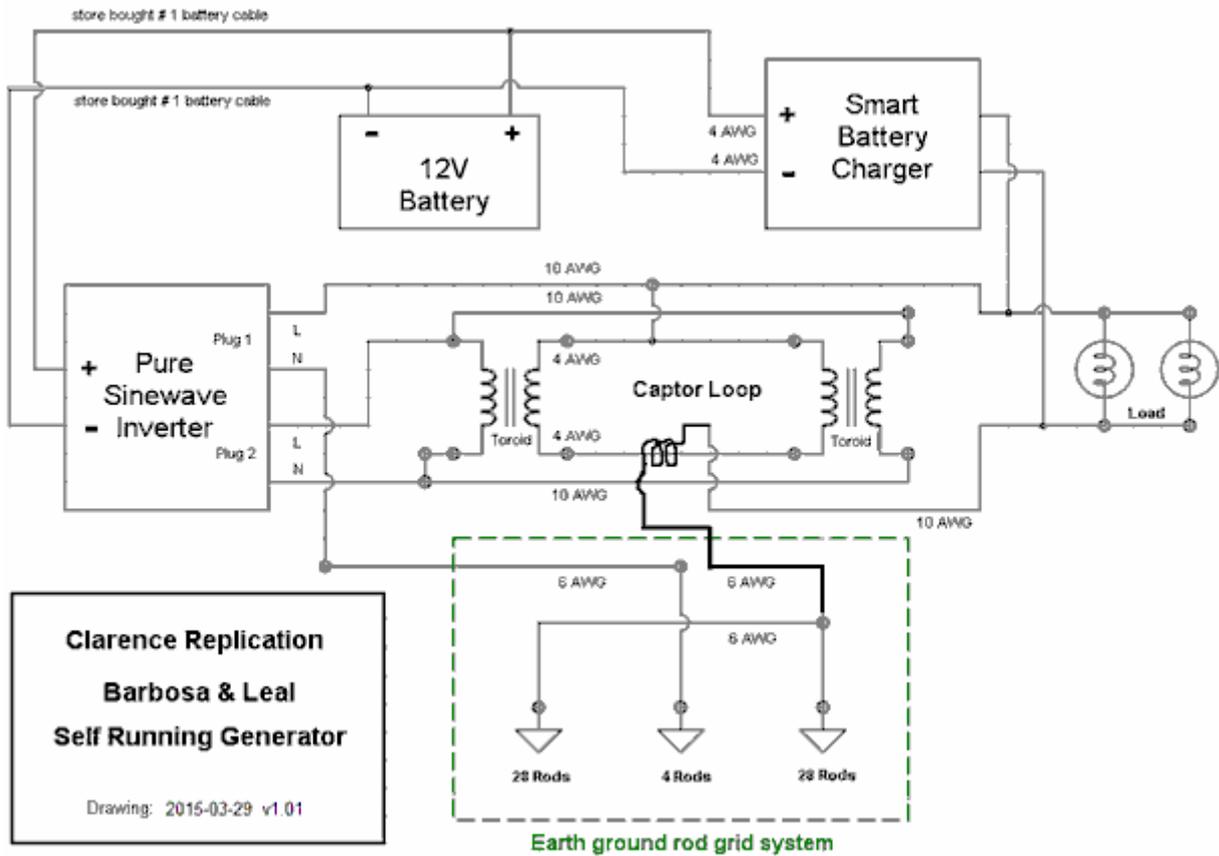
Here are some pictures of Clarence's successful build:
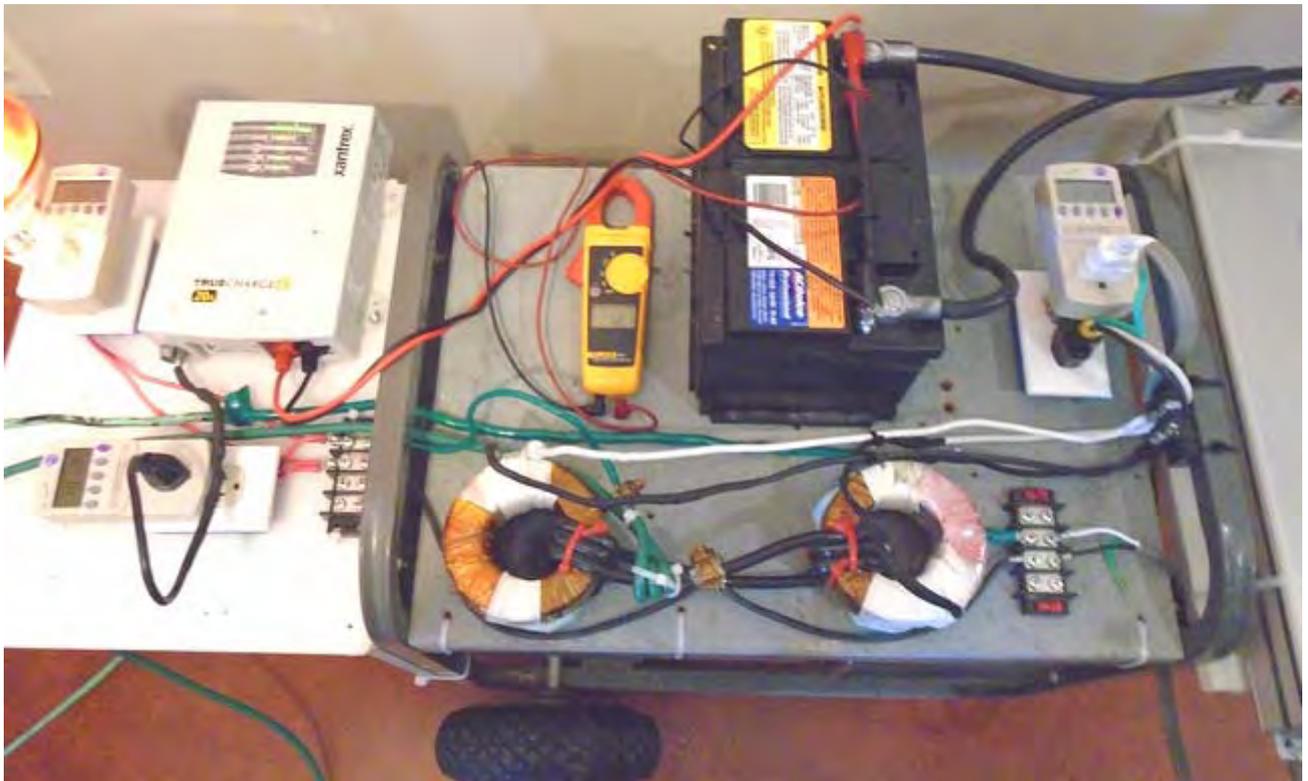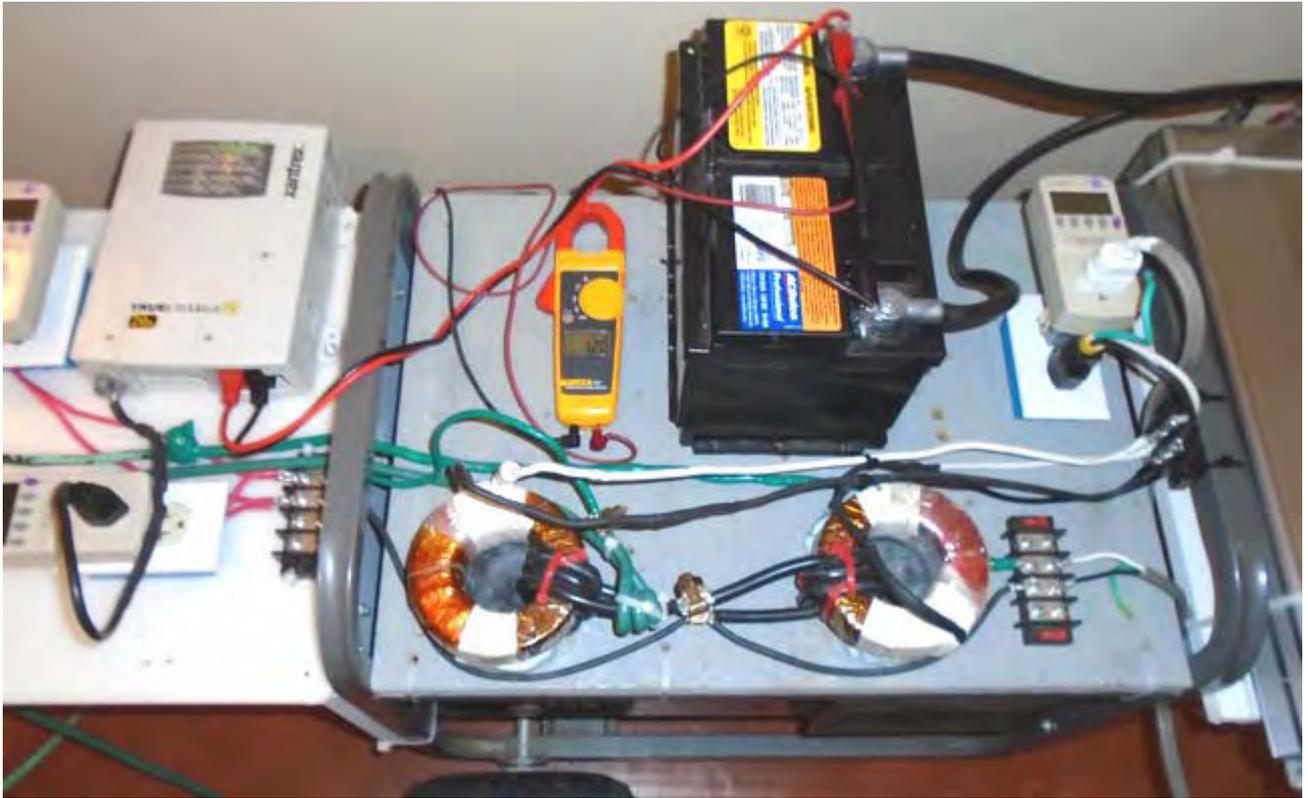
Components used were:

Toroids:

Bridgeport Magnetics :

[Tortran - In Stock Standard Design Toroidal Isolation Transformers - Bridgeport Magnetics Group](#)

Contact: Michael Kharaz E-mail: sales@bridgeportmagnetics.com

[Tortran Division- Contact us - Bridgeport Magnetics Group](#)

Custom ordered toroid (2 required):

TD300-1120-P, 300VA, 60Hz, Primary 120V, 160 degrees winding on toroid surface, no secondary winding - $125 USD each

Smart Battery Charger:

Xantrex TrueCharge2 Battery Charger - 20Amp model

Website: [Truecharge Battery Charger | Truecharge2 20A, 40A, 60A | Xantrex](#)

Xantrex Dealers list:

[Where to Buy - N. America](#)

Available from Amazon.com:

[Amazon.com: Xantrex 804-1220-02 TRUECharge2 12V 20A Parallel Stackable Battery Charger: GPS & Navigation](#)

Looks like the price is around $260 to $300 USD - depending where you order from.

Minimum recommended battery bank size for use with the 20Amp Charger model is 40 Ah

12V Pure Sinewave Power Inverter

AIMS POWER 3000 Watt 12VDC Pure Sine Wave Power Inverter - Model: PWRIG300012120S

Website: http://www.aimscorp.net/3000-Watt-Pu...-Inverter.html

Available from:

InvertersRUs - $699 USD http://www.invertersrus.com/aims-pwrig300012120s.html

Amazon - $799 USD http://www.amazon.com/AIMS-Power-PWR...+wave+inverter

Forum moderator "Level" who has done an excellent job of retrieving and displaying Clarence's material here: http://www.energeticforum.com/renewable-energy/20091-barbosa-leal-devices-info-replication-details-2.html, says:

Stick to the battery and inverter method as the power source, as that is the only way you can avoid a ground loop to the mains electrical power system. The one exception is you might be able to avoid such a problem when powering from the mains if you use an isolation transformer, but isolation transformers can be expensive and have a limited capacity as well.

Caution: Also beware that an inverter with an output of 120 volts or 240 Volts can kill you if you touch live wires, so don't build such a setup if you don't understand such things. You need to take necessary safety precautions.

Free energy from Lorrie Matchett

The style of operation used by Barbosa and Leal looks as if it is related to the developments of Lorrie Matchett. On 16th June 2008, Lorrie Matchett published his very simple design for a device which captures usable free-energy (video: http://youtu.be/eGD9o7D4To8). His device is based on a very simple and well-know principle of static electricity. This is a principle which is taught in schools all around the world but is generally considered to be of no importance as static electricity is considered too low-power to be of any use. I seriously doubt that anyone who has been struck by lightning would consider static electricity to be "low-power" and suggesting that to them is likely to expand your vocabulary with some words which are seldom heard.

Important Note: the following details mention the use of mains voltages and so let me stress that this presentation is for information purposes only and must not be construed as being a recommendation that you construct or use any such device. Should you choose to ignore this and construct and use Lorrie Matchett's device, then please

The principle which is being used here is that an electrically charged object causes the migration of opposite charges on the surface of any object brought close to it. For example if a charged surface if brought close to a metal sphere, then this happens:
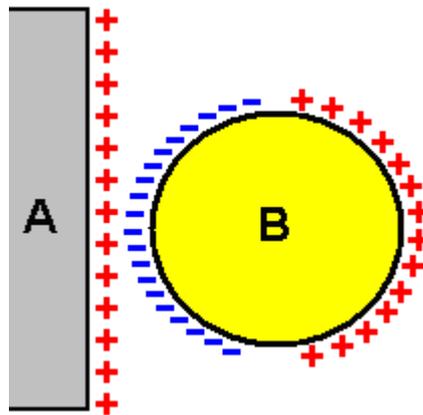
The ordinary metal sphere "**B**" which has no particular charge on it is very much affected by being close to a charged surface "**A**" and the closer it gets, the greater the effect. The surface of the sphere had an even distribution of positive and negative charges on its surface, giving it an overall charge of about zero, but the charged surface changes all that. The positive charges on surface "**A**" attract the negative charges on the surface of the sphere causing them to migrate towards surface "**A**". While the positive charges on surface "**A**" do repel the existing positive charges on the surface of the sphere, the migrated negative charges of the sphere itself have an even greater effect, causing the segregation of electrical charges shown above.   The situation returns to normal if the sphere is moved away again.

However, the situation changes considerably if the metal sphere "**B**" is connected to the ground:
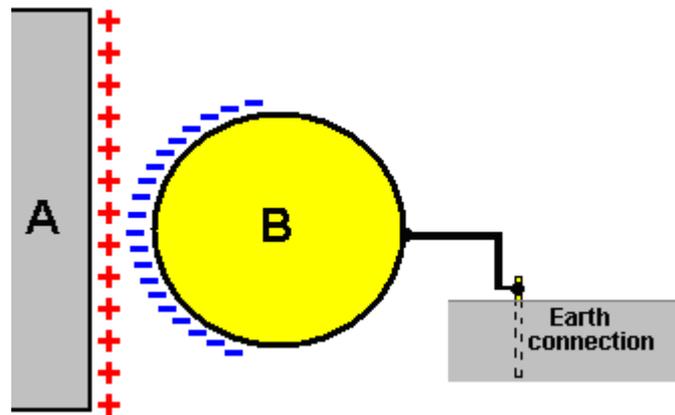
The movement of charges on the surface of the sphere is the same as before, but the Earth has millions of spare charges of both kinds and so, immediately siphons off the excess positive charges on the side of the sphere away from charged surface "**A**". You will notice that charged surface "**A**" is not directly involved in any way and no charge moves from "**A**" to "**B**".

The same effect is seen if the surface "**A**" is negatively charged (except for the fact that the sphere has positive charges rather than the negative charges shown above. The only current flow is along the wire connecting the sphere to the earth connection.

Lorrie Matchett uses this principle, and for the charged surface he connects one end of a brass rod to the 'Live' side of a 100V 60 Hz mains electricity supply. The other end of the brass rod is not connected to anything else. This produces this situation for 8.3 milliseconds:
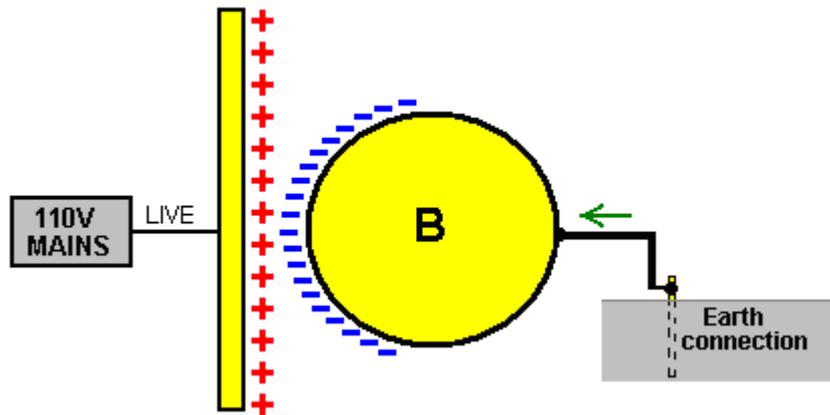
And then for the following 8.3 milliseconds the mains reverses and you get this situation:
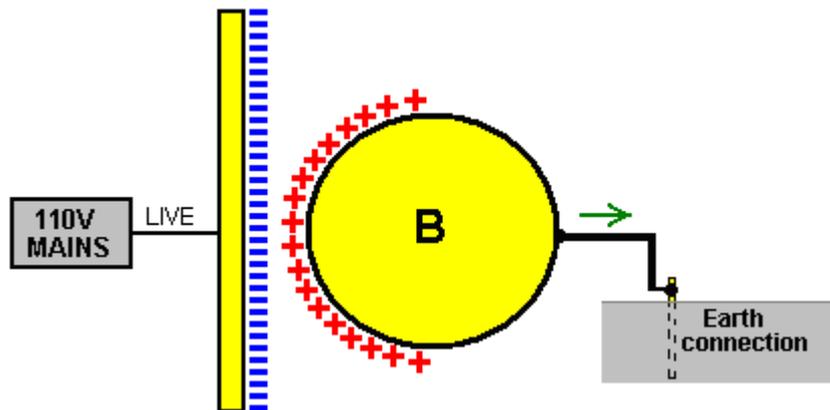
The result of this is that there is a backwards and forwards flow of static electricity along the earth connecting wire, a flow which reverses direction sixty times per second. This is not conventional electricity but is the same form of electricity which is collected by an aerial. Nikola Tesla's patents show many different ways of utilising this static electricity, as does Herman Plauson in his patent (www.free-energy-info.com/Chapter7.pdf). Thomas Henry Moray produced fifty kilowatts of continuous power from quite a small aerial. Paul Baumann of the Swiss commune produced several kilowatts from static electricity. Lorrie Matchett settles for just a few watts and he does it like this:

He connects the live wire of a 110V (RMS) AC mains supply to a brass rod 28-inches (710 mm) long and 3/16 inches (4.76 mm) in diameter. The rod is not directly connected to anything else and so does not form part of a closed loop circuit and so, no current flows from the mains. It must be stressed that the rod and connecting wire are potentially very dangerous and need to be insulated very carefully to ensure that touching them will not cause an electric shock. Please understand very clearly that as no current of any kind is drawn from the mains that this circuit is **not** "stealing electricity from the mains".

For convenience, and only for convenience, Lorrie uses the earthing system of the house mains supply by connecting a green earthing wire to the earth pin of his mains plug. It needs to be clearly understood that this has nothing directly to do with the mains supply and any good quality separate earth would be at least as good as the earthing point inside the mains plug. Effectively, there is only one mains connection.

Instead of using a metal sphere as shown in the illustrations above, Lorrie uses a coil of wire wound around the insulation layer on his brass rod, and he passes the alternating flow of static electricity, drawn from the earth, through a standard diode bridge as shown here:
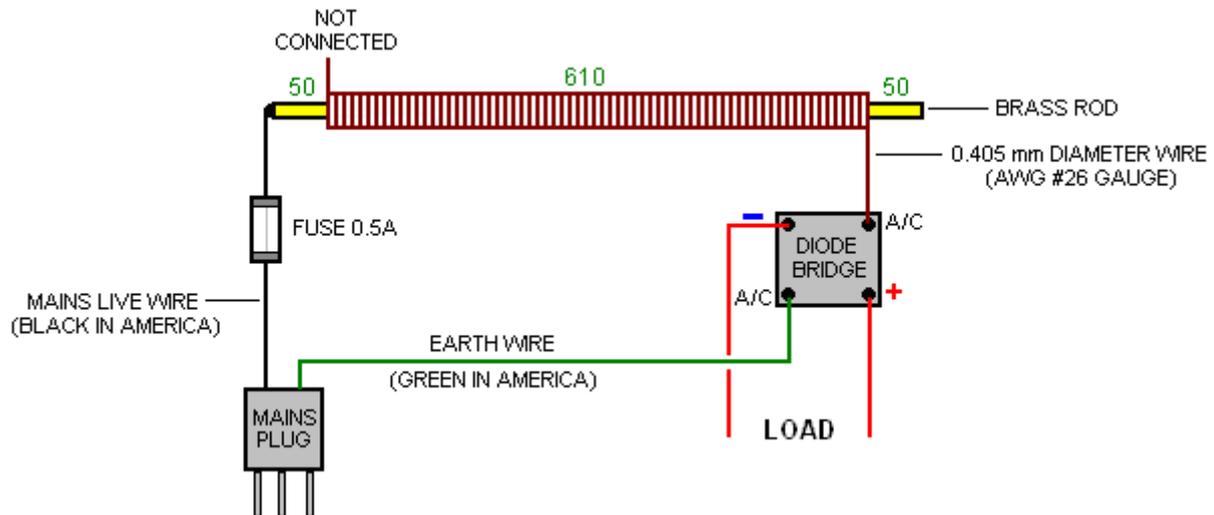
Lorrie covers the brass rod with insulation which is as thin as possible. He suggest heat-shrink tubing for the insulation and on top of it he winds 0.405 mm diameter, solid-core enamelled copper wire, covering a 24-inch (610 mm) length of the rod, placing the turns closely side by side and leaving 2-inches (50 mm) clear at each end of the rod. Thicker wire should not be used.

He also shows a 500 milliamp fuse in the mains supply line. I am not at all happy about that as that fuse can power five incandescent 100-watt mains bulbs connected in parallel, and do you really want that amount of power flowing through you if your insulation is not good enough and you touch it?   If you use a fuse in that position I would suggest a 20 mm glass quick-blow 100 mA fuse (mainly because no smaller one is readily available). The fuse is not needed for the circuit and is there in an attempt to protect careless humans.

The coil wound on the insulated brass rod is only connected at one end and that end goes to one of the two "Alternating Current" tags on a 3A diode bridge. Lorrie does not specify the voltage rating for the diode bridge, but it needs to be a minimum of 170-volts if the mains is a 110V (RMS) type, and double that for a 220V (RMS) mains connection. I have no idea why he specifies a 3-amp rating, but the minimum bridge available locally at 3-amps which I would recommend is a 400V rated unit which is supplied at trivial cost.

We need to understand the effect of the diode bridge. It halves the available voltage and doubles the frequency as illustrated here:
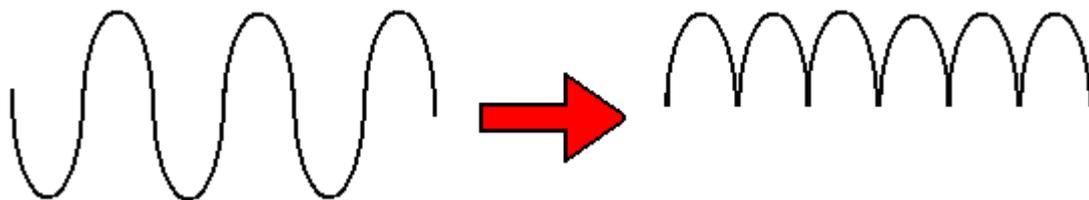
A 110V supply is supposed to swing from Minus 155V to Plus 155V and back again sixty times per second, which is an overall voltage swing of 310V. When passed through a diode bridge that changes to a voltage waveform which swings from Zero volts to Plus 154V and back again 120 times per second, which is an overall voltage swing of 154V which is an average or "RMS" voltage of 109V due to the sine wave shape.

In the rest of the world, the mains voltage is 220V (RMS) nominal, alternating fifty times per second and the Live mains wire is colour coded brown in the UK and the earth wire yellow/green stripes. In passing, the Neutral wire is white for the American 110V system and blue for the 220V system used in the UK.

This design has been brought to my attention by Jes Ascanius of Denmark who is a very able developer of all kinds of free-energy designs. He has replicated this design of Lorrie Matchett and confirms that it works. He has also taken the design further and shares some of the practical details which he has discovered through his own experimentation:

For greater power, additional rods can be used:
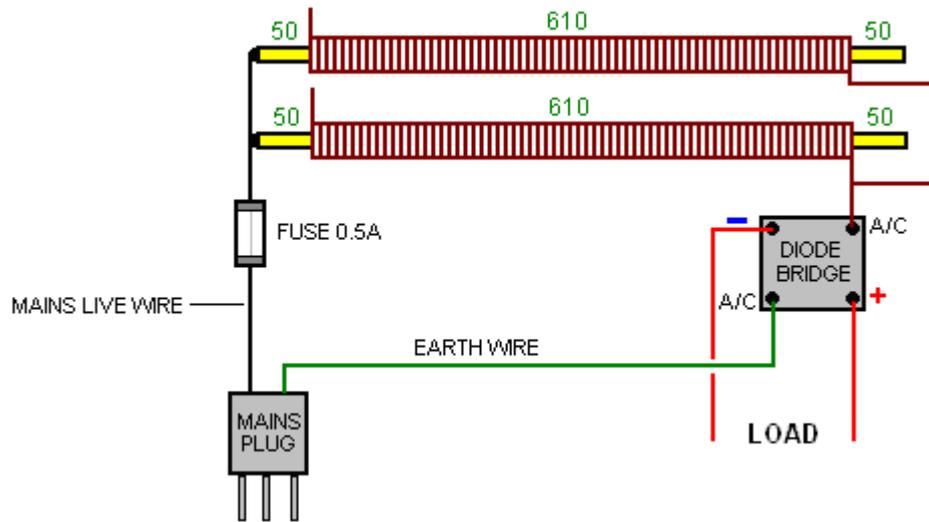
While brass is considered to be the best material for the rod, the diameter is not critical in any way and any size from 5 mm to 20 mm can be used and instead of a rod, a length of brass pipe should be quite suitable. It is also possible to use other materials for the rod but doing that reduces the output power available.

Jes has checked the output of his implementation with the mains fuse removed. The result was an output voltage of 2.6V picked up from the many 220V 50Hz signals generated by the mains wiring all around the place for lighting and sockets. When the fuse is inserted, the voltage rises immediately to 129V with two rods or 162V with five rods. When that voltage is loaded with a 7-watt LED lighting array, the voltage gets pulled down to 61V, but good lighting is being produced for zero current draw from the mains. I would expect that putting a reasonably large capacitor across the load, that the reservoir effect of the capacitor would improve the LED output. Jes initially used two long rods wound with coils:

And later, five rods. His AC ammeter is sensitive enough to show that due to inefficiencies caused by the tiny stray capacitance between the rods and the coils, there is a very slight current draw from the mains. The mains wattage is far less than the output wattage of the system.

An improvement implemented by Jes is adding four high-speed BYV27 diodes to the ordinary diode bridge like this:
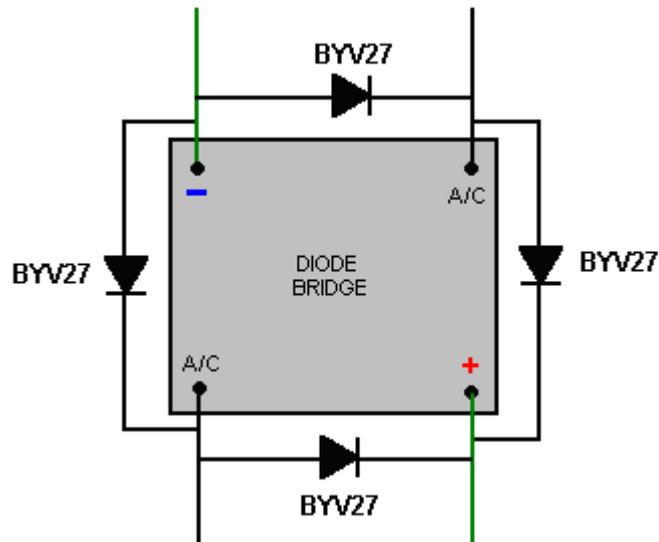
This has the effect of improving the action of the diode bridge and allows more power to extracted from each cycle of the energy flow. When using two brass rods, Jes gets his 5-watt LED array to light up like this:
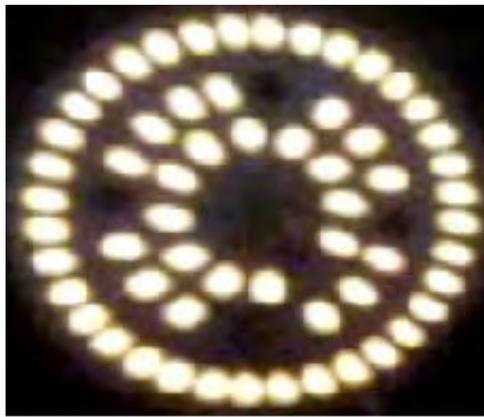
Two rods

Five rods

Lorrie also extended his development to a remarkable 48 rods:
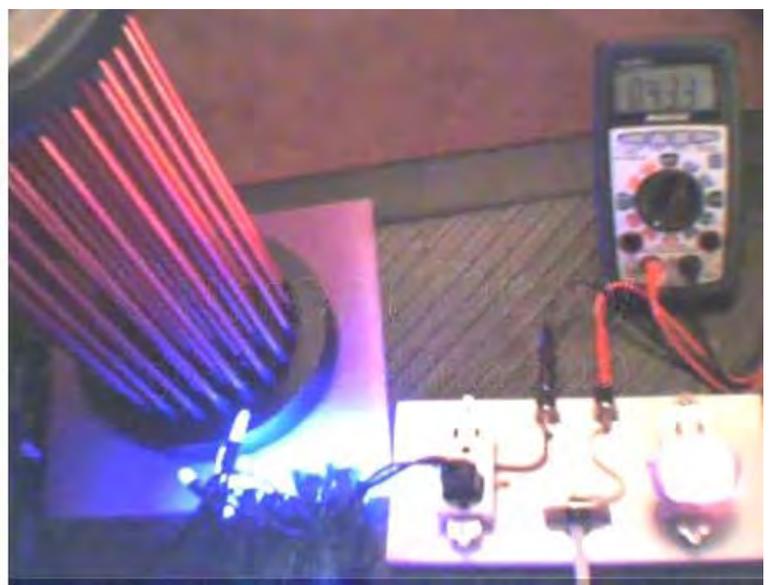
Video link: http://youtu.be/hJyZK6t9qcA   The electrical output could be used to charge batteries. Adding extra turns does not increase the output voltage. If the number of turns in each coil matches the output load, then the output power will be greater.

Alexkor in Russia, who is expert in recharging batteries has experimented with this concept and he uses ten coils connected in parallel. He does not use brass, but instead uses the much shorter 300 mm long, 3 mm diameter welding rods with their chemical coating removed. Also, these rods are only used to raise the effectiveness of two separate coils wound on each rod. Each coil is 700 to 750 turns of 0.4 mm diameter wire and the connections are made to the coils and not the rods, as shown here for a single coil pair :
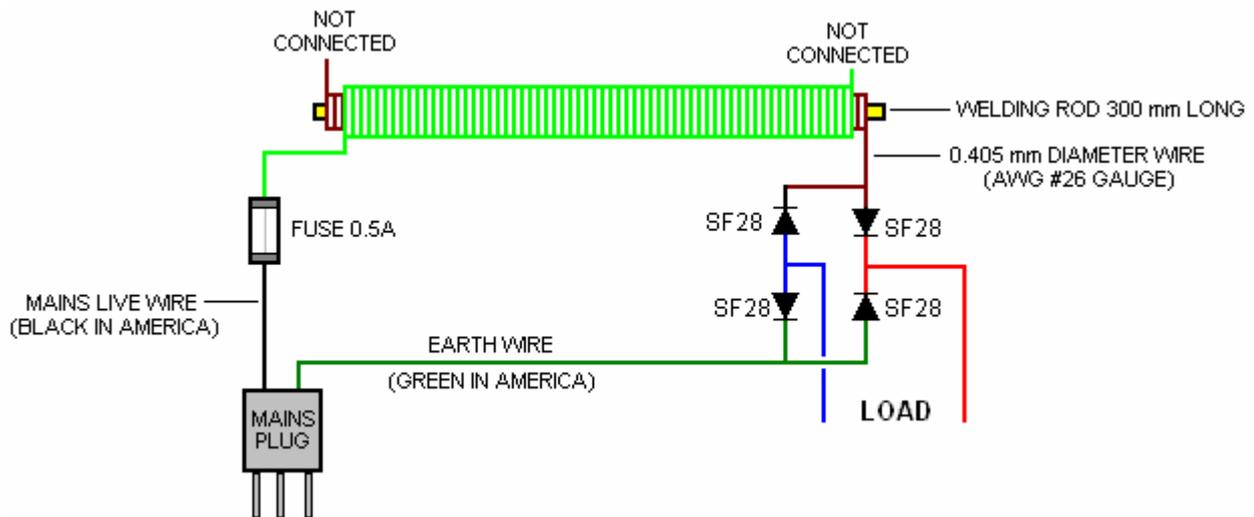
Alex isolates his set of 10 coil-pairs inside a short length of plastic piping:

and uses them to power his battery-charging circuit:
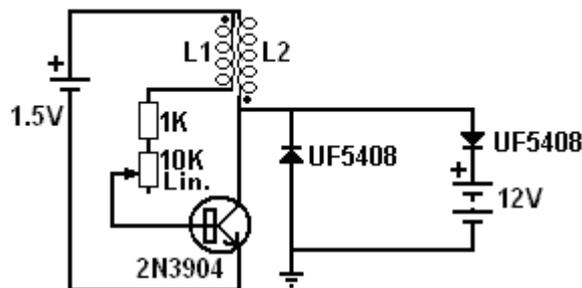
Coils: 0.5 to 1.0mm diameter solid copper
wire length: 1 to 2 metres bi-filar wound

Some people claim that these Matchette style circuits just draw power from the mains. I do not believe that that is the case (although there is a very small leakage caused by the slight capacitance between the coils and the rods, and that is indeed, charged for by the electricity supply company. For drawing power from the mains, a circuit like this is used:
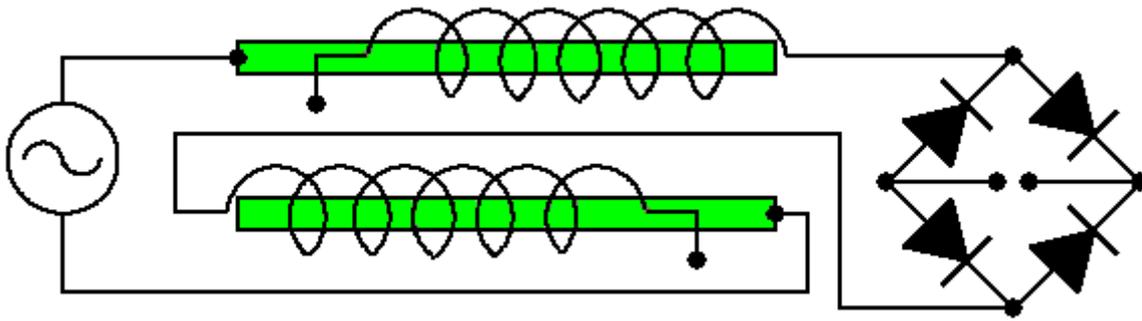
Here, the output voltage is determined by the number of turns in the coils and the available current is controlled by the number of rods involved:
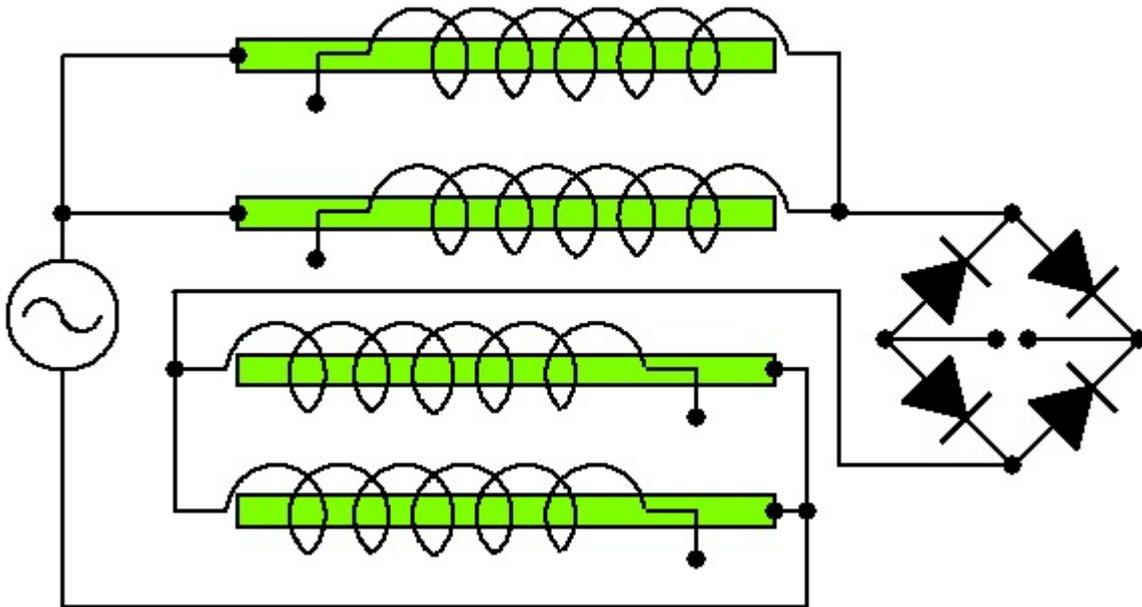
You will notice that these circuits have connections only to the mains and nowhere else. These are not circuits which I use, nor do I recommend that you use it either. The green bars are iron welding rods with the chemical coating removed. These are then wound with a single layer of 0.5 mm diameter enamelled copper wire – that is swg 25 or AWG 24 size wire (a power hand screwdriver is said to be good for coil winding like that). The side-by-side wire coil is then coated with shellac or high-voltage varnish. I am told that with 220V mains power and a 1A diode bridge, that power can be drawn from the circuit without anything being recorded on the electricity supply meter. This is a seriously dangerous circuit as it can produce high voltage at the output of the bridge and that power could kill you. No power drain is recorded, presumably because the coils are wound in opposing directions. Now that is a circuit which could be considered to "steal" power from the mains.

The Matchett style circuit is different in that the power flows through the circuit from the ground. Barbosa and Leal demonstrated 169 kilowatts of power flowing from the ground, and as they powered their circuit from a battery-driven inverter and not the mains, there was definitely no question of 'stealing' mains power. The battery input also allowed them to establish the actual performance as 104 times more energy flowing out of their circuit than the energy flowing into it.

Actually, I'm not at all convinced that the circuit shown above does actually draw net power from the mains. The mains meter charges you for power assessed by multiplying the average voltage by the average current, even when those two are out of step and you receive less power than you are charged for. In this instance, if no current draw is registered on the meter, then perhaps as a result of the opposing direction coils, the power drawn is matched by an equal amount being returned to the mains and there may not be any real net current draw. Either way, I do not recommend the use of these circuits.

The Solid-State Magnetostrictive System of Annis and Eberly.

Theodore Annis & Patrick Eberly have produced a variation on this multiple-magnetic-path method which is shown in their US Patent Application 20090096219. They have opted to use a motionless reluctance switch

which is a solid-state device which can block magnetic flow when energised. They have arranged one of their devices like this:
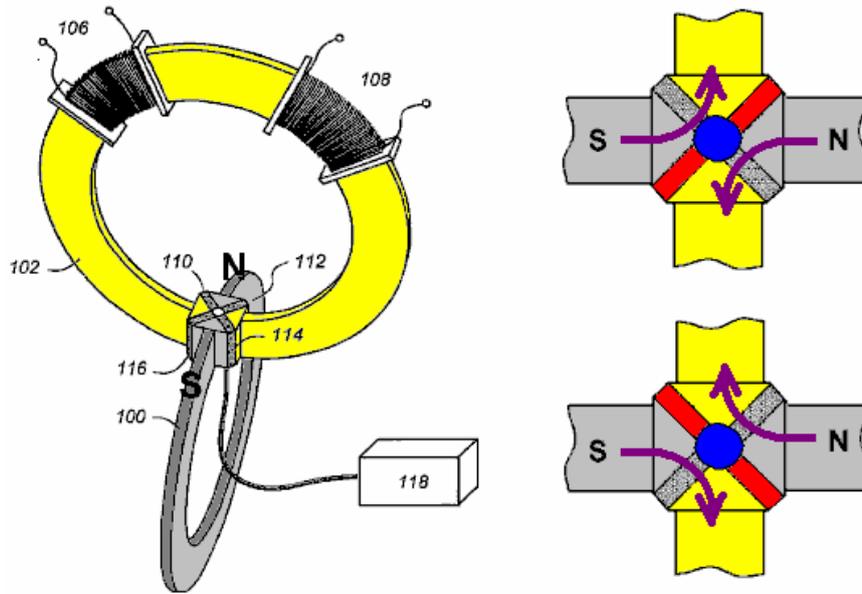
The ring shown in grey is a magnet which connects to the ring shown in yellow through two diagonal 'reluctance' (magnetic flow) switches. The yellow ring can carry magnetic flux and the control box marked **118** switches the diagonal strips on and off in turn, causing the magnetic flux to reverse it's direction through the yellow ring. The coils wound on the yellow ring pick up this reversing magnetic flux and pass it out as an electric current. While only one pair of rings are shown here, the design allows for as many rings as are needed to be connected together as shown here:

Fig - 10
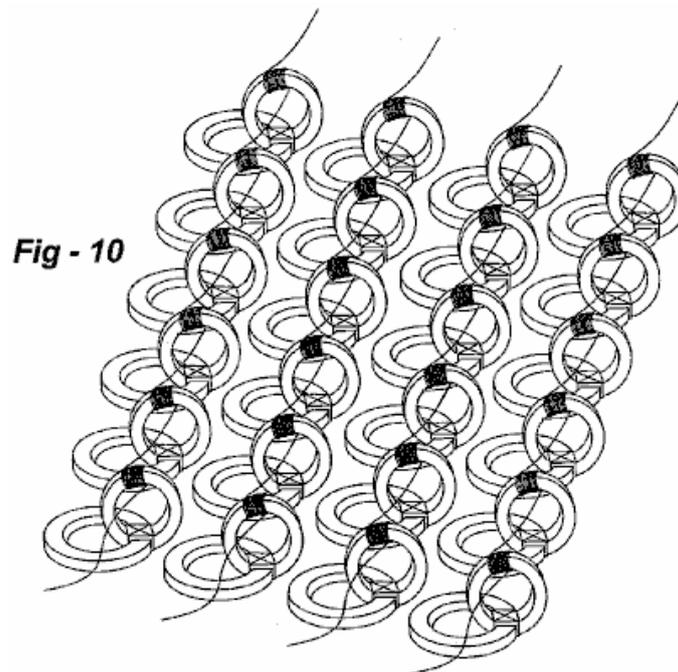
The patent says: "The currently preferred motionless reluctance switch is described by Toshiyuki Ueno & Toshiro Higuchi, in their paper entitled „Investigation of the Dynamic Properties of a Magnetic Flux Control Device composed of Laminations of Magnetostrictive Piezoelectric Materials" – University of Tokyo 2004. As shown in Fig.4, this switch is made of a laminate of a Giant Magnetostrictive Material **42**, a TbDyFe alloy, bonded on both sides to a Piezoelectric material **44**, **46** to which electricity is applied. The application of electricity causes the reluctance of the piezoelectric material to increase.

Fig - 4
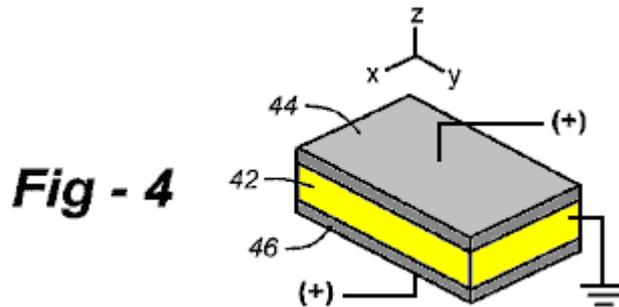
This original patent application is included in the Appendix.

However, very interestingly, there is another, completely different patent application from Annis and Eberly, with the same publication date and the same number. It is not at all obvious to me how that could be, but here is the bulk of that other patent application (the original being in the Appendix).

ENERGY GENERATION APPARATUS AND METHODS BASED UPON MAGNETIC FLUX SWITCHING

Abstract
In an electrical energy generator, at least one permanent magnet generates flux and a magnetisable member forms the single flux path. An electrically conductive coil is wound around the magnetisable member, and a plurality of flux switches are operative to sequentially reverse the flux from the magnet through the member, thereby inducing electrical current in the coil. A "Figure of Eight" construction comprises two continuous loops of magnetisable material sharing a magnetisable member common to both loops. An alternative configuration uses stacked loops and a separate piece of material acting as the magnetisable member. One end of the magnet is coupled to one of the loops, with the other end being coupled to the other loop. Each loop further includes two flux switches operated in a 2 × 2 sequence to sequentially reverse the flux through the magnetisable member. A relatively small amount of electrical power is used to control the magnetic flux of a permanent magnet by switching the flux between alternate paths. The resulting power from the switched magnetic flux yields substantially more power than the power required for the input switching.

Description

FIELD OF THE INVENTION
This invention relates generally to energy generation and, in particular, to methods and apparatus wherein magnetic flux is switched through a flux path to produce electricity.

BACKGROUND OF THE INVENTION
Magnetic flux may exist in "free-space," in materials that have the magnetic characteristics of free-space, and in materials with magnetically conductive characteristics. The degree of magnetic conduction in magnetically conductive materials is typically indicated with a B-H hysteresis curve, by a magnetisation curve, or both.

Permanent magnets may now be composed of materials which have a high coercively (Hc), a high magnetic flux density (Br), a high magneto motive force (mmf), a high maximum energy product (BHmax), with no significant deterioration of magnetic strength over time. An example is the NdFeB permanent magnet from VAC of Germany, which has an Hc of 1,079,000 Amperes/meter, a Br of 1.427 Tesla, an mmf ranging up to 575,000 Ampere-turns, and a BHmax of 392,000 Joules/meter^3.

According to Moskowitz, "Permanent Magnet Design and Application Handbook" 1995, page 52, magnetic flux may be thought of as flux lines which always leave and enter the surfaces of ferromagnetic materials at right angles, which never can make true right-angle turns, which travel only in straight or curved paths, which follow the shortest distance, and which follow the path of lowest reluctance (resistance to magneto motive force).

Free space presents a high reluctance path to magnetic flux. There are many materials which have magnetic characteristics similar to those of free space. There are other materials which offer a low or lower reluctance path for magnetic flux, and it is these materials that typically comprise a defined and controllable magnetic path.

High-performance magnetic materials for use as magnetic paths within a magnetic circuit are now available and are well suited for the (rapid) switching of magnetic flux with a minimum of eddy currents. Certain of these materials are highly non-linear and respond to a "small" applied magneto motive force (mmf) with a robust generation of magnetic flux (B) within the material. The magnetisation curves of such materials show a high relative permeability (ur) until the "knee of the curve" is reached, at which point ur decreases rapidly approaching unity as magnetic saturation (Bs) is reached.

Some of these non-linear, high-performance magnetic materials are referred to as "square" due to the shape of their B-H hysteresis curves. An example is the FINEMET® FT-3H nanocrystalline core material made by Hitachi of Japan. Other examples include Superperm49, Superperm80, SuperMalloy, SuperSquare80, Square50, and Supermendur, which are available from Magnetic Metals in the USA.

A "reluctance switch" is a device or means that can significantly increase or decrease (typically increase) the reluctance of a magnetic path. This is ideally done in a direct and rapid manner, while allowing a subsequent restoration to the previous (typically lower) reluctance, also in a direct and rapid manner. A reluctance switch typically has analogue characteristics. By way of contrast, an off/on electric switch typically has a digital characteristic, as there is no electricity "bleed-through." With the current state of the art, however, reluctance switches exhibit some magnetic flux bleed-through. Reluctance switches may be implemented mechanically, such as to cause keeper movement to create an air gap, or electrically by various other means.

One electrical reluctance switch implementation uses a control coil or coils wound around a magnetic path or a sub-member that affects the path. U.S. Navy publication, "Navy Electricity and Electronics Series, Module 8 - Introduction to Amplifiers" September 1998, page 3-64 to 3-66 describes how to modulate alternating current by changing the reluctance of the entire primary magnetic path by these means, one of which is used in a saturable-core reactor and the other in a magnetic amplifier. Flynn, U.S. Pat. No. 6,246,561; Patrick et al., U.S. Pat. No. 6,362,718; Pedersen, U.S. Pat. No. 6,946,938; Marshall, and US Patent Application 2005/01256702-A1 all disclose methods and apparatus that employ this type of reluctance switch for switching magnetic flux from a stationary permanent magnet or magnets for the purpose of generating electricity (and/or motive force).

Another electrical means of implementing a reluctance switch is the placement within the primary magnetic path of certain classes of materials that change (typically increase) their reluctance upon the application of electricity. Another electrical means of implementing a reluctance switch is to saturate a sub-region of a primary magnetic path by inserting conducting electrical wires into the material comprising the primary magnetic path. Such a technique is described by Konrad and Brudny in "An Improved Method for Virtual Air Gap Length Computation," in IEEE Transactions on Magnetics, Vol. 41, No. 10, October 2005.
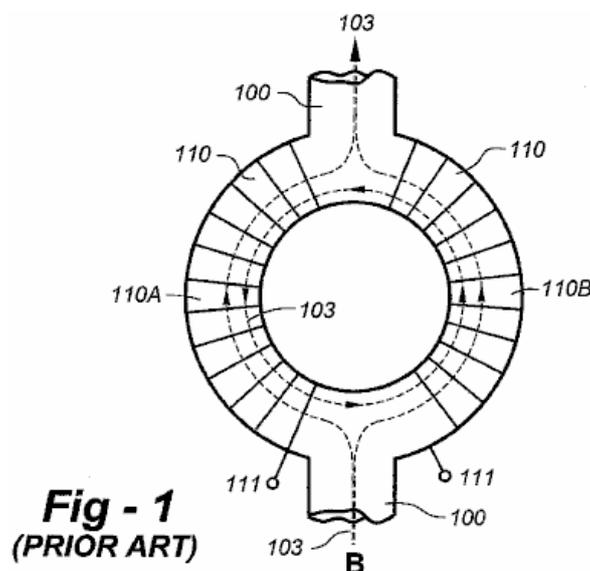
Fig - 1
(PRIOR ART)

Another electrical means of implementing a reluctance switch is described by Valeri Ivanov of Bulgaria on the web site www.inkomp-delta.com, shown in **Fig.1**. An electric toroid **110** is inserted into a primary magnetic path (**100**), so that the primary magnetic path is divided into two sub-paths **110A** and **110B**. A net magnetic flux reduction

effect in the primary magnetic path **100** results from the combination of the effects in the two sub-paths **110A** and **110B**, each of which results from different physics principles. In the first sub-path **110A**, the magnetic flux generated by applying electrical current to the windings **110** around toroidal path **110** opposes and subtracts from its portion of the magnetic flux **103** received from the primary magnetic path **100** yielding a reduced magnetic flux, which is also further reduced by a decrease in the sub-path **110A**'s relative permeability thereby increasing the reluctance of the sub-path. In the second sub-path **110B**, the magnetic flux generated by applying electrical current to the toroid windings **111** adds to its portion of the magnetic flux **103** received from primary magnetic path **100** yielding an increased net magnetic flux that approaches or exceeds the knee of the material's magnetisation curve thereby reducing its relative permeability and increasing its reluctance.

SUMMARY OF THE INVENTION

This invention is directed to methods and apparatus where magnetic flux is switched in both direction and intensity through a flux path to produce electricity. The apparatus broadly comprises at least one permanent magnet generating flux, a magnetisable member forming the flux path, an electrical conductor wound around the magnetisable member, and a plurality of flux switches operating to reverse sequentially, the flux from the magnet flowing through the member, thereby inducing electrical current in the coil.
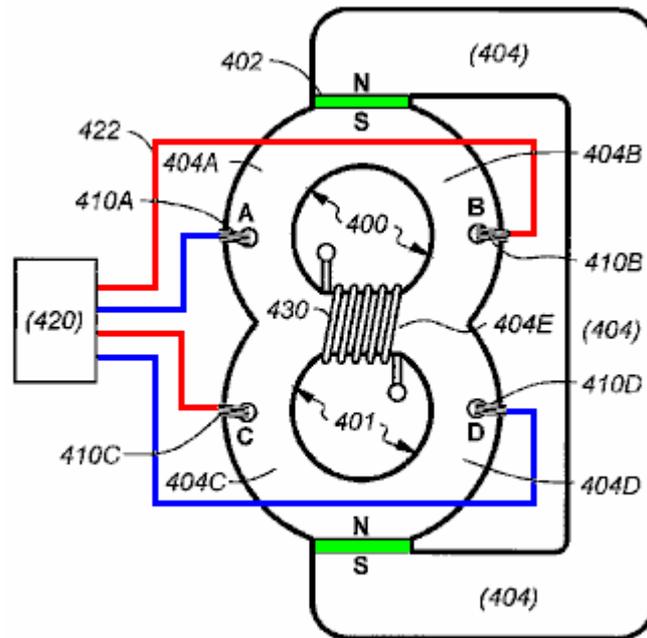
The preferred embodiment includes first and second loops of magnetisable material. The first loop has four segments in order **A, 1, B, 2**, and the second loop has four segments in order **C, 3, D, 4**. The magnetisable member couples segments **2** and **4**, and the permanent magnet couples segments **1** and **3**, such that the flux from the magnet flows through segments **A, B, C, D** and the magnetisable member. Four magnetic flux switches are provided, each controlling the flux through a respective one of the segments **A, B, C, D**. A controller is operative to activate switches **A-D** and **B-C** in an alternating sequence, thereby reversing the flux through the segment and inducing electricity in the electrical conductor. The flux flowing through each segment **A, B, C, D** is substantially half of that flowing through the magnetisable member prior to switch activation.
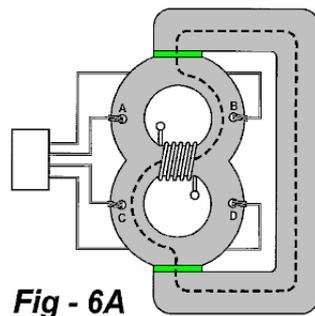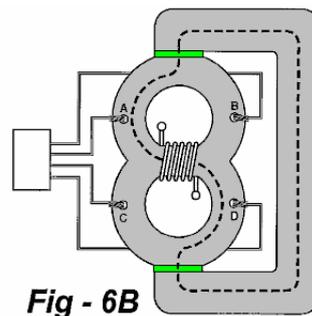
Fig - 6A   Fig - 6B

The loops and magnetisable member are preferably composed of a nanocrystalline material exhibiting a substantially square BH intrinsic curve. Each magnetic flux switch adds flux to the segment it controls, thereby magnetically saturating that segment when activated. To implement the switches, each segment may have an aperture formed through it and a coil of wire wound around a portion of that segment and through the aperture. The controller may be at least initially operative to drive the switch coils with electrical current spikes.

The first and second loops may be toroidal in shape, and the loops may be spaced apart from one another, with **A** opposing **C**, and **1** opposing **3**, and with **B** opposing **D** and **2** opposing **4**. The magnetisable member in this case is preferably a separate piece of material. Alternatively, the first and second loops may form a "Figure of eight" shape, with the two loops intersecting to form the magnetisable member.

The permanent magnet(s) and the material comprising the magnetic paths are preferably proportioned such that the material through the common segment is at or slightly below its maximum relative permeability before the electrically conducting output coil is energized. In the preferred embodiments, the power resulting from the switched magnetic flux yields substantially more power than the power required for the input switching.

BRIEF DESCRIPTION OF THE DRAWINGS
Fig.1 is a drawing of a prior art reluctance switch in the form of an electrical toroid inserted into a primary magnetic path;

Fig.2 is a detail drawing of a reluctance switch according to the invention;

Fig.3A and **Fig.3B** are detail drawings showing the use of four reluctance switches according to the invention;

Fig.4 is a drawing which depicts a preferred embodiment of the invention;

Fig.5 is a detail drawing an alternative reluctance switch according to the invention implemented through split laminations;

Fig.6A and **Fig.6B** show the operation of an energy generator according to the invention;

Fig.7A is an exploded view of a preferred energy generator construction;

Fig.7B is a side view of the construction shown in **Fig.7A**;

Fig.8 is a simplified schematic diagram of components used to simulate the apparatus of the invention;

Fig.9A is a diagram that shows the current delivered to one pair of flux switches in the simulation;

Fig.9B is a diagram that shows the current delivered to the other set of flux switches in the simulation;

Fig.10 shows the output of the simulation shown here; and

Fig.11 is a block diagram of a controller applicable to the invention

DETAILED DESCRIPTION OF THE INVENTION
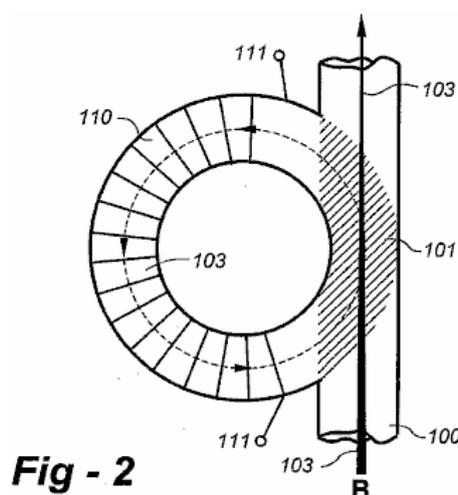
Fig - 2

Fig.2 is a detail drawing of a reluctance switch according to the invention. The reluctance switch includes the following components: a closed magnetic path **110** comprised of a high performance magnetic material (preferably a non-linear material exhibiting a "sharp knee" as saturation is approached), around which is wound a coil **111**. The closed magnetic path **110** shares a common segment **101** with a primary magnetic path **100**, in which magnetic flux **103** is induced by a permanent magnet (shown in subsequent drawings). Electric current is applied to windings **111** having a polarity and sufficient amperage so that the magnetic flux generated in the path

of switch **110** is additive to the magnetic flux **103** from the permanent magnet, such that the primary path **110** approaches or reaches magnetic saturation.

Fig - 3A   **Fig - 3B**
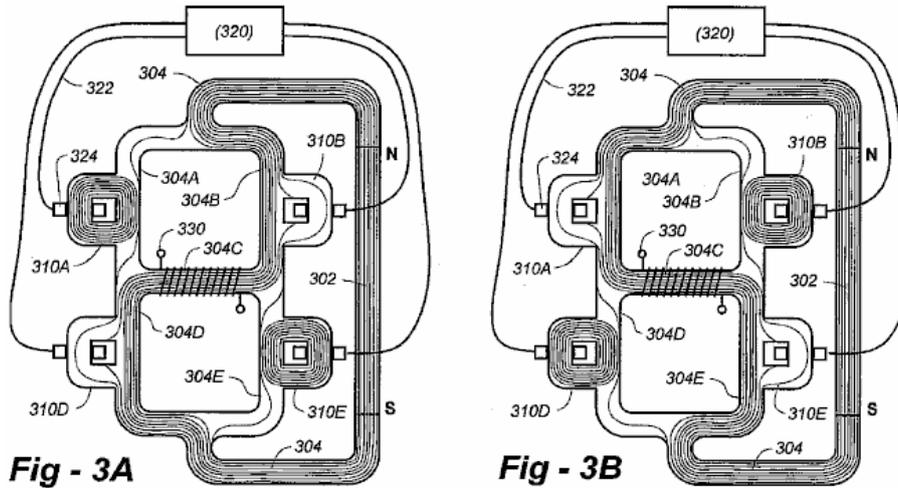
Fig.3A and **Fig.3B** are detail drawings of an apparatus which employs four reluctance switches according to the invention in a manner similar to that disclosed in U.S. patent application Ser. No. 11/735,746 entitled "Electricity Generating Apparatus Utilising a Single Magnetic Flux Path", the entire content of which is incorporated herein by reference. In this and in all embodiments described herein, the geometry of the closed magnetic paths may be circular (toroidal), rectangular, or any other closed-path shapes . A primary path **304** carries the flux from permanent magnet **302** unidirectionally. Flux switch pairs **310 A/E** and **310 B/D** are activated in alternating fashion to reverse the flux in magnetisable member **304C**, thereby inducing electrical current in winding **330**. **Fig.3A** shows the flux flow in one direction, and **Fig.3B** shows it reversed.

In **Fig.3A**, switches **310A** and **310E** are activated by controller **320** in electrical communication with the windings on the switches such as through conductor **322** to winding **324**. The additional flux in switches **310A** and **310E** are additive with the flux that would otherwise be present in segments **304A** and **304E**, thereby saturating these paths, causing the flux through segment **304C** to be in the direction shown. In **Fig.3B**, switches **310B** and **310D** are activated, saturating segments **304B** and **304D**, and reversing the flow.
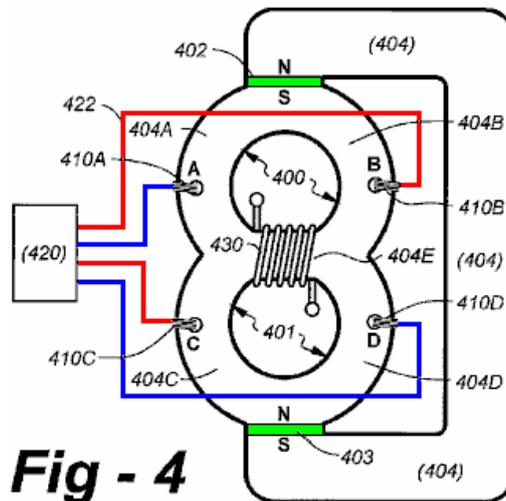
Fig - 4

Fig.4 is a drawing that depicts an embodiment of the invention using circular toroids **400**, **401** and multiple permanent magnets **402**, **403** disposed in the primary path **404**. The two toroids **400**, **401** intersect, forming magnetisable member **404E**.   A coil **430** is wound around the member **404E**, as shown.

The primary magnetic path **404** interconnects the upper end of loop **400** and the lower end of loop **401**. One of the magnets, **402**, couples one end of the primary magnetic path **404** to the first loop **400**, and another, **403**, couples the other end of the primary magnetic path **404** to the second loop **401**.

In this, and all of the embodiments described here, the permanent magnets are strong, rare-earth magnets, and multiple magnets of any length (thickness) may be used in each case. Further, in all embodiments, the loops, primary magnetic path and/or magnetisable member are preferably constructed from a high magnetic permeability

material such as the FINEMET FT-3H nanocrystalline soft magnetic material available from Hitachi. The invention is not limited in this regard, however, as alternative materials, including laminated materials, may be used.

The connections of the primary magnetic path **404** to the two loops **400**, **401** create four segments apart from the magnetisable member **404E**, the four segments including two opposing segments **A, B** in the first loop on either side of magnet **402**, and the two opposing segments **C, D** in the second loop on either side of magnet **403**.

Four magnetic flux switches are provided, each being operative to control the flux through a respective one of the four segments. A controller **420** is operative to activate the switches associated with segments **A** and **D**, and then **B** and **C**, alternately, thereby reversing the flux through the member **404E**, and so, inducing electrical current in coil **430**.
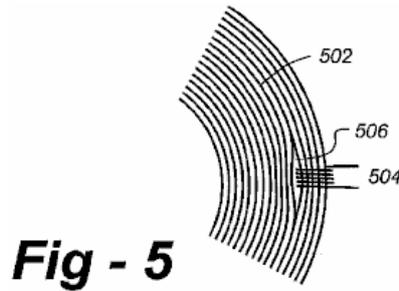
Fig - 5

Apertures may be formed through each of the four segments, with the switches being implemented by coils **410A** to **410D** which pass through the apertures and around an outer (or inner) portion of each segment. As shown in **Fig.5**, if the loops are fabricated with laminated material **502**, the laminations may be split at **506** to accommodate coil **504**. The percentage of the segment surrounded by the coil may vary in accordance with the material used, the waveforms presented to the coils, and other factors, with the goal being to magnetically saturate each segment through activation of the associated switch, thereby reversing the flux through path **404E**.

Fig - 6A   Fig - 6B
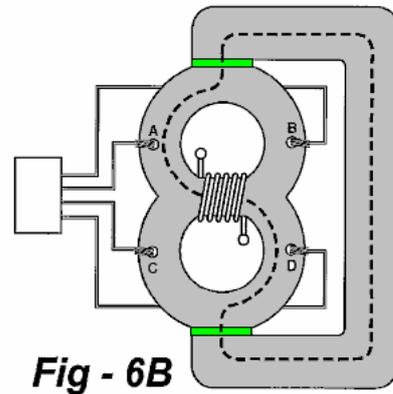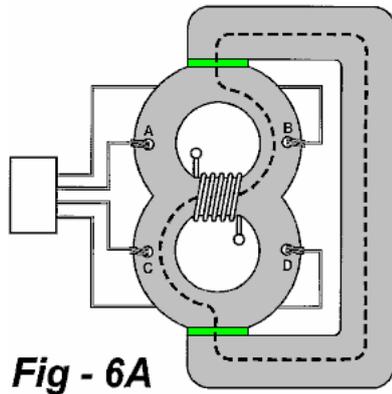
Fig.6A and **Fig.6B** show the operation of the apparatus of **Fig.4**. The primary path **404** carries the flux from permanent magnets **402** and **403** unidirectionally. Reluctance switches **410A** to **410D** are activated alternately to reverse the flux in segment **404E** which, in turn, induces electrical current in winding **430**. **Fig.6A** shows the flux flow in one direction, and **Fig.6B** shows it flowing in the opposite direction.

In **Fig.6A**, switches **410A** and **410D** are activated by controller **420** in electrical communication with the windings on the switches, such as through conductors **422** to switch **410B**. The flux provided by switches **410A** and **410D**, thereby saturating these paths, causing the flux through segment **404C** to be in the direction shown. In **Fig.6B**, switches **410B** and **410C** are activated, saturating segments **404B** and **404D**, thereby reversing the flux through path **404E**.

Fig - 7B
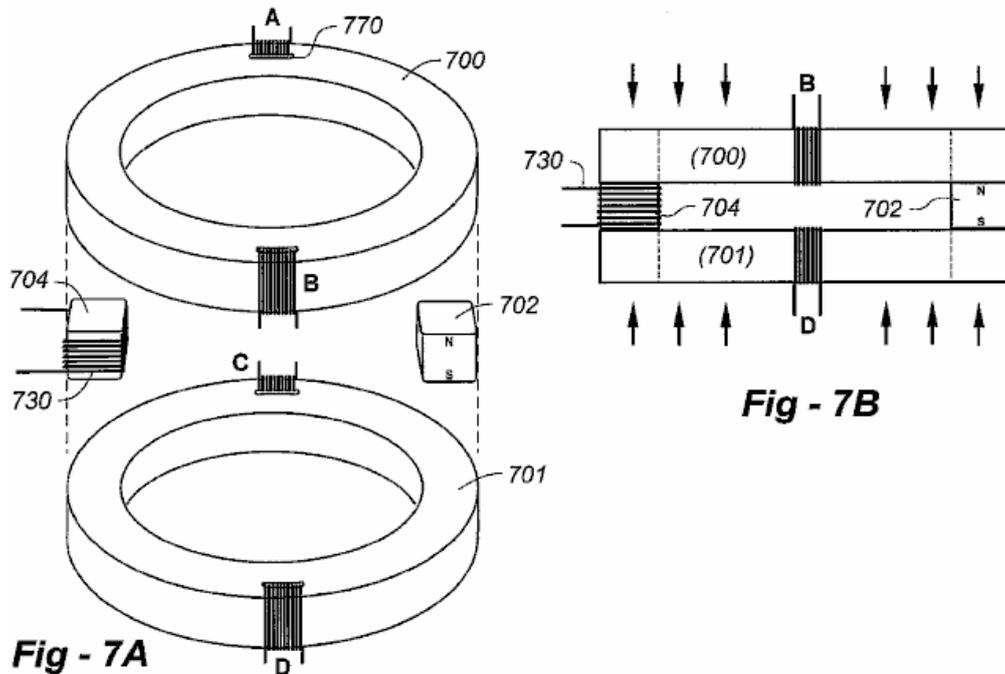
Fig - 7A

Fig.7A depicts a preferred construction of the apparatus depicted in **Fig.4**, **Fig.6A** and **Fig.6B**. Loops **400** and **401** are implemented as complete toroids **700**, **701**. This is important, since preferred high-performance magnetic materials are currently available in regular shapes of this kind. Note that, in this case, curved slots such as **770** are formed through the sides of each toroid to implement flux switches **A** to **D**. The magnetisable member in this embodiment is implemented with a block of material **704**, preferably the same high-performance magnetic material used to construct loops **400**, **401**. Permanent magnet **702**, shown at **702**, preferably has the same length as block **704**, enabling the various constituent parts to be held together with compression, shown in **Fig.7B**.

The following sections summarise some of the important characteristics of the preferred embodiments:
In terms of materials, the apparatus benefits from the use of nanocrystalline material with a "Square" BH intrinsic curve, a high Br (remanence) which is about 80% of its Bs (saturation), a low Hc (coercivity), and a fast magnetic response time to saturation. An example is FineMet FT-3H from Hitachi of Japan, which has a Br of 1.0 Tesla, a Bs (saturation) of 1.21 Tesla, a time to saturation (Bs) of 2 usec, and an Hc of −0.6 amp-turns/meter.

Modern permanent magnets are used with a square BH intrinsic curve, a Br in the range of 1.0 Tesla or more, and high Hc in the range of −800,000 amp-turns/meter or more. An example is the NdFeB magnet from the German company VAC, which has a Br of 1.427 Tesla and an Hc of −1,079,000 amp-turns/meter.

An important consideration is the matching of the magnet to the nanocrystalline material, both in Tesla rating and in cross-sectional area. The magnet's Br should be below the Bs of the nanocrystalline material. If the magnet is too "strong" for the nanocrystalline material, this may cause the nanocrystalline material to saturate at the area of contact with the magnet.

The current driving the reluctance switches in the prescribed 2 × 2 sequence should have a sharp rise in the leading edge (Tr) of each pulse with a pulse width (Pw) and Amperage value that are sustained until released at the end of the pulse width (Tf). The table below shows the effects of input current pulse rise times (Tr) on the output. There exists a narrow band of Tr, before which there is small power output, at which there are excellent power output and COPs in the range of 200 to 400 or greater, and after which there is no major increase in power output. The COP of this device without the coupling circuit is defined as "Output power/Drive Power" for the switches.

Tr	Output Power	Waveform Description
1.0E–4 secs	50 Watts	Spikes
7.5E–5	50 Watts+	Spikes with intermittent 30 Kilowatt square waves
5.0E–5	15 Kilowatts	Square waves after 3 cycles
1.0E–5	15 Kilowatts	Square waves after 1 cycle

Valeri Ivanov's Motionless Generator.
There are other devices which have what appears to be a very important air-gap in a magnetic frame. One of these was displayed on a Bulgarian website and is on the web page which is located at http://www.inkomp-delta.com/page3.html, put up by Valeri Ivanov in 2007. Valeri lives in Elin Pelin, Bulgaria and his motionless generator has COP=2.4 performance. Videos:
http://www.youtube.com/watch?v=7IP-buFHKKU and
http://www.youtube.com/watch?v=npFVaeSbk1Q are for his design, and it appears that he is about to go commercial: http://www.inkomp-delta.com/index.html in May 2014.

It is shown that an effective device can be constructed from a permanent magnet, a toroid and a laminated iron yoke. The arrangement is displayed like this:
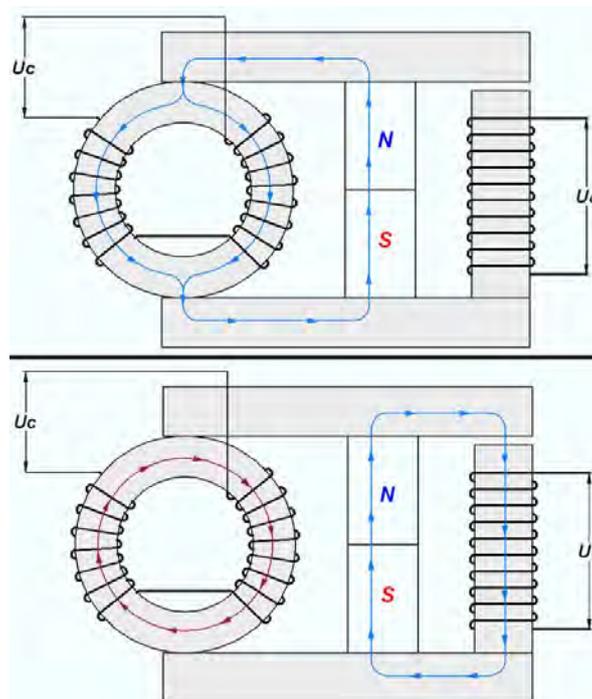
When the input coil is pulsed with an input voltage, it causes a flux reversal in the frame around which the output coil is wound, generating an electrical output.

There is another forum related to this and the better known MEG of Tom Bearden's which can be found at http://tech.groups.yahoo.com/group/MEG_builders/message/1355 where that particular message states that Valeri's device can be made to work at frequencies as low as 50 Hz and can use standard laminated iron frame components and produces Coefficient Of Performance figures up to 5.4 (that is, the output power is more than five times the input power). A demo video is at http://inkomp-delta.com/page10.html but not in English. It may well be that in order to work well, the MEG needs a very narrow input coil with an air-gap on each side of it and the same may well apply to Lawrence Tseung's magnetic frame shown earlier in this chapter.

The Motionless Generators of Kelichiro Asaoka

Kelichiro Asaoka received US patent 5,926,083 some two years before the well-known MEG patent of Tom Bearden and his associates. Personally, I find it hard to understand how the MEG patent (in the Appendix) could have been awarded when the Asaoka patent was already in place. However, here is most of the content of the Asaoka patent:

US Patent 5,926,083   20 July 1999   Inventor: Kelichiro Asaoka

Static magnet dynamo for generating electromotive force based on changing flux density of an open magnetic path

ABSTRACT

A static magnet dynamo including at least one permanent magnet having different poles; a first core comprising a soft magnetic material and which couples the different poles of the permanent magnet to form a closed magnetic path; a second core comprising a soft magnetic material which couples to the closed magnetic path via a paramagnetic material to form an open magnetic path; a magnetised coil wound around a portion of the first core where the closed magnetic path is formed; and an induction coil wound around a portion of the second core. A direction of a flux of the closed magnetic path is changed by applying an alternating voltage to the magnetised coil, generating an electromotive force in the induction coil by electromagnetic induction due changes in a flux of the open magnetic path induced by the change in direction of the flux of the closed magnetic path.

FIELD OF THE INVENTION

This invention relates to a dynamo which generates electromotive force by electromagnetic induction by changing the flux passing through an induction coil. More particularly, this invention relates to a static magnet dynamo that changes magnets that pass through an induction coil without turning the armature or electromagnet.

DISCUSSION OF BACKGROUND

Dynamos currently in practical use are so designed as to generate electromotive force by electromagnetic induction by changing the flux passing through an induction coil. Dynamos that generate power this way come in a wide variety, ranging from large models used in hydroelectric, thermal or atomic power plants to small models such as small dynamos with a diesel engine.

In all dynamo models mentioned above, the armature and electromagnet are turned, to change the flux passing through the induction coil, thus generating electromotive force in the induction coil by electromagnetic induction. For examples, the armature and electromagnet are turned by the torque of a water turbine in hydroelectric power generation, by the torque of the steam turbine in thermal and atomic power generation, and by the torque of the diesel engine in small dynamos.

Disadvantages:

Dynamos that generate electromotive force by electromagnetic induction as mentioned above are so designed that, regardless of the size of the dynamo, the armature and electromagnet are turned in order to change the flux passing the induction coil. These dynamos are disadvantageous in that the said turning of the armature and electromagnet generates vibrations and noise.

OBJECTS OF THE INVENTION

The purpose of this invention is to provide a static magnet dynamo devoid of any torque-giving means or other moving part to eliminate vibrations and noise, in order to resolve the various problems mentioned above.

To resolve the above problems, this invention is composed as described below.

The static magnet dynamo involved in this invention consists of at least one permanent magnet, a first core consisting of a soft magnetic material forming a closed magnetic path by coupling the different poles of the said permanent magnet, a second core consisting of a soft magnetic material forming an open magnetic path by being coupled to the closed magnetic path via a paramagnetic material, a magnetised coil wound around a part consisting of only the closed magnetic path of the first core, and an induction coil wound around the second core. The point of this invention is to generate electromotive force in the induction coil by electromagnetic induction by changing the direction of the flux of the closed magnetic path by applying an alternating voltage to the magnetised coil and by changing the flux of the open magnetic path induced by changes in the direction of the flux in the closed magnetic path.

Effects:
In the above configuration, the static magnet dynamo involved in this invention consists of a first core consisting of a permanent magnet and a closed magnetic path, a second core consisting of an open magnetic path via a paramagnetic material, a magnetised coil wound around the part consisting only of the closed magnetic path of the first core, and an induction coil wound around the second magnetic path. The dynamo is so designed as to generate electromotive force in the induction coil by electromagnetic force by changing the direction of the flux of the first core by applying an alternating voltage to the magnetised coil, and by changing the flux of the second core induced by changes in the direction of the flux of the first core.

This makes it possible to change the flux passing through the induction coil without a torque-giving means or other moving part and to generate electromotive force in the induction coil by electromagnetic induction, thus enabling power generation without causing vibrations or noise. This dynamo can also be downsized and made available at low prices.

Other characteristics and benefits of this invention will be made clear by the description given below with diagrams attached.

BRIEF DESCRIPTION OF THE DRAWINGS
A more complete appreciation of the invention and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, wherein:
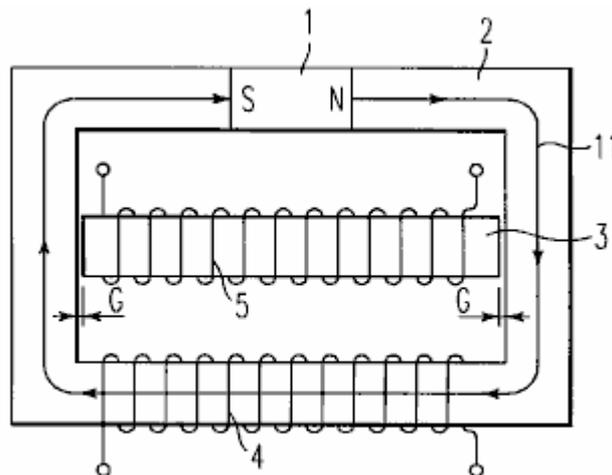
FIG. 1

Fig.1 represents a basic configuration of a static magnet dynamo with an open magnetic path involved in this invention.
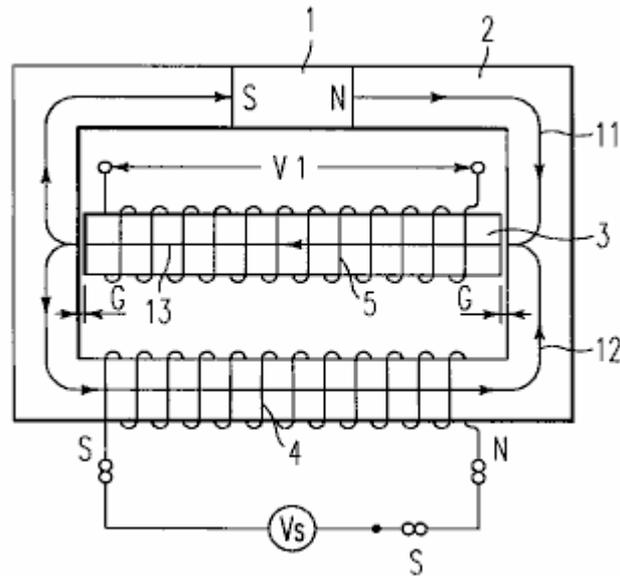
FIG.2

Fig.2 represents how a flux in the direction opposed to that of a permanent magnet typically occurs in the magnetised coil.
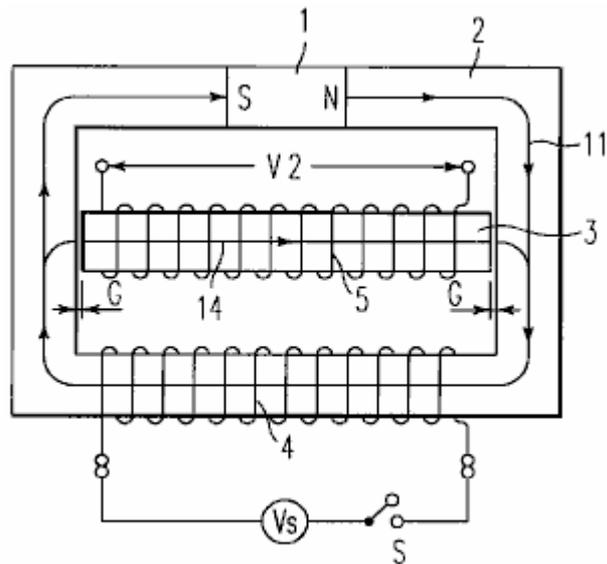
FIG.3

Fig.3 represents how a flux in the direction opposed to that of a permanent magnet typically disappears from the magnetised coil.
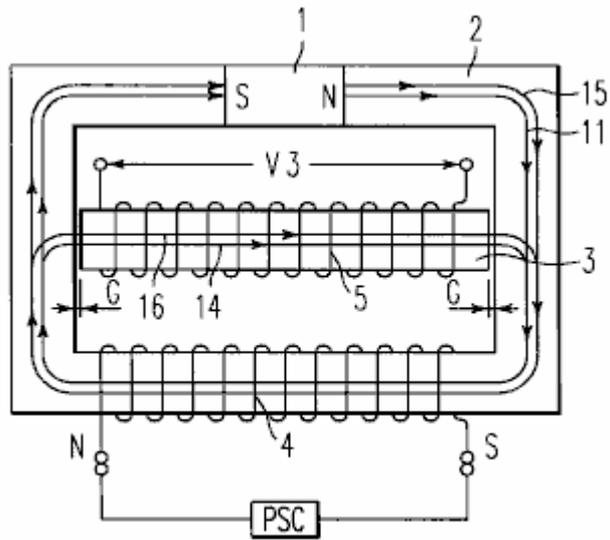
FIG. 4

Fig.4 represents how a flux in the same direction as that of the permanent magnet typically occurs in the magnetised coil.
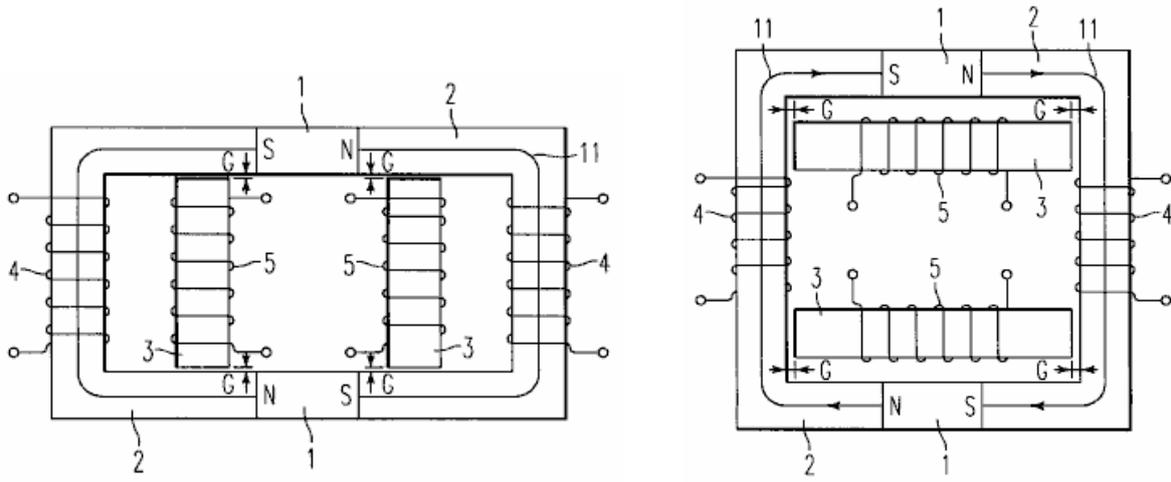
FIG. 5A

FIG. 5B

Fig.5 is a first embodiment of the static magnet dynamo involved in this invention.
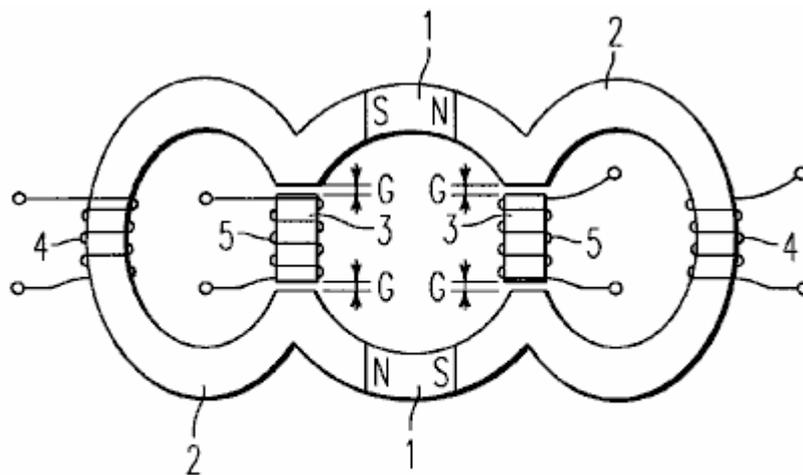
FIG. 6

Fig.6 is a second embodiment of the static magnet dynamo involved in this invention.
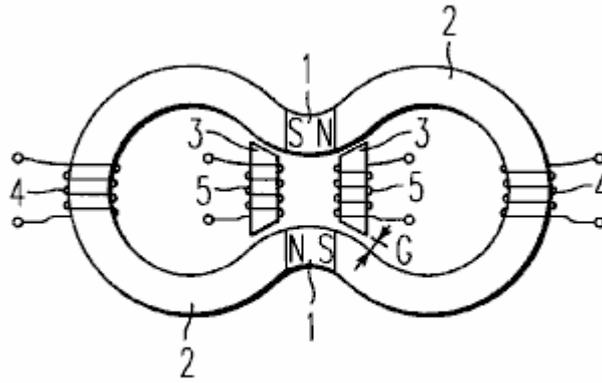
FIG. 7

Fig.7 is a third embodiment of the static magnet dynamo involved in this invention.
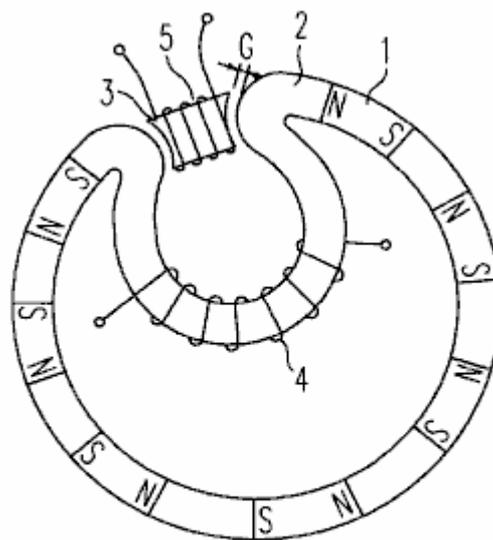
FIG. 8

Fig.8 is a fourth embodiment of the static magnet dynamo involved in this invention.
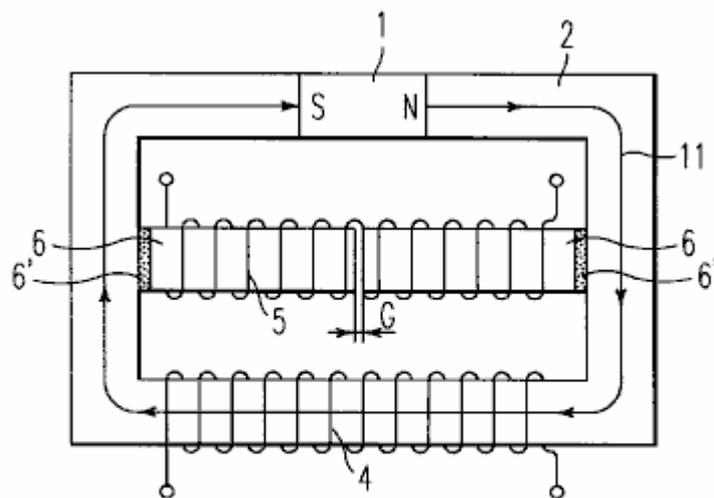
FIG. 9

FIG. 9 is a fifth embodiment with an open magnetic path.
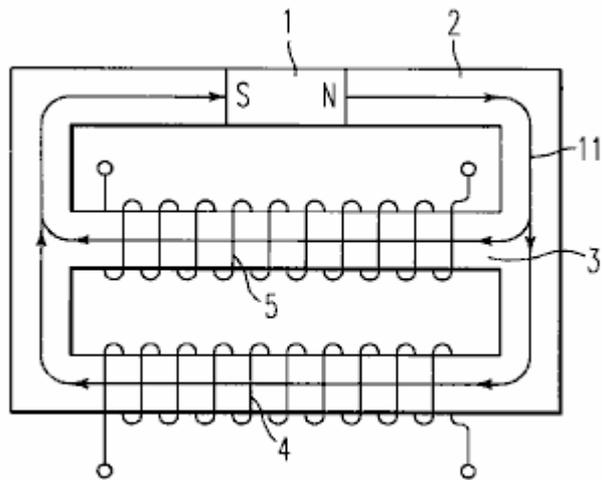
FIG. 10

Fig.10 is a basic configuration of a static magnet dynamo with a closed magnetic path involved in this invention.
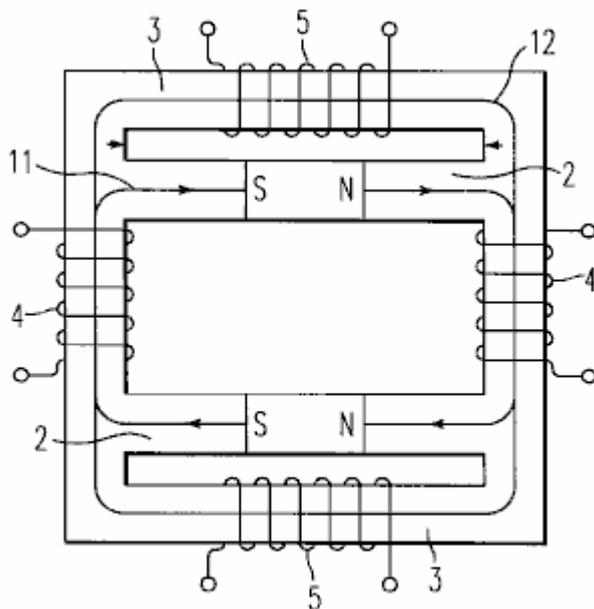
FIG. 11

Fig.11 is a first embodiment of the static magnet dynamo with a closed magnetic path involved in this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, wherein like reference numerals designate identical or corresponding parts throughout the several views, and more particularly to **Fig.1** where there is illustrated a basic configuration of the static magnet dynamo with one permanent magnet. **Figs. 2, 3**, and **4** describe how the static magnet dynamo represented in **Fig.1** generates power.
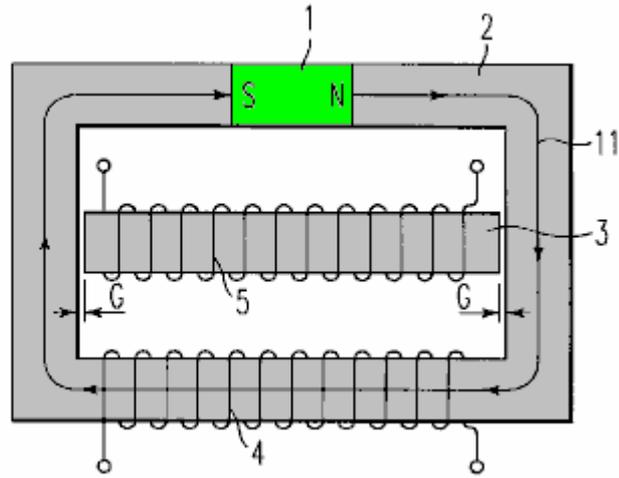
FIG. 1

As indicated in the figures, the first core **2** formed to couple the permanent magnet **1** and the different poles of the permanent magnet **1** in an annular manner, forms a closed magnetic path. This closed magnetic path is then equipped with a second core **3** via a paramagnetic material 10 μm to 5 mm thick. This results in the formation of an open magnetic path consisting of a permanent magnet **1**, part of a first core **2**, a paramagnetic material, and a second core **3**. The part consisting only of the closed magnetic path of the first core **2** is wound around with a magnetised coil **4**. The second core **3** is then wound around with an induction coil **5** designed to generate electromotive force by electromagnetic induction.

Here, the permanent magnet **1** is a magnet with a high residual flux density, a great coercive force, and a large maximum energy product for higher power generation efficiency. Typical materials used here are neodymium iron boride magnet ($Nd_2Fe_{14}B$), samarium cobalt magnet (Sm_2Co_{17}), or samarium iron nitride ($Sm_2Fe_{17}N_2$).

The first core **2** and the second core **3** are made of a soft magnetic material having a high permeability, with high initial, maximum, and other permeability levels, high residual flux density and saturation magnetisation, and small coercive force, thus making effective use of the flux of the magnetic path for power generation. Examples include Permalloy based alloys.

Applicable paramagnetic materials are those with a specific permeability comparable to that of a vacuum, such as air, copper, and aluminium. When air is used as a paramagnetic material, that is, when a gap **G** is secured between the first core **2** and the second core **3**, the second core **3** is retained with a solid paramagnetic material. The figures represent embodiments with a gap **G**, without a solid paramagnetic material designed to retain the second core **3**.

Following is a description of how a static magnet dynamo of the above configuration generates power. First, when no voltage is applied to the magnetised coil **4** of the static magnet dynamo, a first flux **11** is formed in the first core **2** in the direction going from the N pole to the S pole of the permanent magnet **1**. In this state, no flux has been formed in the second core 3 coupled via the gap **G**.
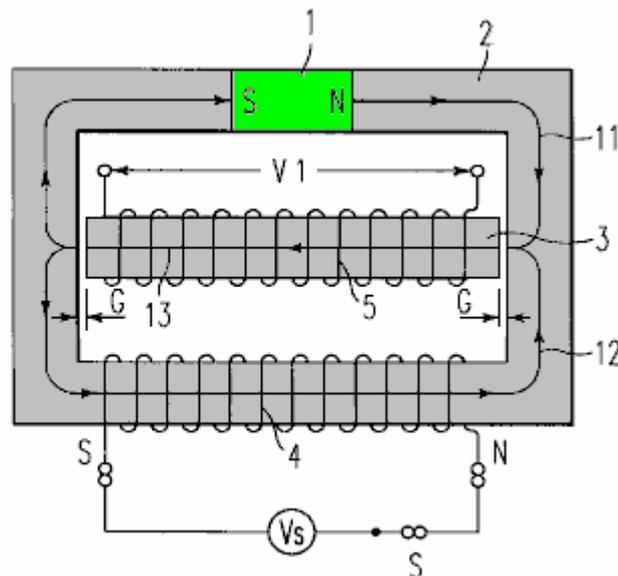
FIG.2

A voltage can be applied to the magnetised coil **4** in three manners described below. In the first voltage application, as indicated in **Fig.2**, a DC voltage **VS** is applied to the magnetised coil **4** in the direction that the voltage repels the first flux **11** of the first core **2** generated by the permanent magnet **1**, and vice versa, that is, in such a manner that the second flux **12** occurs in the reverse direction of the first flux **11**. As a result, the first flux **11** repels the second flux **12** and vice versa, so that the flux more easily leaks from the closed magnetic path. The first flux **11** and the second flux **12**, which more easily leak from the closed magnetic path, jump across the gap **G** and enter the second core **3**, so that a third flux **13** is induced in the second core **3**. Furthermore, the induction of this third flux **13** changes the flux passing through the induction coil **5**, so that electromotive force **V1** occurs in the induction coil **5**, resulting in power being generated.
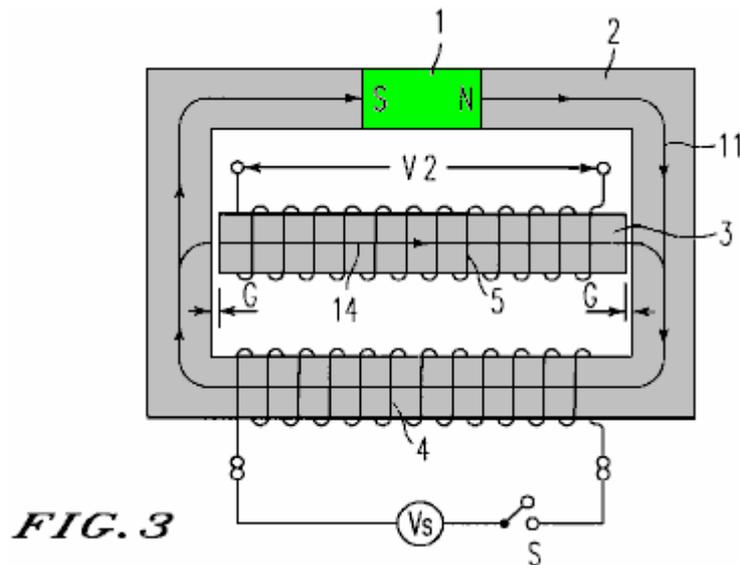
FIG. 3

Next, removing the DC voltage applied to the magnetised coil **4** prompts the first core **2** to try going back to a state where only the first flux **11** is formed as indicated in **Fig.1**. At that time, the second core **3** has a flux in the reverse direction of the third flux **13**, that is, the fourth flux **14** indicated in **Fig.3**, in order to kill the third flux **13**. Then, the induction of the fourth flux **14** changes the flux passing the induction coil **5**, so that electromotive force **V2** occurs in the induction coil **5**, resulting in power being generated.

Power generation in this first voltage application can be realised by a static magnet dynamo involved in this invention, a DC power supply to apply a DC voltage **VS** to the magnetised coil **4**, and a switching circuit that turns the DC power supply on and off. A contact-less switching circuit can be made if a semiconductor switching device, such as a thyristor, is available.

The second voltage application is the same as the first voltage application up to the point where the third flux **13** is induced in the second core **3** by applying a DC voltage **VS** to the magnetised coil **4** so as to generate the second flux **12** in the reverse direction of the first flux **11** and where the third flux **13** is induced to generate electromotive force **V1** in the induction coil **5**, thus generating power.
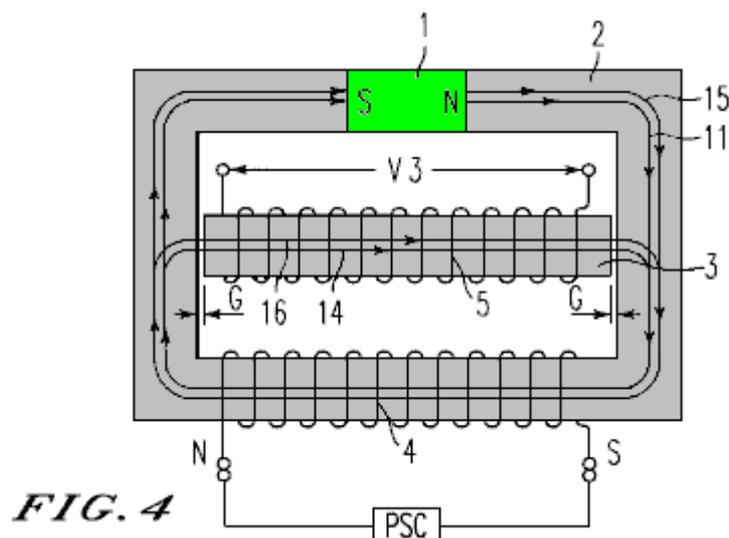
FIG. 4

Next, changing the polarity of the DC voltage applied to the magnetised coil **4** generates in the first core **2** the first flux **11** caused by the permanent magnet **1**, as well as the fifth flux **15** in the same direction as the first flux, caused by the magnetised coil **4**.   Here, the first flux **11** is given the fifth flux **15**, so that the second core **3** is given the fourth flux **14** as indicated in **Fig.4**, as well as the sixth flux **16** in the same direction as the fourth flux **14**. Furthermore, inducing the fourth flux **14** and the sixth flux **16** changes the flux passing through the induction coil **5**, so that an electromotive force **V3** larger than the electromotive force **V2** is generated in the rotary coil to produce power.

This second voltage application requires a polarity switching circuit **PSC** that changes the polarity of **DO** voltage instead of a switching circuit that turns on and off the DC voltage applied to the magnetised coil **4** in the first voltage application. This polarity switching circuit can be made of a semiconductor switching device, similarly to the switching circuit in the first voltage application.

In the third voltage application, AC voltage **VS** is applied to the magnetised coil **4** instead of applying DC voltage to the magnetised coil **4** in the second voltage application with the polarity changed. The flux generated by applying AC voltage to the magnetised coil **4** becomes an alternating flux that alternates between the second flux **12** in **Fig.2** and the fifth flux **15** in. **Fig.4**. Then, the flux induced in the second core **3** is the third flux **13** in **Fig.2** when the second flux **12** is generated, and is the fourth flux **14** trying to kill the sixth flux **16** and the third flux **19** in **Fig.4** when the fifth flux **15** is generated. That is, the flux induced in the second core **3** naturally also becomes an alternating flux.

In power generation of this third voltage application, AC voltage is applied to the magnetised coil **4**, which overcomes the need for a switching circuit or polarity switching circuit **PSC**, which was needed in the first and the second voltage application, so that the device becomes simplified.   Furthermore, the flux induced in the first core **2** and the second core **3** becomes an alternating flux induced by AC voltage, so that the dynamo functions also as a transformer having a gap **G** between the first core **2** and the second core **3**. It is therefore possible to increase further the electromotive force **V** generated by electromagnetic induction in the induction coil **5**.
Next, the power generation efficiency of a static magnet dynamo involved in this invention is described. The static magnet dynamo can be considered as a transformer if its permanent magnet **1** is removed and there is a gap **G**.

A transformer entails an eddy current loss **We** and hysteresis loss **Wh** of the core, and a loss **Wr** due to the electric resistance of the coil. These factors are in a relation formulated below.

$$\text{Total loss } \mathbf{W1 = We + Wh + Wr} \quad \ldots\ldots\ldots(1)$$

Let the input be **Win** and the output **Wo**, and the **Win** becomes equal to the total loss, so that the conversion efficiency of the transformer is

$$\mathbf{Eff} = Wo / Win = Wo(We + Wh + Wr) < 1 \ldots\ldots\ldots (2)$$

In reality, in **Fig.1**, the closed magnetic path consisting of the first core **2** contains a permanent magnet **1**. The flux of this permanent magnet **1** therefore contributes to power generation.   Therefore, in **Fig.1**, let the input be **Win2** and the output **Wo2**, then

$$Wo2 = Wp + \alpha Win2 \ldots\ldots\ldots (3)$$

Where **Wp** represents power resulting from the flux of the permanent magnet **1** contributing to power generation, and **α** represents a conversion efficiency obtained when the device is considered as a transformer with a gap **G**.

Therefore, power generation efficiency is:

$$Eff = Wo2 / Win2 \text{ or}$$

$$Eff = (Wp / Win2) + \alpha \ldots\ldots\ldots (4)$$

Here, since **α** < 1, if **Wp / Win2** > 1, that is, if power obtained resulting from the flux of the permanent magnet **1** contributing to power generation is larger than dynamo power supplied to the magnetised coil **4**, power generation efficiency becomes no less than 1, so that the device can display its performance as a dynamo.

Thus, the inventor examined as described below how much the flux of the permanent magnet **1** contributes to the induction of the third flux **13** in **Fig.2**. First, the inventor provided static magnet dynamos of the basic configuration indicated in **Fig.1**, one with a permanent magnet **1** and another without a permanent magnet **1**. The inventor then compared the power levels needed to induce fluxes of equal flux densities to the second core **3** of

each embodiment, that is, the power levels supplied to the magnetised coil **4**. As a result, an embodiment with a permanent magnet **1** required only a very low power level to be supplied to the magnetised coil **4**. It was observed that the power level required was no more than one fortieth of that of the embodiment without a permanent magnet **1**, depending on the test condition.

In a static magnet dynamo involved in this invention, therefore, **Win2** can be made sufficiently smaller than **Wp**, so that the inventor considers it possible to make **Wp / Win2** > 1.

Embodiment 1

Next, as the first embodiment, a static magnet dynamo system composed of two static magnet dynamos of the basic configuration is described based on **Fig.5**.
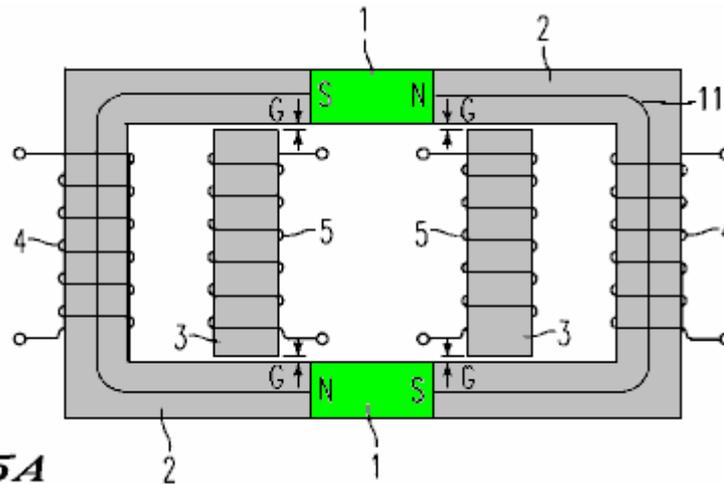
FIG.5A

In **Fig.5A**, in a static magnet dynamo, a closed magnetic path is made of two permanent magnets **1** and two first cores **2** formed so as to couple the different poles of one permanent magnet **1** with the other permanent magnet **1** in an annular manner. This closed magnetic path is then equipped with a second core **3** via a gap **G**. This forms an open magnetic path consisting of a permanent magnet **1**, part of a first core **2**, a paramagnetic material, and a second core **3**.
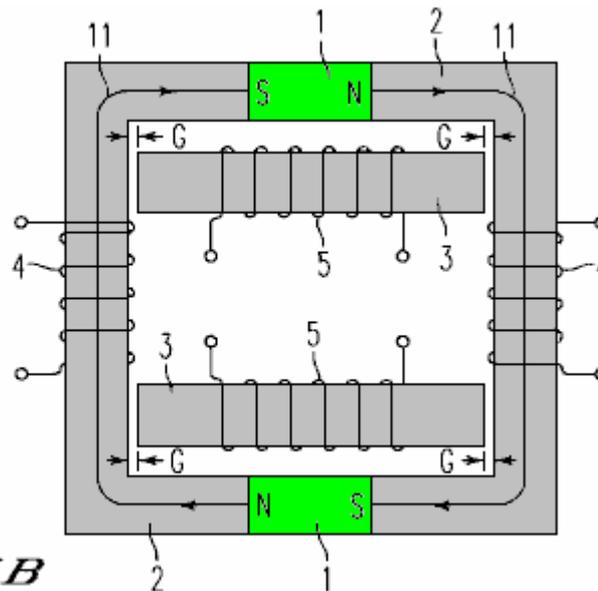
FIG.5B

This open magnetic path can be arranged in two different ways. In one configuration, as indicated in **Fig.5A**, one open magnetic path can be made of two permanent magnets **1** and two second cores **3**. In the other configuration, as indicated in **Fig.5B**, one open magnetic path can be made of one permanent magnet **1** and another can be made of one first core **2**. The static magnet dynamos in **Fig.5A** and **Fig.5B** do not differ substantially in terms of effect results, except that their patterns forming such an open magnetic path differ.

The part forming only a closed magnetic path of each first core **2** is wound around with a magnetised coil **4**. Each second core **3** is then wound around with an induction coil **5** which generates electromotive force by electromagnetic induction.

This static magnet dynamo forms a first flux **11** in the first core **2** in the direction going from the N pole to the S pole of the permanent magnet **1**, with no voltage applied to the magnetised coil **4**. Furthermore, the action of this dynamo applying voltage to the magnetised coil **4** and generating electromotive force in the induction coil **5** by electromagnetic induction to generate power is similar to static magnet dynamos of the basic configuration. The static magnet dynamo with two permanent magnets **1** as mentioned above has well-balanced magnetic paths. Since the flux of the permanent magnets **1** can be effectively used, this embodiment achieves higher power generation efficiency than static magnet dynamos of the basic configuration.

The first embodiment is a static magnet dynamo system composed of two static magnet dynamos of the basic configuration. Similarly, a static magnet dynamo system can be made as a combination of three or more static magnet dynamos of the basic configuration (**Figs. 1-4**). In that case, similarly to the first embodiment, an open magnetic path can be formed in two manners. One configuration is the formation of one open magnetic path by coupling all permanent magnets **1** with a second core **3**. The other is the formation of as many open magnetic paths as permanent magnets by coupling the N pole of each permanent magnet **1** to the S pole with a second core **3**.

Embodiment 2
Next, the second embodiment of the present invention is represented in **Fig.6**,

FIG. 6
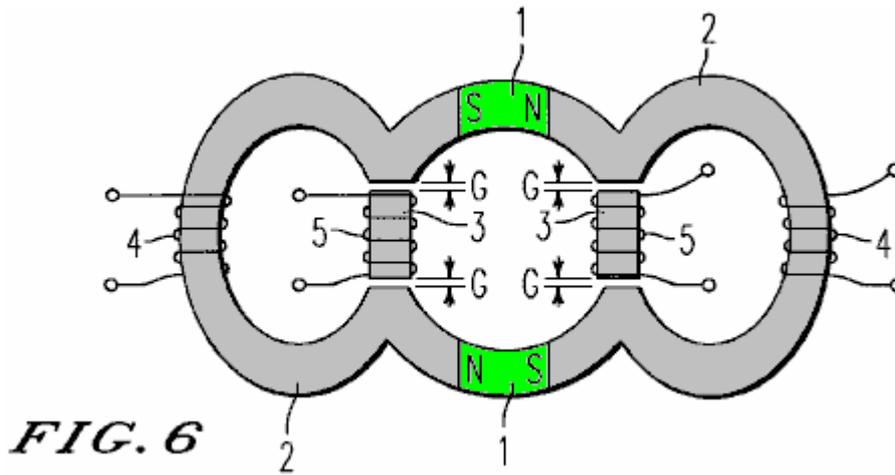
the third embodiment in **Fig.7**,

FIG. 7
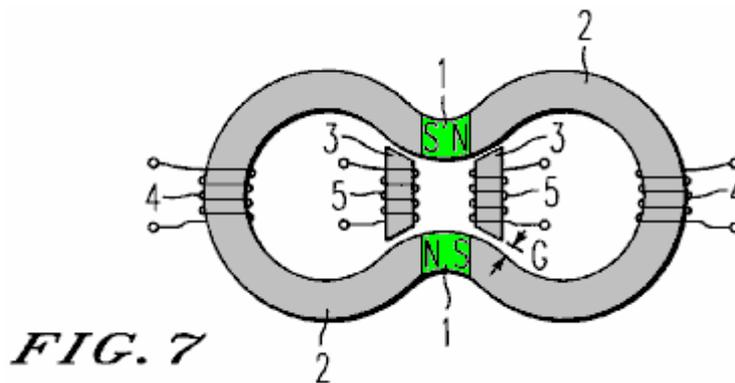
and the fourth embodiment in **Fig.8**.
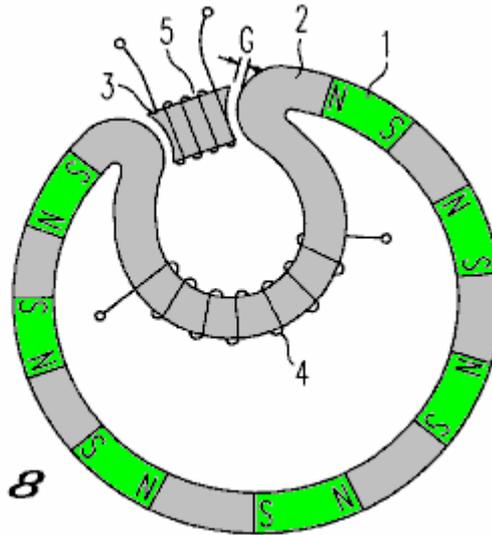
FIG.8

In these embodiments, the action of applying voltage to the magnetised coil **4** and generating electromotive force in the induction coil **5** by electromagnetic induction is similar to that of a static magnet dynamo of the basic configuration (**Figs. 1-4**).

The second and the third embodiments represented in **Fig.6** and **Fig.7** have the same basic configuration as the first embodiment, except that the first core **2** in each embodiment is shaped quite differently.

In the second embodiment, the part opposed to the end of the second core **3** sticks out toward the end of the second core **3**. Thus, the leakage flux due to the repellence of the first flux **11** and the second flux **12** generated in the first core **2** jumps across the gap **G** and enters the second core **3** with greater ease.

Embodiment 3
The third embodiment is so designed that the part coupling the second core **3** is that part of the first core **2** which is nearest to the permanent magnet **1** and, to shorten the open magnetic path even further, the two permanent magnets **1** are close to each other. Since a flux tends to form a closed magnetic path with the shortest distance, the leakage flux due to the repellence of the first flux **11** and the second flux **12** generated in the first core **2** jumps across the gap **G** and enters the second core **3** with greater ease.

Embodiment 4
The fourth embodiment indicated in **Fig.8**, as opposed to a static magnet dynamo of the basic configuration, consists of a first loop where permanent magnets **1** with multiple closed magnetic paths are arranged circularly with the fluxes oriented in the same direction, and of a second loop which is wound around with a magnetised coil **4** and installed inside the first loop. Furthermore, the parts with their first cores **2** coupling the first loop to the second one stick out toward each other across a specified gap. The parts where this first core **2** stick out are coupled together with a second core **3** via a gap **G** to form an open magnetic path. This reinforces the flux of the permanent magnets **1** and makes it easier for the leakage flux due to the repellence of the first flux **11** and the second flux **12** generated in the first core **2** to jump across the gap **G** and enter the second core **3**.

Embodiment 5
The configuration of a static magnet dynamo involved in this invention has so far been described in terms of embodiments where an open magnetic path is connected to the first core **2** at both ends of the second core **3** via a paramagnetic material. However, this invention is not limited to these embodiments.
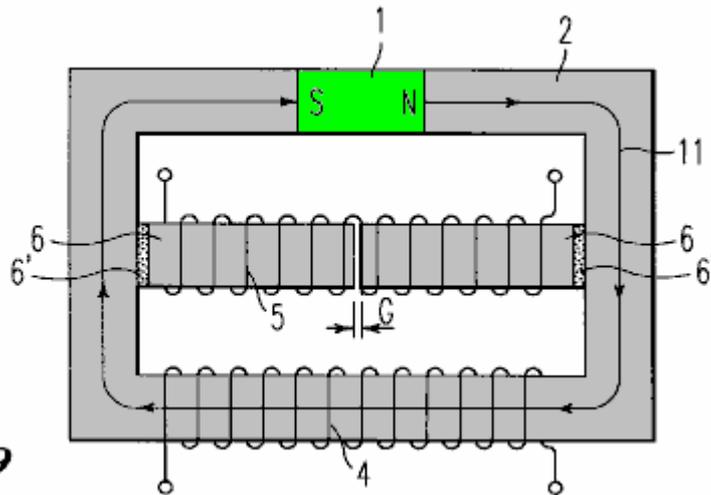
FIG. 9

That is, as indicated in **Fig.9**, the open magnetic path may be embodied by extending any two parts of the first core **2** in the direction that they approach each other, thus defining them as core extensions **6**, and coupling these core extensions **6** via a paramagnetic material **6'**. This embodiment can be applied to all embodiments mentioned above.

Embodiment 6
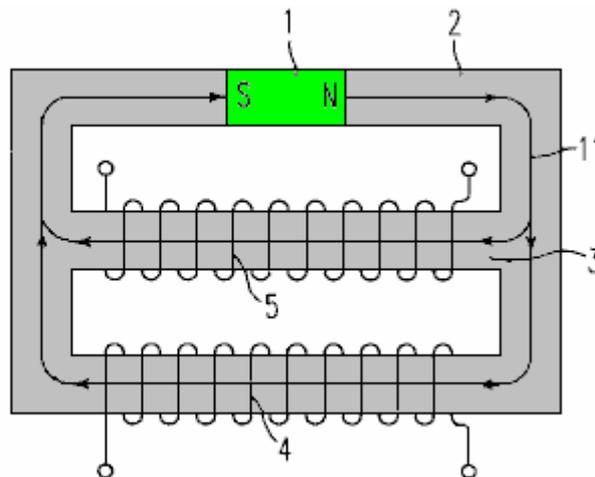
FIG. 10

As indicated in **Fig.10**, a closed magnetic path consists of a permanent magnet **1** and a first core **2** formed so as to couple the different poles of the said permanent magnet **1** in an annular manner. This closed magnetic path is then equipped with a second core **3** so that it comes magnetically in parallel with the permanent magnet **1**, so that a bypass closed magnetic path is composed of a permanent magnet **1**, part of a first core **2**, and a second core **3**.

The part consisting only of the closed magnetic path of the first core **2** is wound around with a magnetised coil **4**. The second core **3** is then wound around with an induction coil **5** designed to generate electromotive force by electromagnetic induction.

The action of a static magnet dynamo of the above configuration generating power is described below. First, when no voltage is applied to the magnetised coil **4** of a static magnet dynamo, the first core **2** forms a first flux **11** in the direction going from the N pole to the S pole of the permanent magnet **1**. In this state, a flux similar to that of the first core **2** is generated in the second core **3** as well.

Embodiment 7
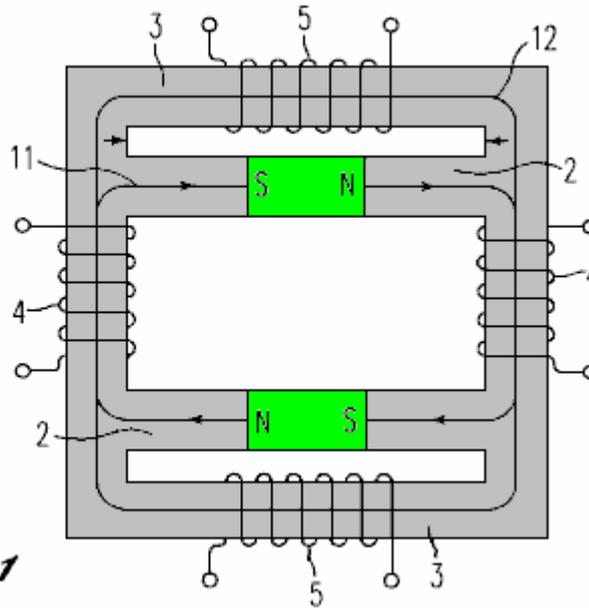
FIG. 11

The seventh embodiment is described below based on **Fig.11**, in terms of a static magnet dynamo system composed of two static magnet dynamos of the basic configuration and with the relative position of the permanent magnets changed.

In a static magnet dynamo, a closed magnetic path is composed of two permanent magnets **1** and two first cores **2** so designed as to couple the different poles of one of the permanent magnets **1** with the other permanent magnet **1** in an annular manner. This closed magnetic path is then equipped with a second core **3**. This results in the formation of a bypass closed magnetic path consisting of a permanent magnet **1**, part of a first core **2**, a paramagnetic material, and a second core **3**.

The parts where a closed magnetic path of each first core **2** alone is formed are wound around with a magnetised coil **4**. Each second core **3** is then wound around with an induction coil **5** designed to generate electromotive force by electromagnetic induction.

In this static magnet dynamo, where no voltage is applied to the magnetised coil **4**, a first flux **11** is formed in the first core **2** in the direction going from the N pole to the S pole of the permanent magnet **1**. The action of applying voltage to the magnetised coil **4** and generating electromotive force in the induction coil **5** by electromagnetic induction to generate power is similar to that of a static magnet dynamo of the basic configuration.

In the aforementioned static magnet dynamo incorporating two permanent magnets **1**, magnetic paths are arranged in a well-balanced manner. This makes it possible to make effective use of the flux of the permanent magnets **1**, so that power generation efficiency is higher than that of a static magnet dynamo of the basic configuration.

This invention has so far been described somewhat in detail in terms of the most favourable embodiments. Since it is clear that a wide variety of embodiments can be realised without opposing the philosophy and scope of this invention, this invention will not be limited to any particular embodiment, except for the limitations described in the attached claim.

Floyd Sweet's "VTA" Generator.
Another device in the same category of permanent magnets in conjunction with oscillating coils, was produced by Floyd Sweet. The device was dubbed "Vacuum Triode Amplifier" or "VTA" by Tom Bearden.

The device was capable of producing more than 500 watts of output power at 120 Volts, 60 Hz requiring less than one third of a milliwatt as input power. The output power can operate AC motors, lights, heaters and when rectified, DC motors.

Thanks is due to Horst Weyrich who has recently provided me with links to useful material which I had not seen before. This link: http://www.youtube.com/watch?v=0gM9natKIyY is to a video in which Floyd shows most of the magnet conditioning process.

Recently, some additional information on Floyd Sweet's device, has been released publicly by an associate of Floyd's who goes just by his first name of "Maurice" and who, having reached the age of seventy has decided that it is time to release this additional information. That information can be found in the Appendix. I am not aware of anybody who has succeeded in replicating Floyd's VTA, but here is as much information as I have at this time.

In the above video, Floyd talks about separating two of his conditioned permanent magnets with an "air gap" which is astonishing as he is putting them on opposite sides of a length of aluminium channel with thick walls and aluminium has a major damping effect on magnetic fields:

This arrangement which seems quite mad, is confirmed by a picture from Floyd's lab. As shown here:
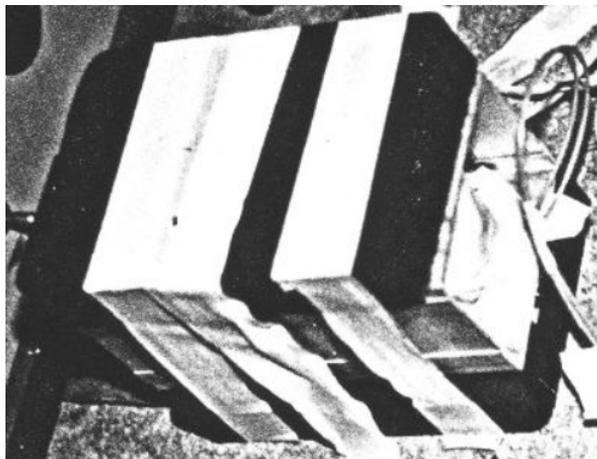
This shows clearly that the open ends of the channel are not between the two magnets allowing an unrestricted magnetic field to flow between them, but instead, two channel thicknesses of aluminium are between the two magnets, obstructing the magnetic flow – quite remarkable !!

Floyd shows two coils being used to condition the magnets. The first is the large vertical coil shown here in front of Floyd:

The second coil is not seen as it is inside the vertical coil, sitting flat on the base, and consisting of an entire reel of AWG #17 (1.15 mm diameter) wire, something like this:

This coil operates effectively as an air-core solenoid, producing a strong axial magnetic field inside the larger coil which surrounds it. This inside coil is driven by a sine wave signal in the 10Hz to 15Hz range, boosted through a 100-watt audio amplifier which provides the current needed to impose the sine wave on this low impedance coil without distorting the waveform.

The first step is to determine the resonant frequency of each of the two permanent magnets to be used. The ferrite magnets used appear to be about 6 x 4 x 1 inch (150 x 100 x 25 mm). As they will eventually be used as a pair, one end of each is marked so that they can be aligned in the correct orientation after conditioning. That size of magnet appears to have a resonant frequency of about 12Hz, but each magnet will be slightly different.

The inside, low frequency coil is powered up at around 12Hz, the length of the magnet aligned with the Earth's magnetic field (that is, North/South), and placed on top of the vertical coil. An iron shim as used in transformer core construction is placed vertically on top of the magnet as an indication of resonating:

As shown in the video, the sine wave frequency feeding the AWG #17 coil is adjusted slowly to find the point at which the iron shim vibrates most strongly. That frequency is noted, and the same is done for the second magnet. It is not likely that the two resonant frequencies will be the same, and so the average frequency for the pair is used.

Next, the two magnets are placed in attraction mode, one on each side of the aluminium channel, with their marked ends at the same end of the channel. That is, the North pole face of one will touch the aluminium and the South pole face of the other will touch the aluminium. The two magnets and their separating aluminium channel are then placed inside the main coil and aligned so that the outer North pole faces southwards and the opposite external South pole faces Northwards. The large coil dimensions are arranged so that the centre of the magnets is at the centre of the outer coil:
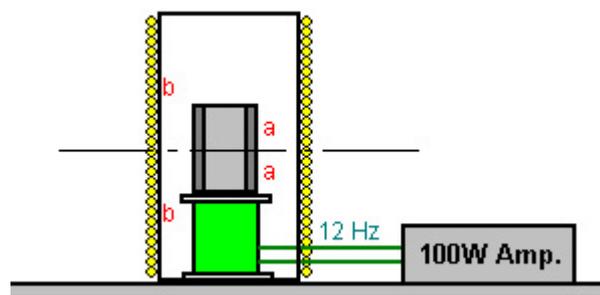
While the inner coil continues to be powered up with a powerful sine wave, the outer coil is now fed a 60Hz stream of sharp voltage pulses. These are generated by charging up a 16,000 microfarad 250V capacitor and then discharging it through an SCR (Thyristor) connected to the outer coil. It is important that the spikes be sharp as they are imposing that frequency on the internal magnetic structure of the magnets. Presumably, if aiming for a European 240V version, then the outer coil would be pulsed at 50Hz rather than the American 60Hz and the capacitor would be a 450V rated type.

The working pictures of Floyd's prototype powering a load, seem to indicate that the one input coil and one output coil as described by Ashley Gray below, are the same as used by Floyd as we see wires coming out of the open end of the channel.

Horst wishes to emphasise that it is not easy to make a working replication of Floyd's design as the people at www.hyiq.org have tried to replicate it for a number of years now, without any success.

Ashley Gray of New Zealand.

In April 2014, I was sent some information about a colleague of Floyd Sweet's – Ashley Gray of Nelson, New Zealand. The version described by Ashley appears to be understandable.

On 20th June 1994, Ashley says:

After a trip to America in 1985 when I was first introduced to Floyd Sweet, I was invited to go back and work with him. At that time he was being funded by Mark Goldes of the Aesop Institute, and Darryl Roberts was working as co-coordinator for the Institute in L.A. After working with Floyd for some time we left America for England. At that stage the "politics" had become difficult. While we were in England, we were contacted by Mark Goldes and told that Floyd had obtained some results which they would like us to verify for them.

On our return to New Zealand, Darryl Roberts sent us the Lab Notes which he had recorded during the first tests of the "Space Quanta Modulator" and it's construction details. We were asked to repeat the experiments to verify the results. We constructed the device but were unable to get any results at that time. In the light of the new information which had been released, I conducted some further experiments and managed to obtain some interesting results without magnet 'conditioning' which, as far as I was aware, was not used in the original device.

The initial device which I constructed when in America, consisted of two 1-inch x 1-inch (25 x 25 mm) neodymium magnets mounted in a steel frame. There were two 'modulating' windings and one output winding. It was driven by a specially built sine-wave oscillator which was adjustable from 1 kHz to 2 kHz. We did not get any output or significant result from this device. Floyd felt that this was due to the high field strength of the neodymium magnets and the closed magnetic path. Floyd did not mention anything about magnet conditioning being necessary.

A second prototype was then built, using Barium Ferrite magnets size 6-inches x 4-inches x 1-inch (150 x 100 x 25 mm):
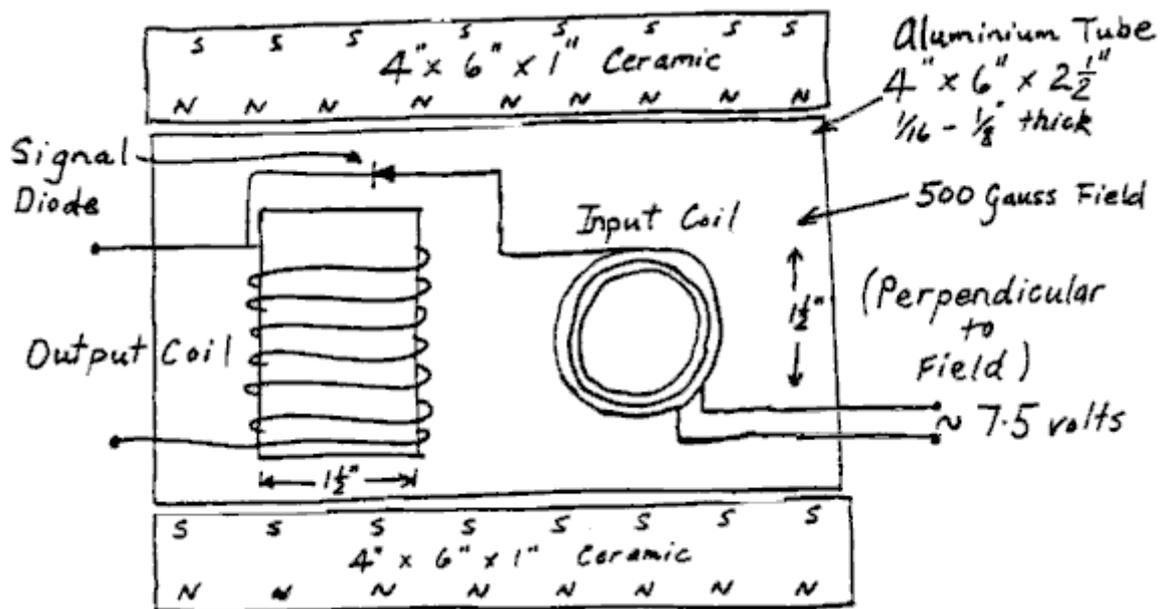
Ashley appears to be using magnets which are not 'conditioned'. Ashley has had what I consider to be very significant results from his prototype with an output power of 111 watts for an input of just 0.001 watts (a COP of 111,000). Ashley's successful build has an aluminium housing. People get the very mistaken idea that aluminium is not magnetic because magnets do not stick to it. The reality is that aluminium has a really major effect on magnetic fields and can be used as magnetic shielding if thick enough. Ashley's design uses two coils at right-angles to each other and that style of operation can be seen in other free-energy designs. Anyway, take a look at the version built by Ashley:
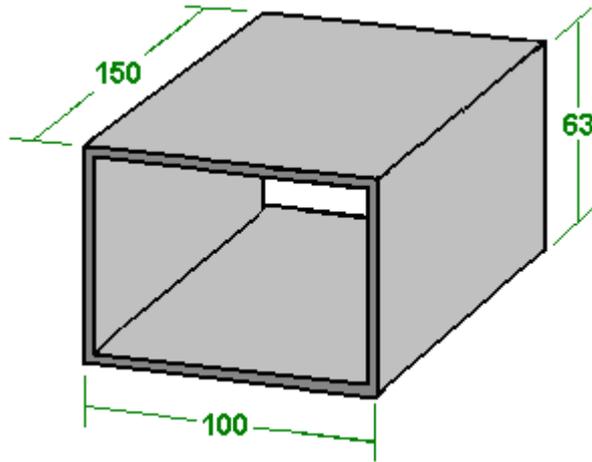
The aluminium enclosure is shallow. The ends are 4" x 2.5" which is 100 x 63 mm. The diameter of the input coil is 1.5 inches or 38 mm. Similarly, the output coil length has to be less than 63 mm.

The diagram below may give a slightly better idea of the dimensions involved in the construction. At the present time, magnets of that size are available for £14 each in the UK. They each have an 8 Kg pull and are very heavy.
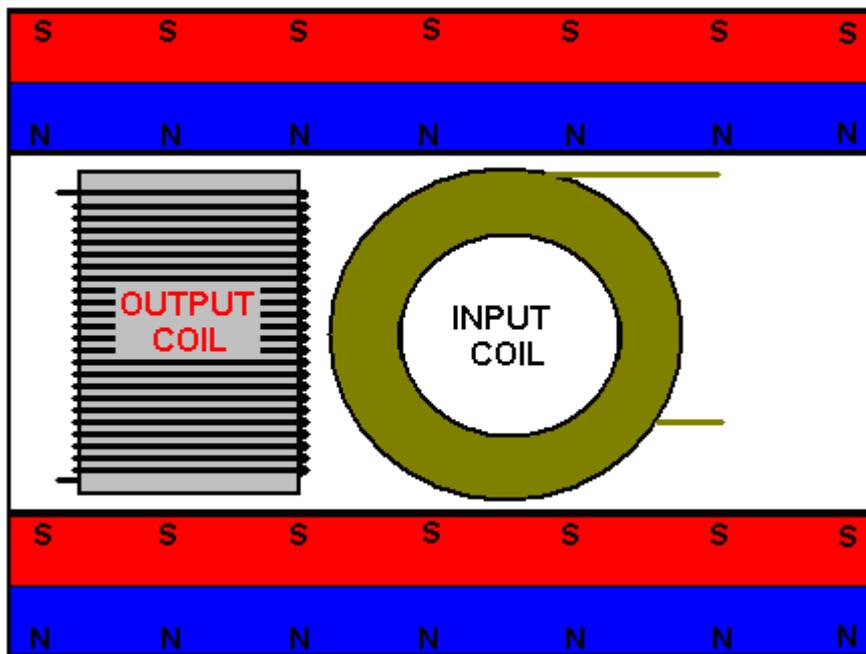
The magnetic lines of force flow through the length of the output coil and through the width of the input coil. As you can see from the diagram, the unit is compact in spite of the very large magnets. The input needed is a good-quality sine wave. Ashley also says:

Details From Lab Notes of First Successful Tests

Original Test Setup:

A Signal Generator made by Wavetek, USA, was used to drive the input coil.

Input coil: 1.5" diameter 120 turns #20 gauge (0.812 mm diameter, overall resistance about 1 ohm)

Input = 7.5 volts at 3.l microamps = 23 micro watts

Output Coil: 1.5" diameter 12 turns #12 gauge (2.05 mm diameter)

Output = 10.4 volts sine wave at 1.84 amps = 19.15 watts at approx 400 Hz

Comments:

Frequency generally affected resistive 1.8 amp 20 watt bulb load proportionally - brightness increased with frequency, decreased with frequency except at certain points when it appeared inversely related, increasing as frequency decreased etc.

First Modifications:

The Signal generator was replaced with a purpose-built Sine Wave Oscillator of 9 volt output. The input coil was increased to 250 turns of #18 gauge (1.024mm) and the output coil was increased to 24 turns of #18 gauge(1.024 mm diameter) wire. Magnets, spacing, etc. all remained the same.

Input: 7.2 volts at 143 micro amps (0.001 watts)

Output: 24.2 volts at 4.6 amps = 111watts. Frequency 388 and 402 Hz

Comments:

By increasing the area of the wire exposed to/or occupying the fluctuating magnetic field the output was doubled. The exact proportions /ratios of the space filling volume of winding to output had not been determined at the time of writing. Magnet size seems to be less important than the volume of the windings, wire diameter, input voltage and current.

The current is only limited by the impedance of the wire which rises dramatically in the magnetic field to several hundred thousand ohms, while the impedance when outside the magnetic the field is only 2 or 3ohms @ 400 Hz. (250 turns #18 (1 mm diameter) wire).

The AC excitation current is only required to support I^2R losses as the magnetic field requires no additional power, as it is not loaded by the wires passing through the field.

The unit ran for 10 to 12 hours with no heating occurring but no longer duration tests were performed. The tests were witnessed by three people.

Technical Notes:

The quality of the oscillator is important - there should be no harmonic distortion i.e. it needs to be a pure sine wave.

The signal diode divides the current into the circuit, and being parallel - puts a small microamp current into the power coil as well as the excitation coil. This works with the magnets in such a way that there is produced a vector complementation.

When in close proximity to the magnets, the output load bulbs vibrate.

The Optical Generator of Pavel Imris.

Pavel was awarded a US patent in the 1970's. The patent is most interesting in that it describes a device which can have an output power which is more than nine times greater than the input power. He achieves this with a device which has two pointed electrodes enclosed in a quartz glass envelope which contains xenon gas under pressure (the higher the pressure, the greater the gain of the device) and a dielectric material.

Fig. 1
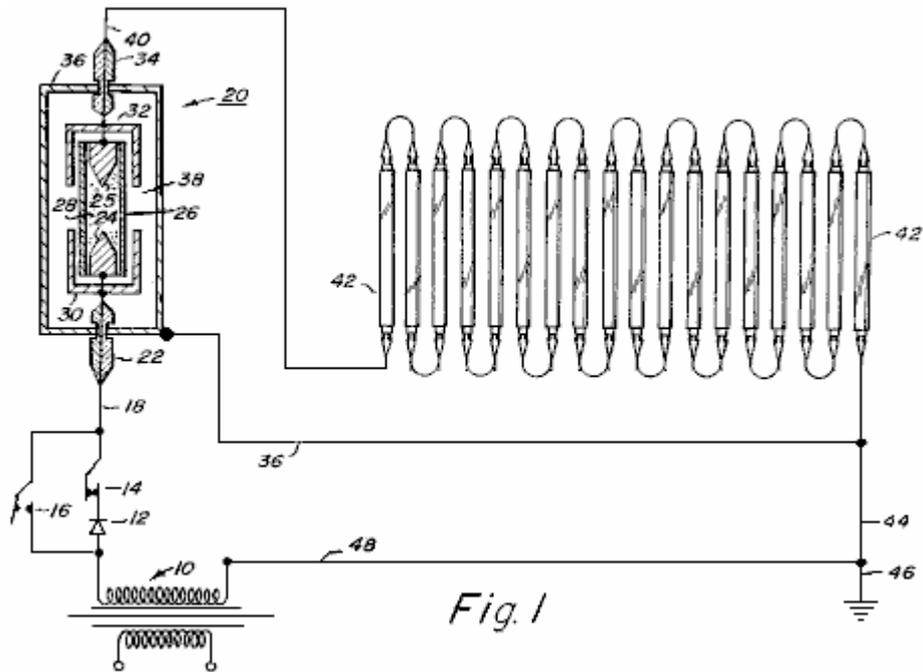
Here, the power supply to one or more standard fluorescent lamps is passed through the device. This produces a power gain which can be spectacular when the gas pressure in the area marked '24' and '25' in the above diagram is high. The patent is included in this set of documents and it contains the following table of experimental measurements:

Table 1 shows the data to be obtained relating to the optical electrostatic generator. **Table 2** shows the lamp performance and efficiency for each of the tests shown in **Table 1**. The following is a description of the data in each of the columns of **Tables 1 and 2**.

Column	Description
B	**Gas used in discharge tube**
C	**Gas pressure in tube** (in torrs)
D	**Field strength across the tube** (measured in volts per cm. of length between the electrodes)
E	**Current density** (measured in microamps per sq. mm. of tube cross-sectional area)
F	**Current** (measured in amps)
G	**Power across the tube** (calculated in watts per cm. of length between the electrodes)
H	**Voltage per lamp** (measured in volts)
K	**Current** (measured in amps)
L	**Resistance** (calculated in ohms)
M	**Input power per lamp** (calculated in watts)
N	**Light output** (measured in lumens)

Table 1

A	B	Optical	Generator	Section		
A	B	C	D	E	F	G
Test No.	Type of discharge lamp	Pressure of Xenon	Field strength across lamp	Current density	Current	Power str. across lamp
		(Torr)	(V/cm)	(A/sq.mm)	(A)	(W/cm.)
1	Mo elec	-	-	-	-	-
2	Xe	0.01	11.8	353	0.1818	2.14
3	Xe	0.10	19.6	353	0.1818	3.57
4	Xe	1.00	31.4	353	0.1818	5.72
5	Xe	10.00	47.2	353	0.1818	8.58
6	Xe	20.00	55.1	353	0.1818	10.02
7	Xe	30.00	62.9	353	0.1818	11.45
8	Xe	40.00	66.9	353	0.1818	12.16
9	Xe	60.00	70.8	353	0.1818	12.88
10	Xe	80.00	76.7	353	0.1818	13.95
11	Xe	100.00	78.7	353	0.1818	14.31
12	Xe	200.00	90.5	353	0.1818	16.46
13	Xe	300.00	100.4	353	0.1818	18.25
14	Xe	400.00	106.3	353	0.1818	19.32
15	Xe	500.00	110.2	353	0.1818	20.04
16	Xe	600.00	118.1	353	0.1818	21.47
17	Xe	700.00	120.0	353	0.1818	21.83
18	Xe	800.00	122.8	353	0.1818	22.33
19	Xe	900.00	125.9	353	0.1818	22.90
20	Xe	1,000.00	127.9	353	0.1818	23.26
21	Xe	2,000.00	149.6	353	0.1818	27.19
22	Xe	3,000.00	161.4	353	0.1818	29.35
23	Xe	4,000.00	173.2	353	0.1818	31.49
24	Xe	5,000.00	179.1	353	0.1818	32.56

Table 2

A	H	Fluorescent	Lamp	Section	
Test No.	Voltage	K	L	M	N
		Current	Resistance	Input Energy	Light Output
	(Volts)	(Amps)	(Ohms)	(Watts)	(Lumen)
1	220	0.1818	1,210	40.00	3,200
2	218	0.1818	1,199	39.63	3,200
3	215	0.1818	1,182	39.08	3,200
4	210	0.1818	1,155	38.17	3,200
5	200	0.1818	1,100	36.36	3,200
6	195	0.1818	1,072	35.45	3,200
7	190	0.1818	1,045	34.54	3,200
8	182	0.1818	1,001	33.08	3,200
9	175	0.1818	962	31.81	3,200
10	162	0.1818	891	29.45	3,200
11	155	0.1818	852	28.17	3,200
12	130	0.1818	715	23.63	3,200
13	112	0.1818	616	20.36	3,200
14	100	0.1818	550	18.18	3,200
15	85	0.1818	467	15.45	3,200
16	75	0.1818	412	13.63	3,200
17	67	0.1818	368	12.18	3,200
18	60	0.1818	330	10.90	3,200
19	53	0.1818	291	9.63	3,200
20	50	0.1818	275	9.09	3,200
21	23	0.1818	126	4.18	3,200
22	13	0.1818	71	2.35	3,200
23	8	0.1818	44	1.45	3,200
24	5	0.1818	27	0.90	3,200

The results from Test No. 24 where the gas pressure is a very high 5,000 Torr, show that the input power for each 40-watt standard fluorescent tubes is 0.9 watts for full lamp output. In other words, each lamp is working to its full specification on less than one fortieth of its rated input power. However, the power taken by the device in that test was 333.4 watts which with the 90 watts needed to run the 100 lamps, gives a total input electrical power of 423.4 watts instead of the 4,000 watts which would have been needed without the device. That is an output power of more than nine times the input power.

From the point of view of any individual lamp, without using this device, it requires 40 watts of electrical input power to give 8.8 watts of light output which is an efficiency of about 22% (the rest of the input power being converted to heat). In test 24, the input power per lamp is 0.9 watts for the 8.8 watts of light produced, which is a lamp efficiency of more than 900%. The lamp used to need 40 watts of input power to perform correctly. With this device in the circuit, each lamp only needs 0.9 watts of input power which is only 2.25% of the original power. Quite an impressive performance for so simple a device!

The Michel Meyer and Yves Mace Isotopic Generator.
There is a French patent application number FR 2,680,613 dated 19th August 1991 entitled "Activateur pour Mutation Isotopique" which provides some very interesting information. The system described is a self-contained solid-state energy converter which abstracts large amounts of energy from an ordinary iron bar. This is also shown in Michel's Czechoslovakia Patent No.284,333

The inventors describes the technique as an "isotopic mutation effect" as it converts ordinary iron (isotope 56) to isotope 54 iron, releasing large amounts of electrical energy in the process. This excess energy can, they say, be used to drive inverters, motors or generators.

The description of the mechanism which is being used by the device is: "the present invention uses a physical phenomenon to which we draw attention and which we will call 'Isotopic Change'. The physical principle applies to isotope 56 iron which contains 26 protons, 26 electrons and 30 neutrons, giving a total mass of 56.52 Mev, although its actual mass is 55.80 Mev. The difference between the total mass and the actual mass is therefore

0.72 Mev this which corresponds to an energy of cohesion per nucleon of 0.012857 Mev.

So, If one introduces an additional 105 ev of energy to the iron core isotope 56, that core isotope will have a cohesion energy level of 0.012962 Mev per nucleon corresponding to iron isotope 54. The instability created by this contribution of energy will transfer the isotope 56 iron to isotope 54 causing a release of 2 neutrons.

This process generates an excess energy of 20,000 ev since the iron isotope 54 is only 0.70 Mev while isotope 56 has 0.72 Mev. To bring about this iron isotope 56 conversion, we use the principle of Nuclear Magnetic Resonance."

The practical method for doing this is by using three coils of wire and a magnetic-path-closing support frame of iron as shown in this diagram:
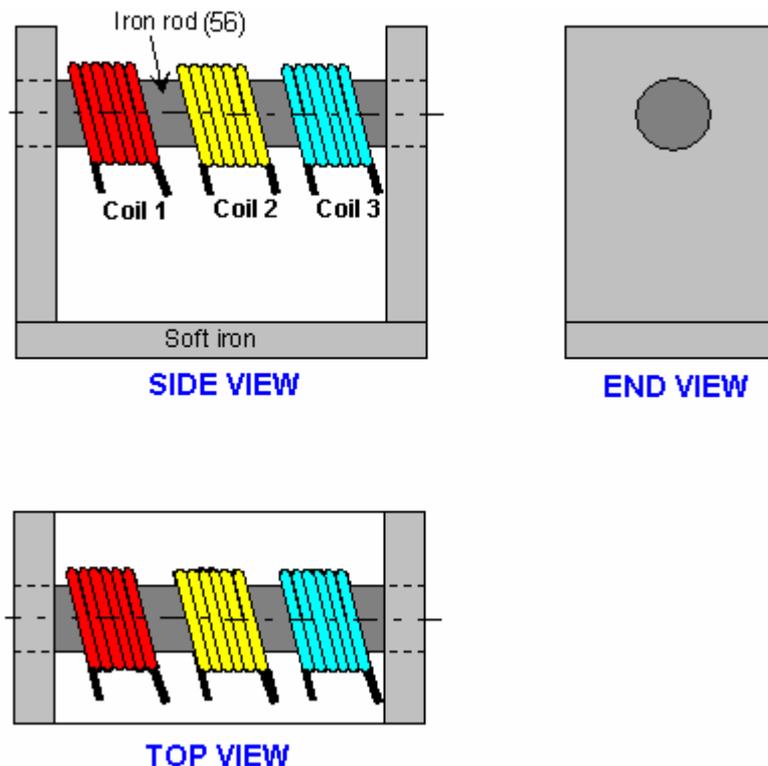
In this arrangement,

Coil 1: Produces 0.5 Tesla when fed with DC, converting the iron bar into an electromagnet
Coil 2: Produces 10 milli-Tesla when fed with a 21 MHz AC sinewave signal
Coil 3: Is the output coil, providing 110, 220 or 380 volts AC at about 400 Hz depending on the number of turns in the coil

This simple and cheap system has the potential for producing substantial energy output for a very long time. The inventors claim that this device can be wired to be self-powered, while still powering external devices. Coil 1 turns the iron rod into an electromagnet with it's flux channelled in a loop by the iron yoke. Coil 2 then oscillates that magnetic field in resonance with the isotope 56 iron atoms in the rod, and this produces the isotope conversion and release of excess energy. Coil 3 is wound to produce a convenient output voltage.

The Colman / Seddon-Gilliespie Generator.
This device, patented by Harold Colman and Ronald Seddon-Gillespie on 5th December 1956, is quite remarkable. It is a tiny lightweight device which can produce electricity using a self-powered electromagnet and chemical salts. The working life of the device before needing refurbishment is estimated at some seventy years with an output of about one kilowatt.

The operation is controlled by a transmitter which bombards the chemical sample with 300 MHz radio waves. This produces radioactive emissions from the chemical mixture for a period of one hour maximum, so the transmitter needs to be run for fifteen to thirty seconds once every hour. The chemical mixture is shielded by a lead screen to prevent harmful radiation reaching the user. The patent, GB 763,062 is included in the Appendix.

This generator unit includes a magnet, a tube containing a chemical mixture of elements whose nuclei becomes unstable as a result of bombardment by short waves so that the elements become radio-active and release electrical energy, the mixture being mounted between, and in contact with, a pair of different metals such as copper and zinc, and a capacitor mounted between those metals.

The mixture is preferably composed of the elements Cadmium, Phosphorus and Cobalt having Atomic Weights of 112, 31 and 59 respectively. The mixture, which may be of powdered form, is mounted in a tube of non-conducting, high heat resistivity material and is compressed between granulated zinc at one end of the tube and granulated copper at the other end, the ends of the tube being closed by brass caps and the tube being carried in a suitable cradle so that it is located between the poles of a magnet. The magnet is preferably an electro-magnet and is energised by the current produced by the unit. The transmitter unit which is used for activating the generator unit may be of any conventional type operating on ultra-shortwave and is preferably crystal controlled at the desired frequency.
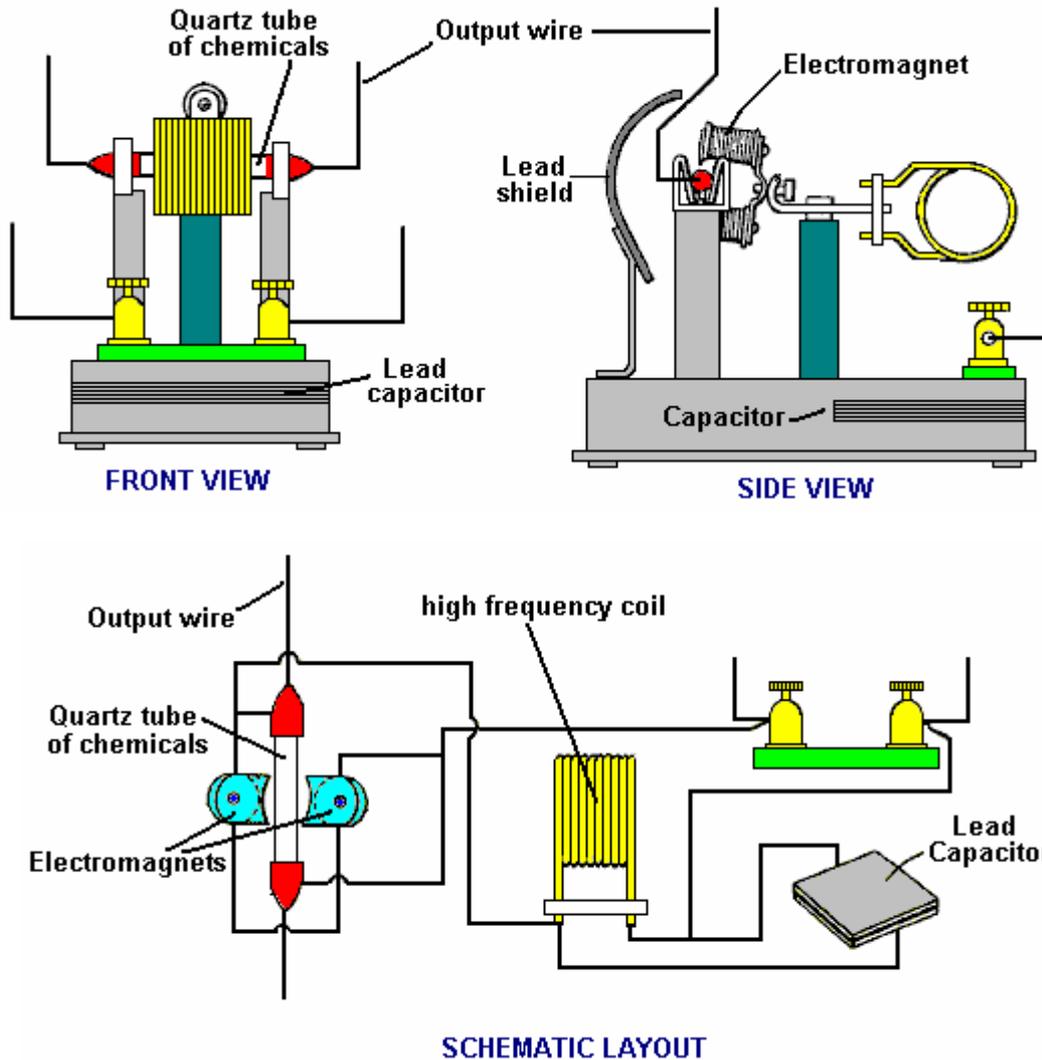
The transmitter unit is of any suitable conventional type for producing ultra shortwaves and may be crystal controlled to ensure that it operates at the desired frequency without needing tuning. The quartz tube containing the chemical mixture, works best if made up of a number of small cells in series. In other words, considering the cartridge from one end to the other, at one end and in contact with the brass cap, there would be a layer of powdered copper, then a layer of the chemical mixture, then a layer of powdered zinc, a layer of powdered copper, etc. with a layer of powdered zinc in contact with the brass cap at the other end of the cartridge. With a cartridge some forty five millimetres long and five millimetres diameter, some fourteen cells may be included.

Quartz tube

Electrical connection cap

Copper powder

5 mm

Chemical mix

Zinc powder

45 mm
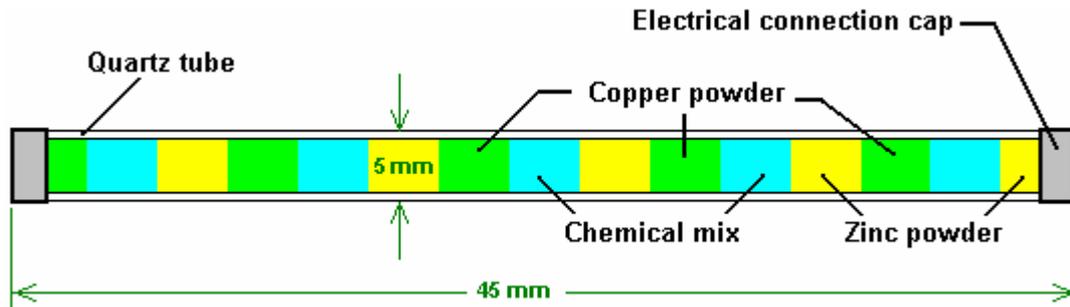
The Devices of Don Smith.

Donald Lee Smith died a few years ago. He is famous for his high-power self-powered free energy designs. There are several videos on the web, showing some of his lectures. He produced one pdf document which is shown at the end of this chapter, and in May 2004 he was granted one patent. Don stated clearly in one of his lectures, that he never did disclose the full details of his designs. However, Don says that he discloses enough for somebody who is experienced in radio-frequency electronics to be able to deduce the things which he does not disclose and so build a device for his own use. If that is the case, then anybody who has succeeded in doing so has kept very quiet about it afterwards (which would be understandable).

Don produced at least forty eight different devices which draw energy from what Don prefers to call "the ambient background". His devices are capable of supplying kilowatts of excess energy and in most cases they do not require any input energy to be supplied by the user.

Don's work is subtle and not easy to replicate. It is based on the principle that the power output of a circuit increases with the square of the frequency and the square of the voltage. So, if you double the frequency and double the voltage, then the output power goes up and becomes sixteen times greater. As a result of this, Don's best known design uses a Neon Sign Transformer circuit which raises the frequency to around 35,000 cycles per second and raises the voltage to anything from 2,000 volts to 12,000 volts, giving a power output is physically quite small and yet it has an output of 160 kilowatts (8000 volts at 20 amps) from an input of 12 volts 1 amp. That is, the output power is more than thirteen thousand times greater than the input power. Consequently, **his designs are dangerous and can kill you instantly**. In other words, his designs are for experienced developers only. **Please bear in mind that the voltages here and their associated power levels are literally lethal and perfectly capable of killing anyone who handles the device carelessly when it is powered up. When a replication of this device is ready for routine use, it must be encased so that none of the high-voltage connections can be touched by anyone. This is not a suggestion, but it is a mandatory requirement, despite the fact that the components shown in the photographs are laid out in what would be a most dangerous fashion were the circuit to be powered up as it stands. Under no circumstances, construct and test this circuit unless you are already experienced in the use of high-voltage circuits or can be supervised by somebody who is experienced in this field. This is a "one hand in the pocket at all times" type of circuit and it needs to be treated with great care and respect at all times, so be sensible.**

Don Smith considered himself to be self taught. Don says that his understanding comes from the work of Nikola Tesla as recorded in Thomas C. Martin's book "The Inventions, Researches, and Writings of Nikola Tesla" ISBN 0-7873-0582-0. This book can be downloaded from http://www.free-energy-info.com/TeslaBook.pdf as a pdf file.

Don states that he repeated each of the experiments found in the book and that gave him his understanding of what he prefers to describe as the 'ambient background energy' which is also called

the 'zero-point energy field'. Don remarks that he advanced further than Tesla in this field, partly because of the devices now available to him and which were not available when Tesla was alive.

Don stresses two key points. Firstly, a dipole can cause a disturbance in the magnetic component of the 'ambient background' and that imbalance allows you to collect large amounts of electrical power, using capacitors and inductors (coils). Secondly, you can pick up as many powerful electrical outputs as you want from that one magnetic disturbance, without depleting the magnetic disturbance in any way. This allows massively more power output than the small power needed to create the magnetic disturbance in the first place. This is what produces a "Coefficient Of Performance">1 device and Don has created nearly fifty different devices based on that understanding.

Although they get removed quite frequently, there is one video which is definitely worth watching if it is still there. It is located at http://www.metacafe.com/watch/2820531/don_smith_free_energy/ and was recorded in 2006. It covers a good deal of what Don has done. In the video, reference is made to Don's website but you will find that it has been taken over by Big Oil who have filled it with innocuous similar-sounding things of no consequence, apparently intended to confuse newcomers searching for information on Don's designs.

The present situation in 2019 is that few people understand Don's designs fully (and I myself, fall into that category), the high-voltage components are expensive and hard to find, and the high voltages are dangerous. However, we will look at three of his many designs and try to understand them as best we can. We will start with his patented design:

<div align="center">

Patent NL 02000035 A   20th May 2004   Inventor: Donald Lee Smith

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TRANSFORMER GENERATOR MAGNETIC RESONANCE INTO ELECTRIC ENERGY

</div>

ABSTRACT

The present invention refers to an Electromagnetic Dipole Device and Method, where wasted radiated energy is transformed into useful energy. A Dipole as seen in Antenna Systems is adapted for use with capacitor plates in such a way that the Heaviside Current Component becomes a useful source of electrical energy.

DESCRIPTION

Technical Field:

This invention relates to loaded Dipole Antenna Systems and their Electromagnetic radiation. When used as a transformer with an appropriate energy collector system, it becomes a transformer/generator. The invention collects and converts energy which is radiated and wasted by conventional devices.

Background Art:

A search of the International Patent Database for closely related methods did not reveal any prior art with an interest in conserving radiated and wasted magnetic waves as useful energy.

DISCLOSURE OF THE INVENTION

The invention is a new and useful departure from transformer generator construction, such that radiated and wasted magnetic energy changes into useful electrical energy. Gauss meters show that much energy from conventional electromagnetic devices is radiated into the ambient background and wasted. In the case of conventional transformer generators, a radical change in the physical construction allows better access to the energy available. It is found that creating a dipole and inserting capacitor plates at right angles to the current flow, allows magnetic waves to change back into useful electrical (coulombs) energy. Magnetic waves passing through the capacitor plates do not degrade and the full impact of the available energy is accessed. One, or as many sets of capacitor plates as is desired, may be used. Each set makes an exact copy of the full force and effect of the energy present in the magnetic waves. The originating source is not depleted of degraded as is common in conventional transformers.

BRIEF DESCRIPTION OF THE DRAWINGS

The Dipole at right angles, allows the magnetic flux surrounding it to intercept the capacitor plate, or plates, at right angles. The electrons present are spun such that the electrical component of each electron is collected by the capacitor plates. Essential parts are the South and North component of an active Dipole. Examples presented here exist as fully functional prototypes and were engineer constructed and fully tested in use by the Inventor. In each of the three examples shown in the drawings, corresponding parts are used.
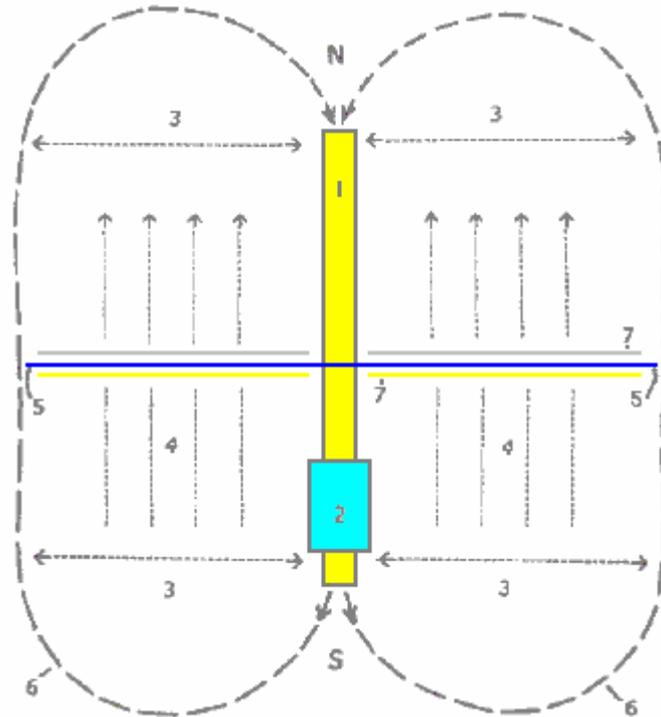
Fig.1 is a View of the Method, where **N** is the North and
S is the South component of the Dipole.

Here, **1** marks the Dipole with its North and South components. **2** is a resonant high-voltage induction coil. **3** indicates the position of the electromagnetic wave emission from the Dipole. **4** indicates the position and flow direction of the corresponding Heaviside current component of the energy flow caused by the induction coil **2**. **5** is the dielectric separator for the capacitor plates **7**. **6** for the purposes of this drawing, indicates a virtual limit for the scope of the electromagnetic wave energy.
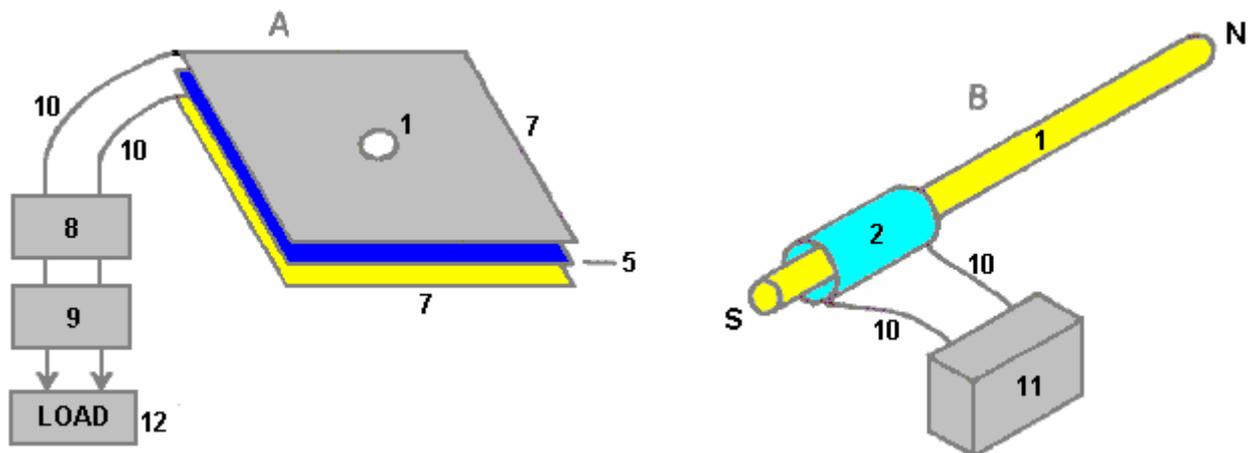
Fig.2 has two parts; **A** and **B**.

In **Fig.2A 1** is the hole in the capacitor plates through which the Dipole is inserted and in **Fig.2B** it is the Dipole with its North and South poles shown. **2** is the resonant high-voltage induction coil surrounding part of the Dipole **1**. The dielectric separator **5**, is a thin sheet of plastic placed between the two capacitor plates **7**, the upper plate being made of aluminium and the lower plate made of copper. Unit **8** is a deep-cycle battery system powering a DC inverter **9** which produces 120 volts at 60 Hz (the US mains supply voltage and frequency, obviously, a 240 volt 50 Hz inverter could be used here just as easily) which is used to power whatever equipment is to be driven by the device. The reference number **10** just indicates connecting wires. Unit **11** is a high-voltage generating device such as a neon transformer with its oscillating power supply.
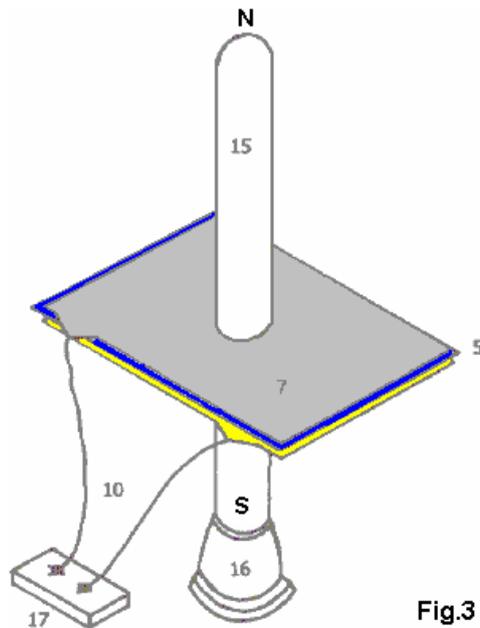
Fig.3

Fig.3 is a Proof Of Principal Device using a Plasma Tube as an active Dipole. In this drawing, **5** is the plastic sheet dielectric separator of the two plates **7** of the capacitor, the upper plate being aluminium and the lower plate copper. The connecting wires are marked **10** and the plasma tube is designated **15**. The plasma tube is four feet long (1.22 m) and six inches (100 mm) in diameter. The high-voltage energy source for the active plasma dipole is marked **16** and there is a connector box **17** shown as that is a convenient method of connecting to the capacitor plates when running tests on the device.
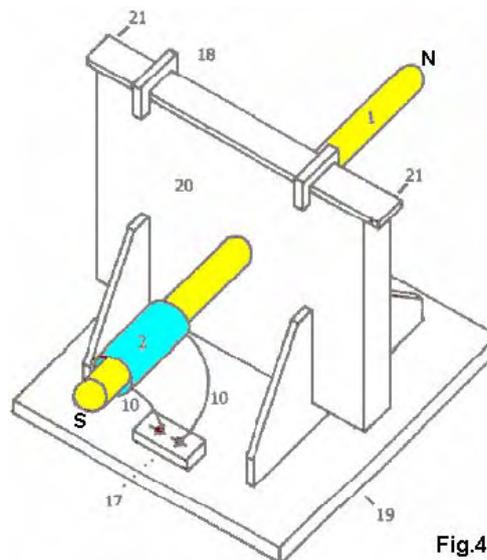
Fig.4

Fig.4 shows a Manufacturer's Prototype, constructed and fully tested. **1** is a metal Dipole rod and **2** the resonant

high-voltage induction coil, connected through wires **10** to connector block **17** which facilitates the connection of it's high-voltage power supply. Clamps **18** hold the upper edge of the capacitor packet in place and **19** is the base plate with it's supporting brackets which hold the whole device in place. **20** is a housing which contains the capacitor plates and **21** is the point at which the power output from the capacitor plates is drawn off and fed to the DC inverter.

BEST METHOD OF CARRYING OUT THE INVENTION

The invention is applicable to any and all electrical energy requirements. The small size and it's high efficiency make it an attractive option, especially for remote areas, homes, office buildings, factories, shopping centres, public places, transportation, water systems, electric trains, boats, ships and 'all things great and small'. The construction materials are commonly available and only moderate skill levels are needed to make the device.

CLAIMS

1. Radiated magnetic flux from the Dipole, when intercepted by capacitor plates at right angles, changes into useful electrical energy.

2. A Device and Method for converting for use, normally wasted electromagnetic energy.

3. The Dipole of the Invention is any resonating substance such as Metal Rods, Coils and Plasma Tubes which have interacting Positive and Negative components.

4. The resulting Heaviside current component is changed to useful electrical energy.

****

This patent does not make it clear that the device needs to be tuned and that the tuning is related to its physical location on Earth. The tuning will be accomplished by applying a variable-frequency input signal to the neon transformer and adjusting that input frequency to give the maximum output.

The second of Don's devices to consider is his table-top very high power generator. This is effectively a Tesla Coil system and so the normal electromagnetic effect of the ratio of the number of coil turns does NOT determine the effect between the coils. The demonstration device looks like this:
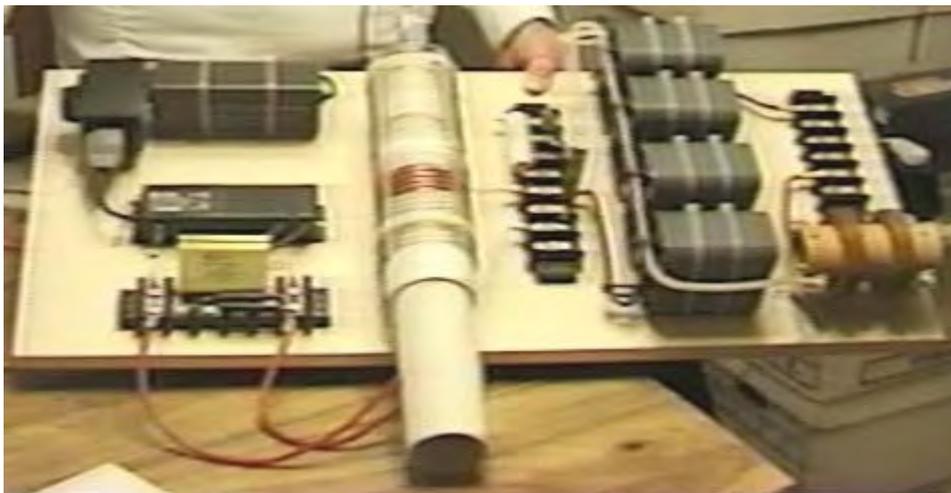
This device is not the easiest thing in the world to understand. Here is the circuit diagram:

ELECTRICAL ENERGY GENERATING SYSTEM
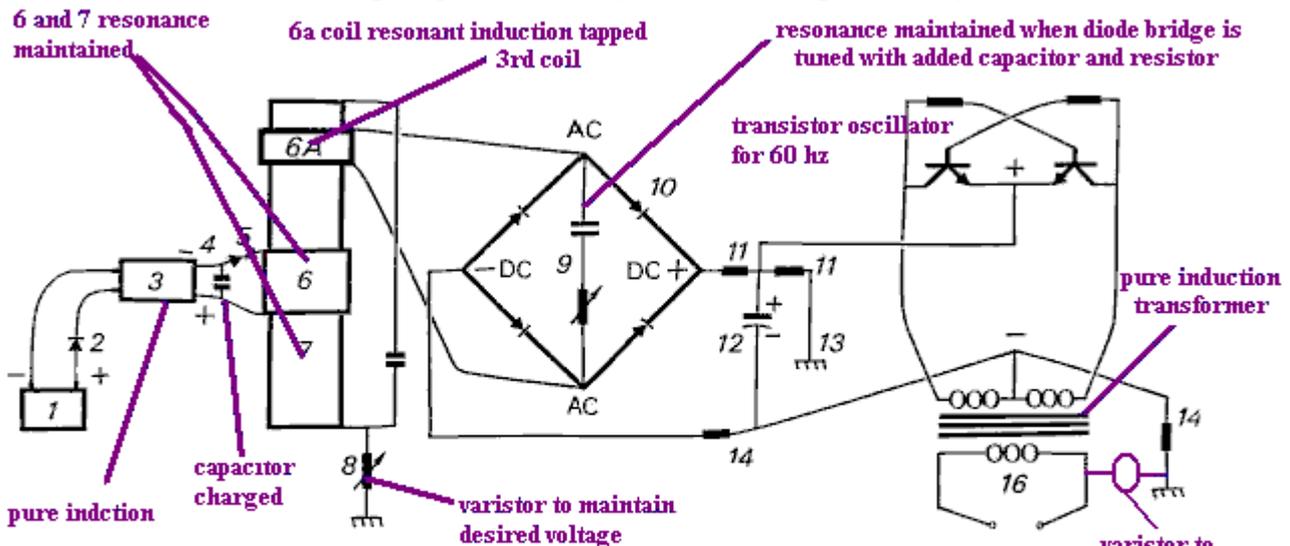
6 and 7 resonance maintained.

6a coil resonant induction tapped 3rd coil

resonance maintained when diode bridge is tuned with added capacitor and resistor

transistor oscillator for 60 hz

pure induction transformer

pure indction

capacitor charged

varistor to maintain desired voltage

varistor to maintain desired voltage

1. Gelcel, 6 or 12 Volt.
2. Diode, Poss. use a Varactor.
3. High Voltage Module, Constituting the L-1 and L-2 Coils.
4. Capacitor, TDK 10.9 Pf., 30 KV
5. Spark Gap, Small Engine Spark Plug, Gap ≈ .0025 in.
6. Induction Transfer Coil L-3. , 6A = L-5
7. Induction Receiving Coil L-4.
8. Voltage Control Shunt.
9. Frequency Adjustor, prevents derating by Diode Bridge

10. Diode Bridge, 200 Nanosecond, R F.. > 100 KV ,
11. Voltage Divider Circuit, corrects voltage for next stage.
12. Capacitor, electrolytic, smooths out DC + ripple effect.
13. Earth Ground.
14. Voltage Divider Curcit, corrects voltage for Transformer
15. Inverter Circuit, DC + in and 60 CPS to Transformer
16. Output from Transformer to Load (Work).

20 Dec., 1994

it is probably worth mentioning some of the main points which Don Smith appears to be making. There are some very important points being made here, and grasping these may make a considerable difference to our ability to tap into the excess energy available in our local environment. There are four points worth mentioning:

1. Voltage
2. Frequency
3. Magnetic / Electric relationship
4. Resonance

1. Voltage. We tend to view things with an 'intuitive' view, generally based on fairly simple concepts. For example, we automatically think that it is more difficult to pick up a heavy object than to pick up a light one. How much more difficult? Well, if it is twice as heavy, it would probably be about twice as much effort to pick it up. This view has developed from our experience of things which we have done in the past, rather than on any mathematical calculation or formula.

Well, how about pulsing an electronic system with a voltage? How would the output power of a system be affected by increasing the voltage? Our initial 'off-the cuff' reaction might be that the power output might be increased a bit, but then hold on… we've just remembered that Watts = Volts x Amps, so if you double the voltage, then you would double the power in watts. So we might settle for the notion that if we doubled the voltage then we could double the output power. If we thought that, then we would be wrong.

Don Smith points out that as capacitors and coils store energy, if they are involved in the circuit, then the output power is proportional to the **square** of the voltage used. Double the voltage, and the output power is four times greater. Use three times the voltage and the output power is nine times greater. Use ten times the voltage and the output power is one hundred times greater !
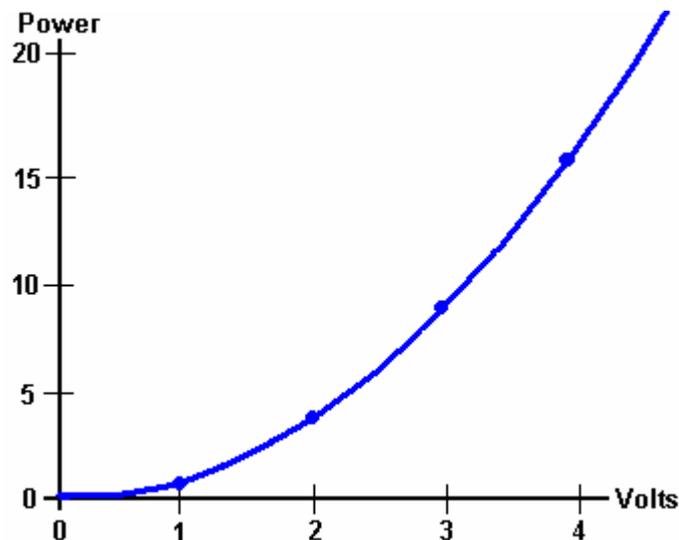
Don says that the energy stored, multiplied by the cycles per second, is the energy being pumped by the system. Capacitors and inductors (coils) temporarily store electrons, and their performance is given by:

Capacitor formula: **W = 0.5 x C x V^2 x Hz** where:

      W is the energy in Joules (Joules = Volts x Amps x seconds)
      C is the capacitance in Farads
      V is the voltage
      Hz is the cycles per second

Inductor formula: **W = 0.5 x L x A^2 x Hz** where:

      W is the energy in Joules
      L is the inductance in henrys
      A is the current in amps
      Hz is the frequency in cycles per second

You will notice that where inductors (coils) are involved, then the output power goes up with the square of the current. Double the voltage **and** double the current gives four times the power output due to the increased voltage and that increased output is increased by a further four times due to the increased current, giving sixteen times the output power.

2. Frequency. You will notice from the formulas above, that the output power is directly proportional to the frequency "Hz". The frequency is the number of cycles per second (or pulses per second) applied to the circuit. This is something which is not intuitive for most people. If you double the rate of pulsing, then you double the power output. When this sinks in, you suddenly see why Nikola Tesla tended to use millions of volts and millions of pulses per second.

However, Don Smith states that when a circuit is at it's point of resonance, resistance in the circuit drops to zero and the circuit becomes effectively, a superconductor. The energy for such a system which is in resonance is:

Resonant circuit: **W = 0.5 x C x V^2 x (Hz)^2** where:

      W is the energy in Joules
      C is the capacitance in Farads
      V is the voltage
      Hz is the cycles per second

If this is correct, then raising the frequency in a resonating circuit has a massive effect on the power output of the device. The question then arises: why is the mains power in Europe just fifty cycles per second and in America just sixty cycles per second? If power goes up with frequency, then why not feed households at a million cycles per second? One major reason is that it is not easy to make electric motors which can be driven with power delivered at that frequency, so a more suitable frequency is chosen in order to suit the motors in vacuum cleaners, washing machines and other household equipment.

However, if we want to extract energy from the environment, then we should go for high voltage and high frequency. Then, when high power has been extracted, if we want a low frequency suited to electric motors, we can pulse the already captured power at that low frequency.

It might be speculated that if a device is being driven with sharp pulses which have a very sharply rising leading edge, that the effective frequency of the pulsing is actually determined by the speed of that rising edge, rather than the rate at which the pulses are actually generated. For example, if pulses are being generated at, say, 50 kHz but the pulses have a leading edge which would be suited to a 200 kHz pulse train, then the device might well see the signal as a 200 kHz signal with a 25% Mark/Space ratio, the very suddenness of the applied voltage having a magnetic shocking effect equivalent to a 200 kHz pulse train.

3. Magnetic / Electric relationship. Don states that the reason why our present power systems are so inefficient is because we concentrate on the electric component of electromagnetism. These systems are always COP<1 as electricity is the 'losses' of electromagnetic power. Instead, if you concentrate on the magnetic component, then there is no limit on the electric power which can be extracted from that magnetic component. Contrary to what you might expect, if you install a pick-up system which extracts electrical energy from the magnetic component, you can install any number of other identical pick-ups, each of which extract the same amount of electrical energy from the magnetic input, **without** loading the magnetic wave in any way. Unlimited electrical output for the 'cost' of creating a single magnetic effect.

The magnetic effect which we want to create is a ripple in the zero-point energy field, and ideally, we want to create that effect while using very little power. Creating a dipole with a battery which has a Plus and a Minus terminal or a magnet which has North and South poles, is an easy way to do create an electromagnetic imbalance in the local environment. Pulsing a coil is probably an even better way as the magnetic field reverses rapidly if it is an air-core coil, such as a Tesla Coil. Using a ferromagnetic core to the coil can create a problem as iron can't reverse it's magnetic alignment very rapidly, and ideally, you want pulsing which is at least a thousand times faster than iron can handle.

Don draws attention to the "Transmitter / Receiver" educational kit "Resonant Circuits #10-416" which was supplied by The Science Source, Maine. This kit demonstrated the generation of resonant energy and it's collection with a receiver circuit. However, if several receiver circuits are used, then the energy collected is increased several times without any increase in the transmitted energy. This is similar to a radio transmitter where hundreds of thousands of radio receivers can receive the transmitted signal without loading the transmitter in any way. In Don's day, this kit was driven by a 1.5 volt battery and lit a 60-watt bulb which was supplied. Not surprisingly, that kit has been discontinued and a trivial kit substituted.
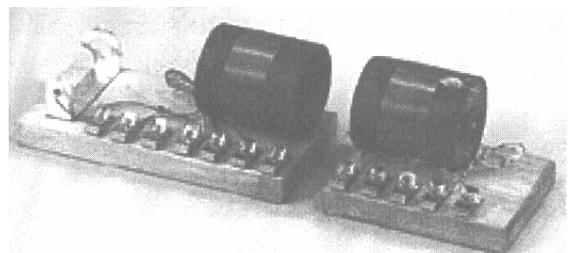
If you get the Science Source educational kit, then there are some details which you need to watch out for. The unit has two very nice quality plastic bases and two very neatly wound coils each of 60 turns of 0.47 mm diameter enamelled copper wire on clear acrylic tubes 57 mm (2.25") in diameter. The winding covers a 28 mm section of the tube. The layout of the transmitter and receiver modules does not match the accompanying instruction sheet and so considerable care needs to be taken when wiring up any of their circuits. The circuit diagrams are not shown, just a wiring diagram, which is not great from an educational point of view. The one relevant circuit is:
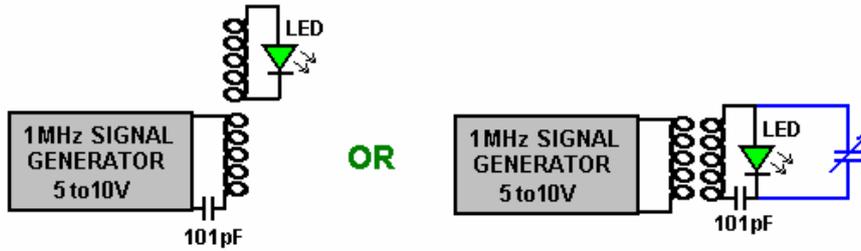
Before you buy the kit, it is not mentioned that in order to use it, you now need a signal generator capable of producing a 10-volt signal at 1 MHz. The coil has a DC resistance of just 1.9 ohms but at a 1 MHz resonant frequency, the necessary drive power is quite low.

A variable capacitor is mounted on the receiver coil tube, but the one in my kit made absolutely no difference to the frequency tuning, nor was my capacitance meter able to determine any capacitance value for it at all, even though it had no trouble at all in measuring the 101 pF capacitor which was exactly the capacitance printed on it. For that reason, it is shown in blue in the circuit diagram above. Disconnecting it made no difference whatsoever.

In this particular kit, standard screw connectors have had one screw replaced with an Allen key headed bolt which has a head large enough to allow finger tightening. Unfortunately, those bolts have a square cut tip where a domed tip is essential if small diameter wires are to be clamped securely. If you get the kit, then I suggest that you replace the connectors with a standard electrical screw connector strip.

In tests, the LED lights up when the coils are aligned and within about 100 mm of each other, or if they are close together side by side. This immediately makes the Hubbard device spring to mind. Hubbard has a central "electromagnetic transmitter" surrounded by a ring of "receivers" closely coupled magnetically to the transmitter, each of which will receive a copy of the energy sent by the transmitter:
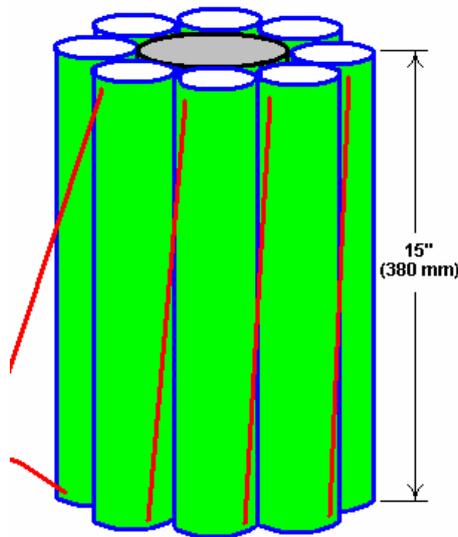
Don points to an even more clearly demonstrated occurrence of this effect in the Tesla Coil. In a typical Tesla Coil, the primary coil is much larger diameter than the inner secondary coil:

If, for example, 8,000 volts is applied to the primary coil which has four turns, then each turn would have 2,000 volts of potential. Each turn of the primary coil transfers electromagnetic flux to every single turn of the secondary winding, and the secondary coil has a very large number of turns. Massively more power is produced in the secondary coil than was used to energise the primary coil. A common mistake is to believe that a Tesla Coil can't produce serious amperage. If the primary coil is positioned

in the middle of the secondary coil as shown, then the amperage generated will be as large as the voltage generated. A low power input to the primary coil can produce kilowatts of usable electrical power.

4. Resonance. An important factor in circuits aimed at tapping external energy is resonance. It can be hard to see where this comes in when it is an electronic circuit which is being considered. However, everything has it's own resonant frequency, whether it is a coil or any other electronic component. When components are connected together to form a circuit, the circuit has an overall resonant frequency. As a simple example, consider a swing:

If the swing is pushed before it reaches the highest point on the mother's side, then the push actually opposes the swinging action. The time of one full swing is the resonant frequency of the swing, and that is determined by the length of the supporting ropes holding the seat and not the weight of the child nor the power with which the child is pushed. Provided that the timing is exactly right, a very small push can get a swing moving in a substantial arc. The key factor is, matching the pulses applied to the swing, that is, to the resonant frequency of the swing. Get it right and a large movement is produced. Get it wrong, and the swing doesn't get going at all (at which point, critics would say "see, see …swings just don't work - this proves it !!"). This principle is demonstrated in the video at http://www.youtube.com/watch?v=irwK1VfoiOA.

Establishing the exact pulsing rate needed for a resonant circuit is not particularly easy, because the circuit contains coils (which have inductance, capacitance and resistance), capacitors (which have capacitance and a small amount of resistance) and resistors and wires, both of which have resistance and some capacitance. These kinds of circuit are called "LRC" circuits because "L" is the symbol used for inductance, "R" is the symbol used for resistance and "C" is the symbol used for capacitance.

Don Smith provides instructions for winding and using the type of air-core coils needed for a Tesla Coil. He says:

1. Decide a frequency and bear in mind, the economy of the size of construction selected. The factors are:

(a) Use radio frequency (above 20 kHz).
(b) Use natural frequency, i.e. match the coil wire length to the frequency - coils have both capacitance
      and inductance.
(c) Make the wire length either one quarter, one half of the full wavelength.
(d) Calculate the wire length in feet as follows:
        If using one quarter wavelength, then divide 247 by the frequency in MHz.
        If using one half wavelength, then divide 494 by the frequency in MHz.
        If using the full wavelength, then divide 998 by the frequency in MHz.
     For wire lengths in metres:
        If using one quarter wavelength, then divide 75.29 by the frequency in MHz.
        If using one half wavelength, then divide 150.57 by the frequency in MHz.
        If using the full wavelength, then divide 304.19 by the frequency in MHz.

2. Choose the number of turns to be used in the coil when winding it using the wire length just
      calculated. The number of turns will be governed by the diameter of the tube on which the coil is to
      be wound. Remember that the ratio of the number of turns in the "L - 1" and "L - 2" coils, controls
      the overall output voltage. For example, if the voltage applied the large outer coil "L - 1" is 2,400

volts and L - 1 has ten turns, then each turn of L - 1 will have 240 volts dropped across it. This 240 volts of magnetic induction transfers 240 volts of electricity to every turn of wire in the inner "L - 2" coil. If the diameter of L - 2 is small enough to have 100 turns, then the voltage produced will be 24,000 volts. If the diameter of the L - 2 former allows 500 turns, then the output voltage will be 120,000 volts.

3. Choose the length and diameter of the coils. The larger the diameter of the coil, the fewer turns can be made with the wire length and so the coil length will be less, and the output voltage will be lower.

4. For example, if 24.7 MHz is the desired output frequency, then the length of wire, in feet, would be 247 divided by 24.7 which is 10 feet of wire (3,048 mm). The coil may be wound on a standard size of PVC pipe or alternatively, it can be purchased from a supplier - typically, an amateur radio supply store.

   If the voltage on each turn of L - 1 is arranged to be 24 volts and the desired output voltage 640 volts, then there needs to be 640 / 24 = 26.66 turns on L - 2, wound with the 10 feet of wire already calculated.

   PJK: At this point, Don's calculations go adrift and he suggests winding 30 turns on a 2-inch former. If you do that, then it will take about 16 feet of wire and the resonant point at 10-feet will be at about 19 turns, giving an output voltage of 458 volts instead of the required 640 volts, unless the number of turns on L1 is reduced to give more than 24 volts per turn. However, the actual required diameter of the coil former (plus one diameter of the wire) is 10 x 12 / (26.67 x 3.14159) = 1.43 inches. You can make this size of former up quite easily if you want to stay with ten turns on the L1 coil.

5. Connect to the start of the coil. To determine the exact resonant point on the coil, a measurement is made. Off-the-shelf multimeters are not responsive to high-frequency signals so a cheap neon is used instead. Holding one wire of the neon in one hand and running the other neon wire along the outside of the L - 2 winding, the point of brightest light is located. Then the neon is moved along that turn to find the brightest point along that turn, and when it is located, a connection is made to the winding at that exact point. L - 2 is now a resonant winding. It is possible to increase the ("Q") effectiveness of the coil by spreading the turns out a bit instead of positioning them so that each turn touches both of the adjacent turns.

6. The input power has been suggested as 2,400 volts. This can be constructed from a Jacob's ladder arrangement or any step-up voltage system. An off-the-shelf module as used with lasers is another option.

7. Construction of the L - 1 input coil has been suggested as having 10 turns. The length of the wire in this coil is not critical. If a 2-inch diameter PVC pipe was used for the L - 2 coil, then the next larger size of PVC pipe can be used for the L - 1 coil former. Cut a 10-turn length of the pipe (probably a 3-inch diameter pipe). The pipe length will depend on the diameter of the insulated wire used to make the winding. Use a good quality multimeter or a specialised LCR meter to measure the capacitance (in Farads) and the inductance (in henrys) of the L - 2 coil. Now, put a capacitor for matching L - 1 to L - 2 across the voltage input of L - 1, and a spark gap connected **in parallel** is required for the return voltage from L - 1. A trimmer capacitor for L - 1 is desirable.

8. The performance of L - 2 can be further enhanced by attaching an earth connection to the base of the coil. The maximum output voltage will be between the ends of coil L - 2 and lesser voltages can be taken off intermediate points along the coil if that is desirable.

This frequency information can be rather hard to understand in the way that Don states it. It may be easier to follow the description given by one developer who says:

I have noticed that any machine can be made a super machine just by adding a bipolar capacitor across the coil. Nothing else is needed. With the correct capacitor the coil becomes Naturally Resonant and uses very little Amperage. Each machine uses a different size capacitor. The correct capacitor size can be calculated by dividing the speed of light by the coil's wire length first to get the coil's Natural Frequency and then dividing the voltage to be used by that

frequency. The result is the correct size for the capacitor. Your machine will then be very powerful even working from a 12V car battery, no other additions needed.

My coil's wire length is 497.333 meters.

299000000 m/sec / 497.333 m = 600000 Hz.

12V / 600000 = 0.00002 or 20 microfarads. A beautiful Naturally Resonant Tank circuit. You can use this with any coil for overunity!

Once we have a Naturally Resonant Coil/Capacitor combination we can bring the frequency down to 50 Hz by calculating for the Power Factor Correction:

Hz = Resistance x Farads   then

50 Hz = R x 0.00002

so   50 / 0.00002 = 2500000

and   R = 2500000   or   2.5 Meg Ohms.

We then place all three components in parallel and our coil should give us a 50 Hz output.

Don provides quite an amount of information on one of his devices shown here:
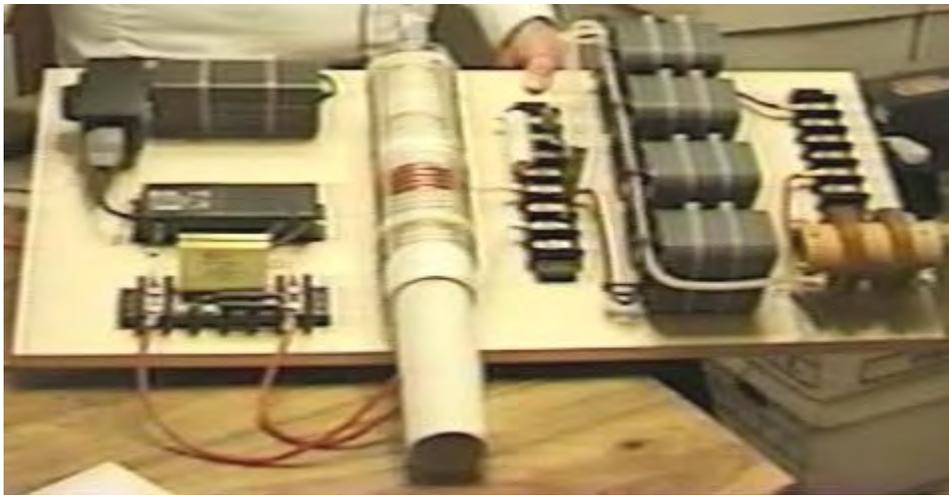
Without his description of the device, it would be difficult to understand it's construction and method of operation. As I understand it, the circuit of what is mounted on this board is as shown here:
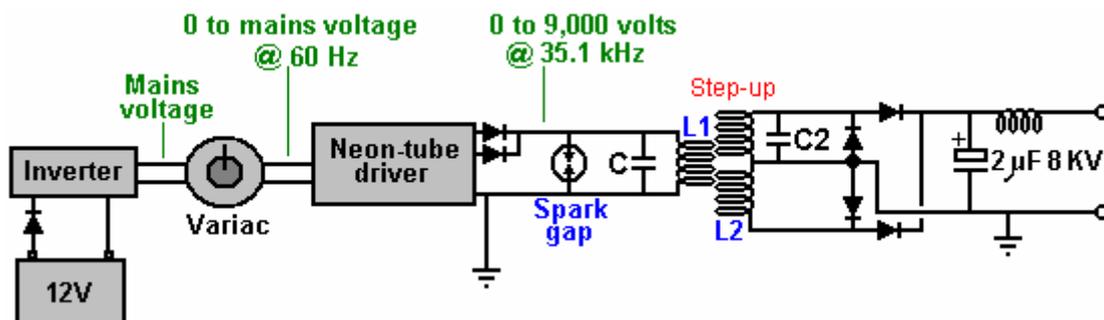
This arrangement has bothered some readers recently as they feel that the spark gap should be in series with the L1 coil, like this:
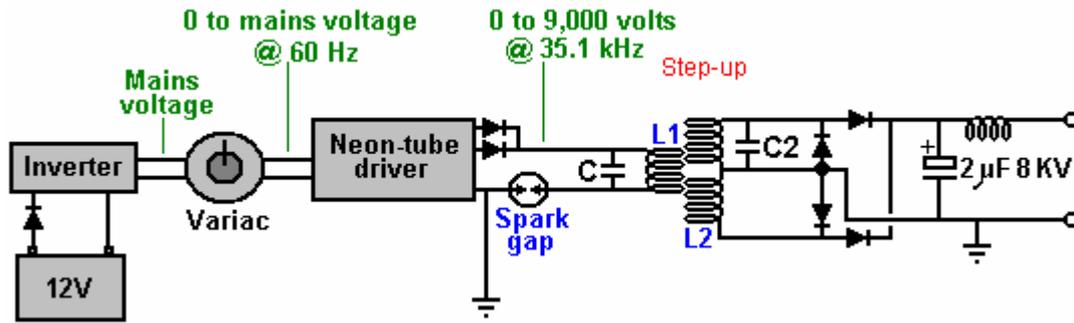
This is understandable, as there is always a tendency to think of the spark gap as being a device which is there to protect against excessive voltages rather than seeing it as an active component of the circuit, a component which is in continuous use. In 1925, Hermann Plauson was granted a patent for a whole series of methods for converting the high voltage produced by a tall aerial system into useable, standard electricity. Hermann starts off by explaining how high voltage can be converted into a convenient form and he uses a Wimshurst static electricity generator as an example of a constant source of high voltage. The output from a rectified Tesla Coil, a Wimshurst machine and a tall aerial are very much alike, and so Hermann's comments are very relevant here. He shows it like this:
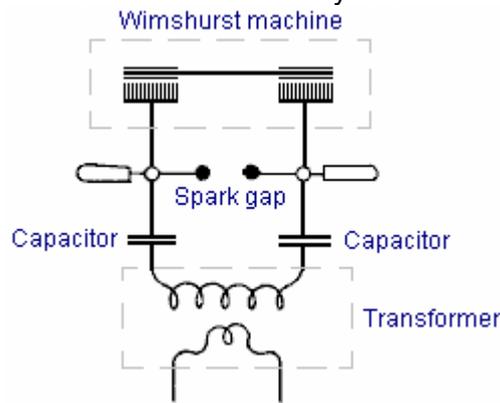
Here, the output of the Wimshurst machine is stored in two high-voltage capacitors (Leyden jars) causing a very high voltage to be created across those capacitors. When the voltage is high enough, a spark jumps across the spark gap, causing a massive surge of current through the primary winding of the transformer, which in his case is a step-down transformer as he is aimed at getting a lower output voltage. Don's circuit is almost identical:
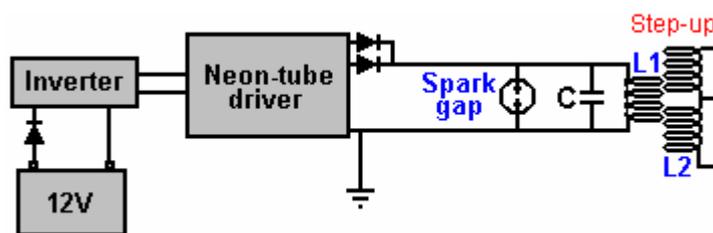
Here the high voltage comes from the battery/inverter/neon-tube driver/rectifiers, rather than from a mechanically driven Wimshurst machine. He has the same build up of voltage in a capacitor with a spark gap across the capacitor. The spark gap will fire when the capacitor voltage reaches its designed level. The only difference is in the positioning of the capacitor, which if it matched Hermann's arrangement exactly, would be like this:
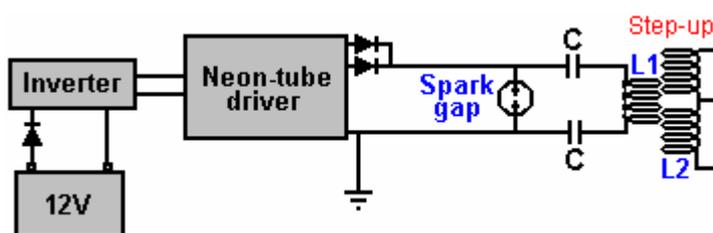
which would be a perfectly viable arrangement as far as I can see. You will remember that Tesla, who always speaks very highly of the energy released by the very sharp discharge produced by a spark, shows a high-voltage source feeding a capacitor with the energy passing through a spark gap to the primary winding of a transformer:
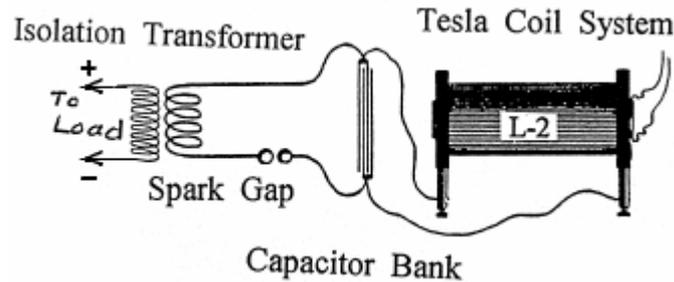
However, with Don's arrangement, it can be a little difficult to see why the capacitor is not short-circuited by the very low resistance of the few turns of thick wire forming the L1 coil. Well, it would do that if we were operating with DC, but we are most definitely not doing that as the output from the neon-tube driver circuit is pulsing 35,000 times per second. This causes the DC resistance of the L1 coil to be of almost no consequence and instead, the coil's "impedance" or "reactance" (effectively, it's AC resistance) is what counts. Actually, the capacitor and the L1 coil being connected across each other have a combined "reactance" or resistance to pulsing current at this frequency. This is where the nomograph diagram comes into play, and there is a much easier to understand version of it a few pages later on in this document. So, because of the high pulsing frequency, the L1 coil does not short-circuit the capacitor and if the pulsing frequency matches the resonant frequency of the L1 coil (or a harmonic of that frequency), then the L1 coil will actually have a very high resistance to current flow through it. This is how a crystal set radio receiver tunes in a particular radio station, broadcasting on it's own frequency.
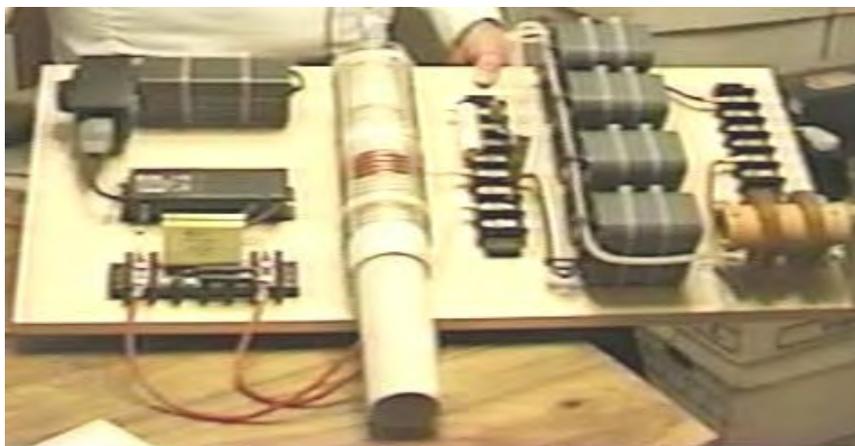
Anyway, coming back to Don's device shown in the photograph above, the electrical drive is from a 12-volt battery which is not seen in the photograph. Interestingly, Don remarks that if the length of the wires connecting the battery to the inverter are exactly one quarter of the wave length of the frequency of the oscillating magnetic field generated by the circuit, then the current induced in the battery wires will recharge the battery continuously, even if the battery is supplying power to the circuit at the same time.

The battery supplies a small current through a protecting diode, to a standard off-the-shelf "true sine-wave" inverter. An inverter is a device which produces mains-voltage Alternating Current from a DC battery. As Don wants adjustable voltage, he feeds the output from the inverter into a variable transformer called a "Variac" although this is often made as part of the neon-driver circuit to allow the brightness of the neon tube to be adjusted by the user. This arrangement produces an AC output voltage which is adjustable from zero volts up to the full mains voltage (or a little higher, though Don does not want to use a higher voltage).   The use of this kind of adjustment usually makes it essential

for the inverter to be a true sine-wave type. As the power requirement of the neon-tube driver circuit is so low, the inverter should not cost very much.

The neon-tube driver circuit is a standard off-the-shelf device used to drive neon tube displays for commercial establishments. The one used by Don contains an oscillator and a step-up transformer, which together produce an Alternating Current of 9,000 volts at a frequency of 35,100 Hz (sometimes written as 35.1 kHz). The term "Hz" stands for "cycles per second". Don lowers the 9,000 volts as he gets great power output at lower input voltages and the cost of the output capacitors is a significant factor. The particular neon-tube driver circuit which Don is using here, has two separate outputs out of phase with each other, so Don connects them together and uses a blocking diode in each line to prevent either of them affecting the other one. Not easily seen in the photograph, the high-voltage output line has a very small, encapsulated, Gas-Discharge Tube spark gap in it and the line is also earthed. The device looks like this:

Please note that when an earth connection is mentioned in connection with Don Smith's devices, we are talking about an actual wire connection to a metal object physically buried in the ground, whether it is a long copper rod driven into the ground, or an old car radiator buried in a hole like Tariel Kapanadze uses. When Thomas Henry Moray performed his requested demonstration deep in the countryside at a location chosen by the sceptics, the light bulbs which formed his demonstration electrical load, glowed more brightly with each hammer stroke as a length of gas pipe was hammered into the ground to form his earth connection.

It should be remarked that since Don purchased his neon-tube driver module that newer designs have generally taken over completely, especially in Europe, and these designs have built in "earth-leakage current" protection which instantly disables the circuit if any current is detected leaking to ground. This feature makes the unit completely unsuitable for use in a Don Smith circuit because there, the transfer of current to the ground is wholly intentional and vital for the operation of the circuit.

The output of the neon-tube driver circuit is used to drive the primary "L1" winding of a Tesla Coil style transformer. This looks ever so simple and straightforward, but there are some subtle details which need to be considered.

The operating frequency of 35.1 kHz is set and maintained by the neon-tube driver circuitry, and so, in theory, we do not have to do any direct tuning ourselves. However, we want the resonant frequency of the L1 coil and the capacitor across it to match the neon-driver circuit frequency.   The frequency of the "L1" coil winding will induce exactly the same frequency in the "L2" secondary winding. However, we need to pay special attention to the ratio of the wire lengths of the two coil windings as we want these two windings to resonate together. A rule of thumb followed by most Tesla Coil builders is to have the same weight of copper in the L1 and L2 coils, which means that the wire of the L1 coil is usually much thicker than the wire of the L2 coil. If the L1 coil is to be one quarter of the length of the L2 coil, then we would expect the cross-sectional area of the L1 coil to be four times that of the wire of the L2 coil and so the wire should have twice the diameter (as the area is proportional to the square of the radius, and the square of two is four).
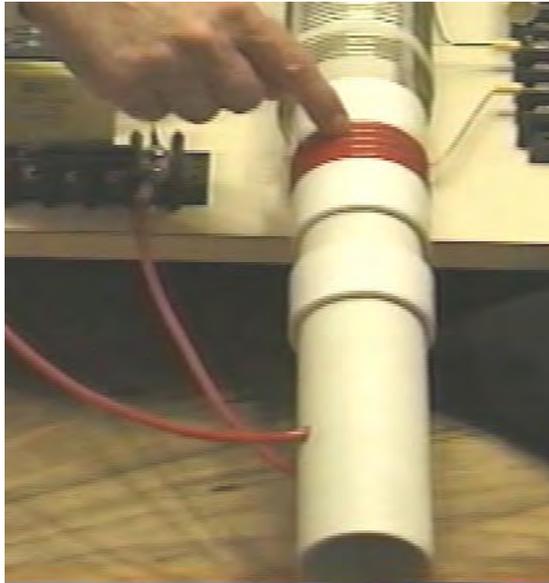
Don uses a white plastic tube as the former for his "L1" primary coil winding. As you can see here, the wire is fed into the former, leaving sufficient clearance to allow the former to slide all the way into the outer coil. The wire is fed up inside the pipe and out through another hole to allow the coil turns to be made on the outside of the pipe. There appear to be five turns, but Don does not always go for a complete number of turns, so it might be 4.3 turns or some other value. The key point here is that the length of wire in the "L1" coil turns should be exactly one quarter of the length of wire in the "L2" coil turns.

The "L2" coil used here is a commercial 3-inch diameter unit from Barker & Williamson, constructed from uninsulated, solid, single-strand "tinned" copper wire (how to make home-build versions is shown later on). Don has taken this coil and unwound four turns in the middle of the coil in order to make a centre-tap. He then measured the exact length of wire in the remaining section and made the length of the "L1" coil turns to be exactly one quarter of that length. The wire used for the "L1" coil looks like Don's favourite "Jumbo Speaker Wire" which is a very flexible wire with a very large number of extremely fine uninsulated copper wires inside it.

You will notice that Don has placed a plastic collar on each side of the winding, matching the thickness of the wire, in order to create a secure sliding operation inside the outer "L2" coil, and the additional plastic collars positioned further along the pipe provide further support for the inner coil. This sliding action allows the primary coil "L1" to be positioned at any point along the length of the "L2" secondary coil, and that has a marked tuning effect on the operation of the system. The outer "L2" coil does not have any kind of tube support but instead, the coil shape is maintained by the stiffness of the solid wire plus four slotted strips. This style of construction produces the highest possible coil performance at radio frequencies. With a Tesla Coil, it is most unusual to have the L1 coil of smaller diameter than the L2 coil.
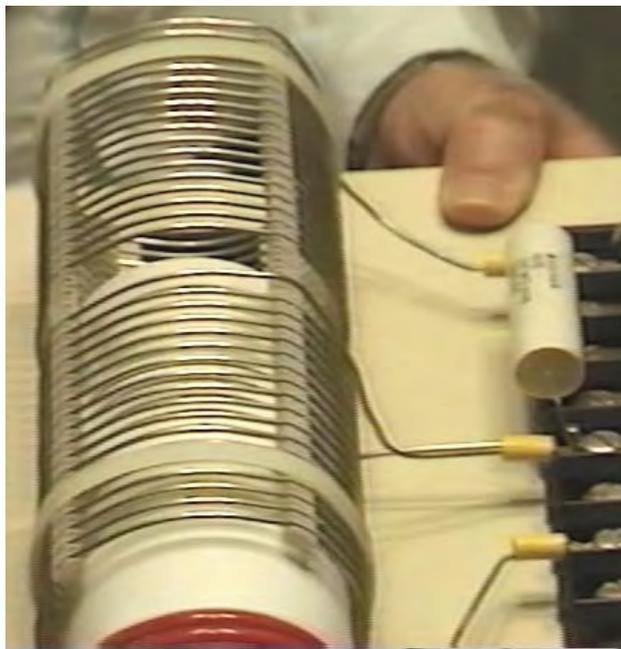
The "L2" coil has two separate sections, each of seventeen turns. One point to note is the turns are spaced apart using slotted strips to support the wires and maintain an accurate spacing between adjacent turns. It must be remembered that spacing coil turns apart like this alters the characteristics of the coil, increasing it's "capacitance" factor substantially. Every coil has resistance, inductance and capacitance, but the form of the coil construction has a major effect on the ratio of these three characteristics. The coil assembly is held in position on the base board by two off-white plastic cable ties. The nearer half of the coil is effectively connected across the further half as shown in the circuit diagram above.

One point which Don stresses, is that the length of the wire in the "L1" coil and the length of wire in the "L2" coil, must be an exact even division or multiple of each other (in this case, the "L2" wire length in each half of the "L2" coil is exactly four times as long as the "L1" coil wire length). This is likely to cause the "L1" coil to have part of a turn, due to the different coil diameters. For example, if the length of the "L2" coil wire is 160 inches and "L1" is to be one quarter of that length, namely, 40 inches. Then, if the "L1" coil has an effective diameter of 2.25 inches, (allowing for the thickness of the wire when wound on a 2-inch diameter former), then the "L1" coil would have 5.65 (or 5 and 2/3) turns which causes the finishing turn of "L2" to be 240 degrees further around the coil former than the start of the first turn - that is, five full turns plus two thirds of the sixth turn.

The L1 / L2 coil arrangement is a Tesla Coil. The positioning of the "L1" coil along the length of the "L2" coil, adjusts the voltage to current ratio produced by the coil. When the "L1" coil is near the middle of the "L2" coil, then the amplified voltage and amplified current are roughly the same. The exact wire ratio of these two coils gives them an almost automatic tuning with each other, and the exact resonance between them can be achieved by the positioning of the "L1" coil along the length of the "L2" coil. While this is a perfectly good way of adjusting the circuit, in the build shown in the photograph, Don has opted to get the exact tuning by connecting a capacitor across "L1" as marked as "C" in the circuit diagram. Don found that the appropriate capacitor value was around the 0.1 microfarad (100 nF) mark. It must be remembered that the voltage across "L1" is very high, so if a capacitor is used in that position it will need a voltage rating of at least 9,000 volts. Don remarks that the actual capacitors seen in the photograph of this prototype are rated at fifteen thousand volts, and were custom made for him using a "self-healing" style of construction. As has already been remarked, this capacitor is an optional component. Don also opted to connect a small capacitor across the "L2" coil, also for fine-tuning of the circuit, and that component is optional and so is not shown on the circuit diagram. As the two halves of the "L2" coil are effectively connected across each other, it is only necessary to have one fine-tuning capacitor. However, Don stresses that the "height" length of the coil (when standing vertically) controls the voltage produced while the coil "width" (the diameter of the turns) controls the current produced.
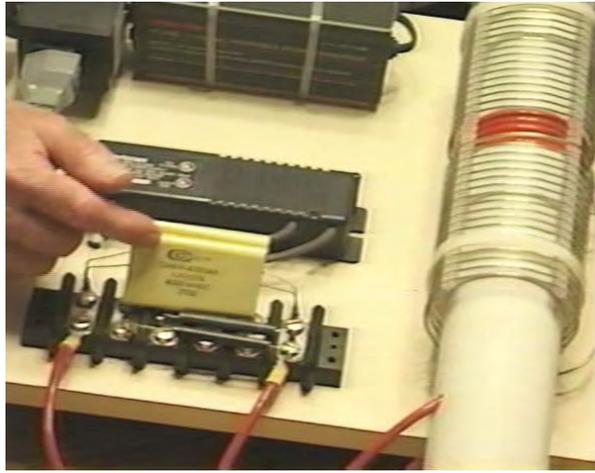
The exact wire length ratio of the turns in the "L1" and "L2" coils gives them an almost automatic synchronous tuning with each other, and the exact resonance between them can be achieved by the positioning of the "L1" coil along the length of the "L2" coil. While this is a perfectly good way of adjusting the circuit, in the 1994 build shown in the photograph, Don has opted to get the exact tuning by connecting a capacitor across "L1" as marked as "**C**" in the circuit diagram. Don found that the appropriate capacitor value for his particular coil build, was about 0.1 microfarad (100 nF) and so he connected two 47 nF high-voltage capacitors in parallel to get the value which he wanted. It must be remembered that the voltage across "L1" is very high, so a capacitor used in that position needs a voltage rating of at least 9,000 volts. Don remarks that the actual capacitors seen in the photograph of this prototype are rated at fifteen thousand volts, and were custom made for him using a "self-healing" style of construction.

Don has also connected a small capacitor across the "L2" coil, and that optional component is marked as "C2" in the circuit diagram and the value used by Don happened to be a single 47nF, high-voltage capacitor. As the two halves of the "L2" coil are effectively connected across each other, it is only necessary to have one capacitor for "L2":
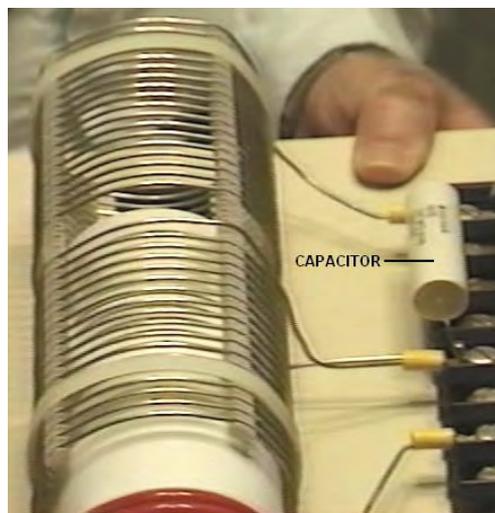
There are various ways of dealing with the output from the "L2" coil in order to get large amounts of conventional electrical power out of the device. The method shown here uses the four very large capacitors seen in the photograph. These have an 8,000 or 9,000 volt rating and a large capacity and they are used to store the circuit power as DC prior to use in the load equipment. This is achieved by feeding the capacitor bank through a diode which is rated for both high voltage and high current, as Don states that the device produces 8,000 volts at 20 amps, in which case, this rectifying diode has to be able to handle that level of power, both at start-up when the capacitor bank is fully discharged and "L2" is producing 8,000 volts, and when the full load of 20 amps is being drawn.

This capacitor bank is fed through a diode which is rated for both high voltage and high current, as Don states that the device produces 8,000 volts at 20 amps, in which case, this rectifying diode has to be able to handle that level of power, both at start-up when the capacitor bank is fully discharged and "L2" is producing 8,000 volts, and when the full load of 20 amps is being drawn. The actual diodes used by Don happen to be rated at 25 KV but that is a far greater rating than is actually needed.

In passing, it might be remarked that the average home user will not have an electrical requirement of anything remotely like as large as this, seeing that 10 kW is more than most people use on a continuous basis, while 8 KV at 20 A is a power of 160 kilowatts. As the neon-tube driver circuit can put out 9,000 volts and since the L1 / L2 coil system is a step-up transformer, if the voltage fed to the capacitor bank is to be kept down to 8,000 volts, then the Variac adjustment must be used to reduce the voltage fed to the neon-tube driver circuit, in order to lower the voltage fed to the L1 / L2 coil pair, typically, to 3,000 volts.

A very astute and knowledgeable member of the EVGRAY Yahoo EVGRAY forum whose ID is "silverhealtheu" has recently pointed out that Don Smith says quite freely that he does not disclose all of the details of his designs, and it is his opinion that a major item which has not been disclosed is that the diodes in the circuit diagrams shown here are the wrong way round and that Don operates his voltages in reverse to the conventional way. In fact, the circuit diagram should be:
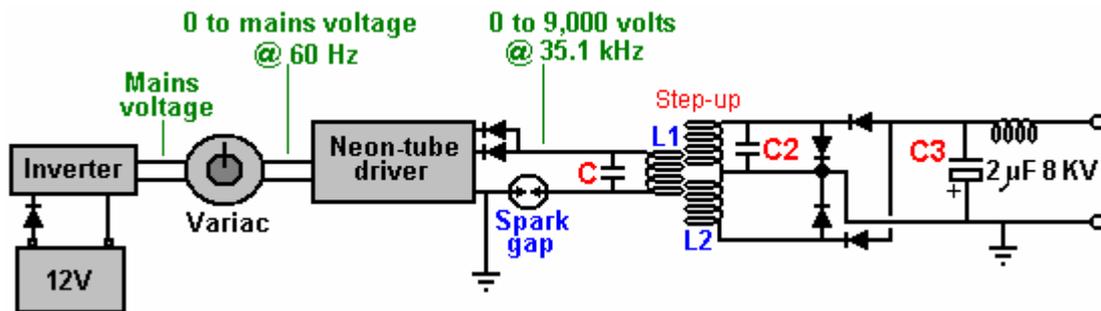
He comments: "the diodes leaving the Neon-tube Driver may need to be reversed as we want to collect the negative polarity. The spark gap will then operate on ambient inversion and the spark will look and sound totally different with a much faster crack and producing very little heat and even becoming covered in frost is possible.

The Variac should be raised up just enough to get a spark going then backed off slightly. Any higher voltage is liable to make the Neon-tube Driver think that it has a short-circuit condition, and the new electronic designs will then shut down automatically and fail to operate at all if this method is not followed.

When running, C, L1 and L2 operate somewhere up in the Radio Frequency band because the Neon-tube Driver only acts as a tank-circuit exciter. The large collection capacitor C3, should fill inverted to earth polarity as shown above. The load will then be pulling electrons from the earth as the cap is REFILLED back to ZERO rather than the joules in the capacitor being depleted.

Also remember that the Back-EMF systems of John Bedini and others, create a small positive pulse but they collect a super large NEGATIVE polarity spike which shoots off the bottom of an oscilloscope display. This is what we want, plenty of this stored in capacitors, and then let the ambient background energy supply the current when it makes the correction."

This is **a very important point** and it may well make a really major difference to the performance of a device of this nature.
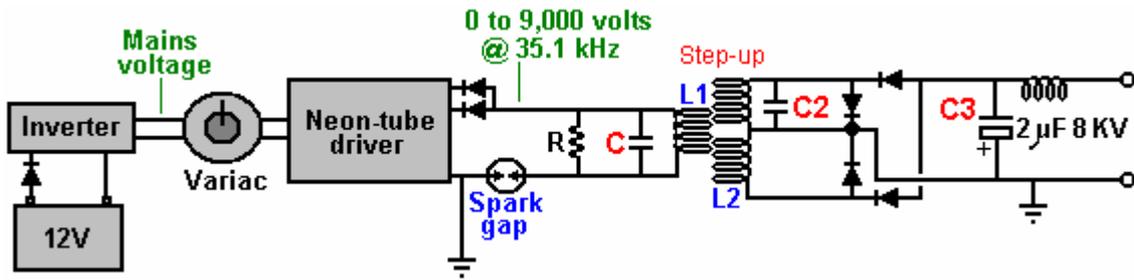
One reader has drawn attention to the fact that Don's main document indicates that there should be a resistor "R" across the L1 coil as well as the capacitor "C" and he suggests that the circuit should actually be as shown above, considering what Don said earlier about his "suitcase" design. Another reader points out that the wire in the output choke shown in the photograph below appears to be wound with wire that is far too small diameter to carry the currents mentioned by Don. It seems likely that a choke is not needed in that position except to suppress possible radio frequency transmissions from the circuit, but a more powerful choke can easily be wound using larger diameter wire.

When the circuit is running, the storage capacitor bank behaves like an 8,000 volt battery which never runs down and which can supply 20 amps of current for as long as you want. The circuitry for producing a 220 volt 50 Hz AC output or a 110 volt 60 Hz AC output from the storage capacitors is just standard electronics. In passing, one option for charging the battery is to use the magnetic field caused by drawing mains-frequency current pulses through the output "choke" coil, shown here:
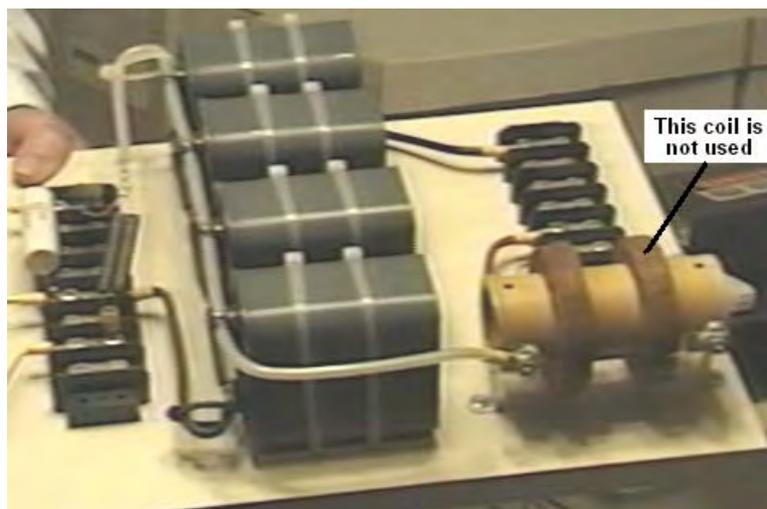
The output current flows through the left hand winding on the brown cylindrical former, and when the photograph was taken, the right-hand winding was no longer in use. Previously, it had been used to provide charging power to the battery by rectifying the electrical power in the coil, caused by the fluctuating magnetic field caused by the pulsing current flowing through the left hand winding, as shown here:
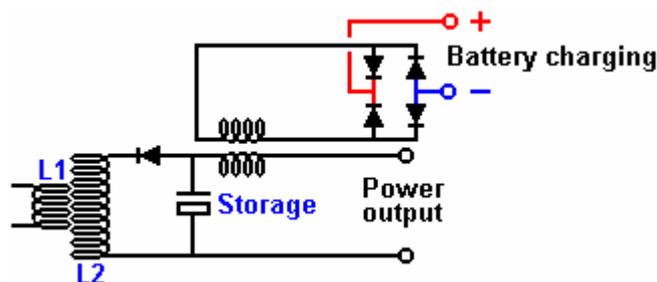
The DC output produced by the four diodes was then used to charge the driving battery, and the power level produced is substantially greater than the minor current drain from the battery. Consequently, it is

a sensible precaution to pass this current to the battery via a circuit which prevents the battery voltage rising higher than it should. A simple voltage level sensor can be used to switch off the charging when the battery has reached its optimum level. Other batteries can also be charged if that is wanted. Simple circuitry of the type shown in chapter 12 can be used for controlling and limiting the charging process. The components on Don's board are laid out like this:
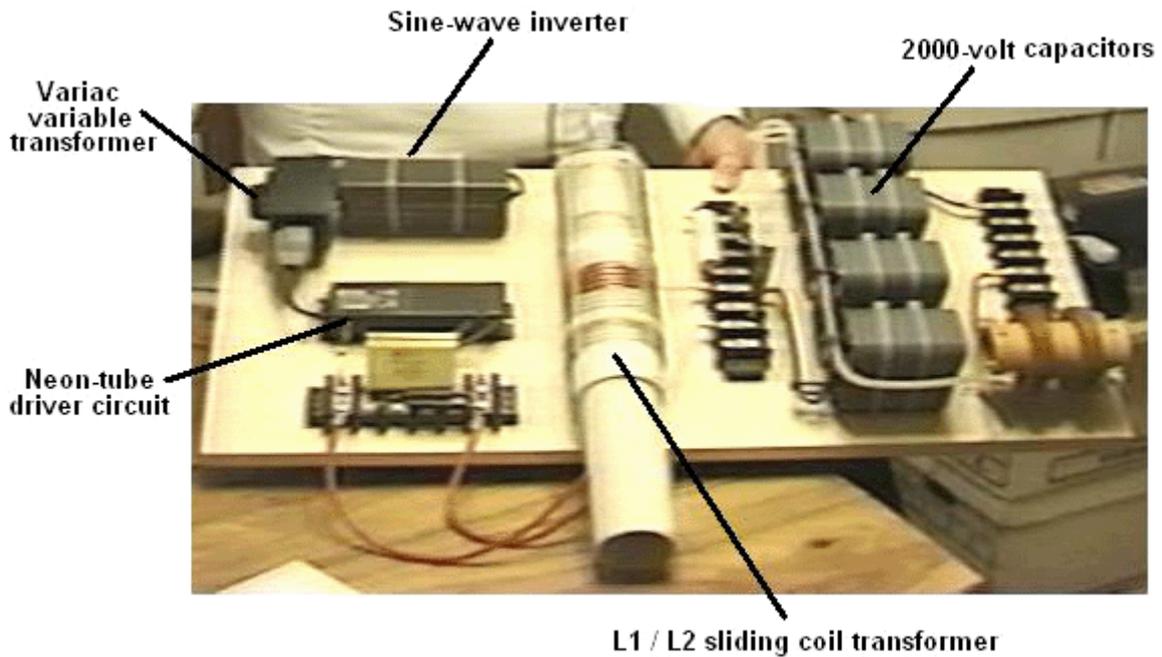
Don draws attention to the fact that the cables used to connect the output of "L2" to the output of the board, connecting the storage capacitors on the way, are very high-voltage rated cables with special multiple coverings to ensure that the cables will remain sound over an indefinite period. It should be remarked at this point, that the outer 3" diameter coil used by Don, is not wound on a former, but in order to get higher performance at high frequencies, the turns are supported with four separate strips physically attached to the turns - the technique described later in this document as being an excellent way for home construction of such coils.

Please bear in mind that the voltages here and their associated power levels are literally lethal and perfectly capable of killing anyone who handles the device carelessly when it is powered up. When a replication of this device is ready for routine use, it must be encased so that none of the high-voltage connections can be touched by anyone. This is not a suggestion, but it is a mandatory requirement, despite the fact that the components shown in the photographs are laid out in what would be a most dangerous fashion were the circuit to be powered up as it stands. Under no circumstances, construct and test this circuit unless you are already experienced in the use of high-voltage circuits or can be supervised by somebody who is experienced in this field. This is a "one hand in the pocket at all times" type of circuit and it needs to be treated with great care and respect at all times, so be sensible.

The remainder of the circuit is not mounted on the board, possibly because there are various ways in which the required end result can be achieved. The one suggested here is perhaps the most simple solution:
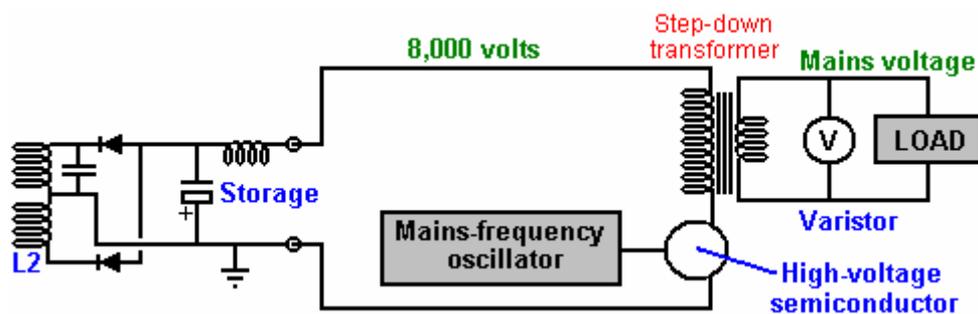
The voltage has to be dropped, so an iron-cored mains-frequency step-down transformer is used to do this. To get the frequency to the standard mains frequency for the country in which the device is to be used, an oscillator is used to generate that particular mains frequency. The oscillator output is used to drive a suitable high-voltage semiconductor device, be it an FET transistor, an IGBT device, or whatever. This device has to switch the working current at 8,000 volts, though admittedly, that will be a current which will be at least thirty six times lower than the final output current, due to the higher voltage on the primary winding of the transformer. The available power will be limited by the current handling capabilities of this output transformer which needs to be very large and expensive.

As the circuit is capable of picking up additional magnetic pulses, such as those generated by other equipment, nearby lightning strikes, etc. an electronic component called a "varistor" marked "V" in the diagram, is connected across the load. This device acts as a voltage spike suppressor as it short circuits any voltage above its design voltage, protecting the load from power surges.

Don also explains an even more simple version of the circuit as shown here:
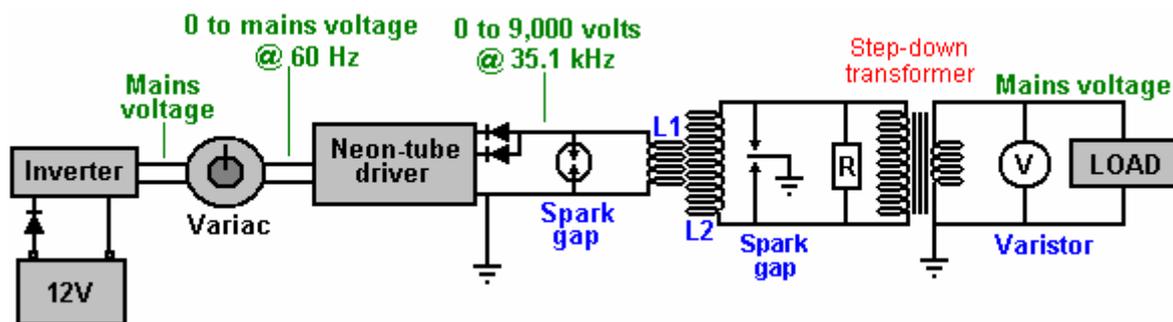
This simplified circuit avoids the need for expensive capacitors and the constraints of their voltage ratings, and the need for electronic control of the output frequency. The wire length in the turns of coil "L2" still needs to be exactly four times the wire length of the turns in coil "L1", but there is only one component which needs to be introduced, and that is the resistor "**R**" placed across the primary winding of the step-down isolation transformer. This transformer is a laminated iron-core type, suitable for the low mains frequency, but the output from "L2" is at much higher frequency. It is possible to pull the frequency down to suit the step-down transformer by connecting the correct value of resistor "R" across the output transformer (or a coil and resistor, or a coil and a capacitor). The value of resistor needed can be predicted from the American Radio Relay League graph (shown as Fig.44 in Don's pdf document. The sixth edition of the Howard Sams book "Handbook of Electronics Tables and Formulas" (ISBN-10: 0672224690 or ISBN-13: 978-0672224690) has a table which goes down to 1 kHz and so does not need to be extended to reach the frequencies used here. The correct resistor value could also be found by experimentation. You will notice that an earthed dual spark gap has been placed across "L2" in order to make sure that the voltage levels always stay within the design range.

Don also explains an even more simple version which does not need a Variac, high voltage capacitors or high voltage diodes. Here, a DC output is accepted which means that high-frequency step-down transformer operation can be used. This calls for an air-core transformer which you would wind yourself from heavy duty wire. Mains loads would then be powered by using a standard off-the-shelf inverter. In this version, it is of course, necessary to make the "L1" turns wire length exactly one quarter of the "L2" turns wire length in order to make the two coils resonate together. The operating frequency of each of these coils is imposed on them by the output frequency of the neon-tube driver circuit. That frequency is maintained throughout the entire circuit until it is rectified by the four diodes feeding the low-voltage storage capacitor. The target output voltage will be either just over 12 volts or just over 24 volts, depending on the voltage rating of the inverter which is to be driven by the system. The circuit diagram is:
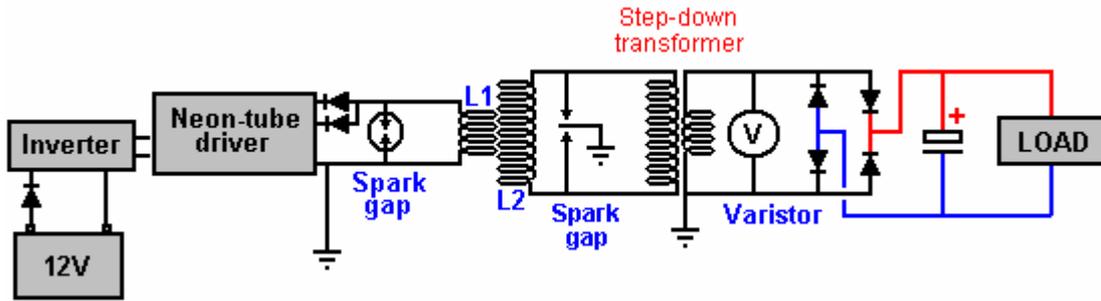
As many people will find the nomograph chart in Don's pdf document very difficult to understand and use, here is an easier version:
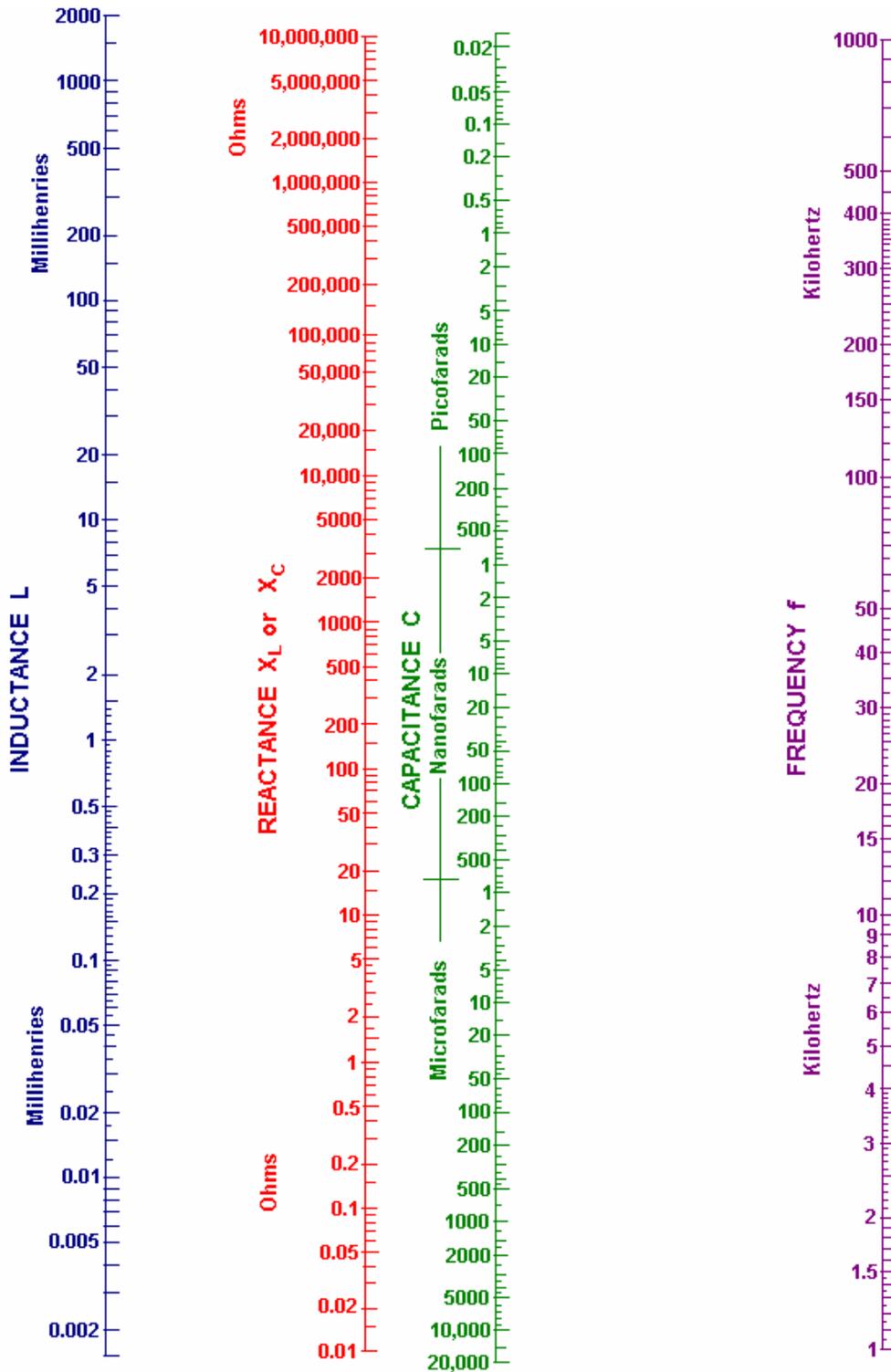
The objective here is to determine the "reactance" or 'AC resistance' in ohms and the way to do that is as follows:

Suppose that your neon-tube driver is running at 30 kHz and you are using a capacitor of 100 nF (which is the same as 0.1 microfarad) and you want to know what is the AC resistance of your capacitor is at that frequency. Also, what coil inductance would have that same AC resistance. Then the procedure for finding that out is as follows:

Draw a straight line from your 30 kHz frequency (purple line) through your 100 nanofarad capacitor value and carry the line on as far as the (blue) inductance line as shown above.

You can now read the reactance ("AC resistance") off the red line, which looks like 51 ohms to me. This means that when the circuit is running at a frequency of 30 kHz, then the current flow through your 100 nF capacitor will be the same as through a 51 ohm resistor. Reading off the blue "Inductance" line that same current flow at that frequency would occur with a coil which has an inductance of 0.28 millihenries.

I have been passed a copy of Don's circuit diagram for this device, and it is shown here:

The 4000V 30mA transformer shown in this circuit diagram, may use a ferrite-cored transformer from a neon-tube driver module which steps up the voltage but it does not raise the frequency as that is clearly marked at 120 Hz pulsed DC. You will notice that this circuit diagram is drawn with Plus shown below Minus (which is most unusual).

Please note that when an earth connection is mentioned in connection with Don Smith's devices, we are talking about an actual wire connection to a metal object physically buried in the ground, whether it is a long copper rod driven into the ground, or an old car radiator buried in a hole like Tariel Kapanadze used, or a buried metal plate. When Thomas Henry Moray performed his requested demonstration deep in the countryside at a location chosen by the sceptics, the light bulbs which formed his demonstration electrical load, glowed more brightly with each hammer stroke as a length of gas pipe was hammered into the ground to form his earth connection.

Don also explains an even more simple version of his main device. This version does not need a Variac (variable voltage transformer) or high voltage capacitors. Here, a DC output is accepted which means that high-frequency step-down transformer operation can be used. This calls on the output side, for an air-core (or ferrite rod core) transformer which you would wind yourself from heavy duty wire. Mains loads would then be powered by using a standard off-the-shelf inverter. In this version, it is of course, very helpful to make the "L1" turns wire length exactly one quarter of the "L2" turns wire length in order to make the two coils automatically resonate together. The operating frequency of each of these coils is imposed on them by the output frequency of the neon-tube driver circuit. That frequency is maintained throughout the entire circuit until it is rectified by the four diodes feeding the low-voltage

storage capacitor. The target output voltage will be either just over 12 volts or just over 24 volts, depending on the voltage rating of the inverter which is to be driven by the system.

As the circuit is capable of picking up additional magnetic pulses, such as those generated by other equipment, nearby lightning strikes, etc. an electronic component called a "varistor" marked "V" in the diagram, is connected across the load. This device acts as a voltage spike suppressor as it short-circuits any voltage above its design voltage, protecting the load from power surges. A Gas-Discharge Tube is an effective alternative to a varistor.

This circuit is effectively two Tesla Coils back-to-back and the circuit diagram might be:
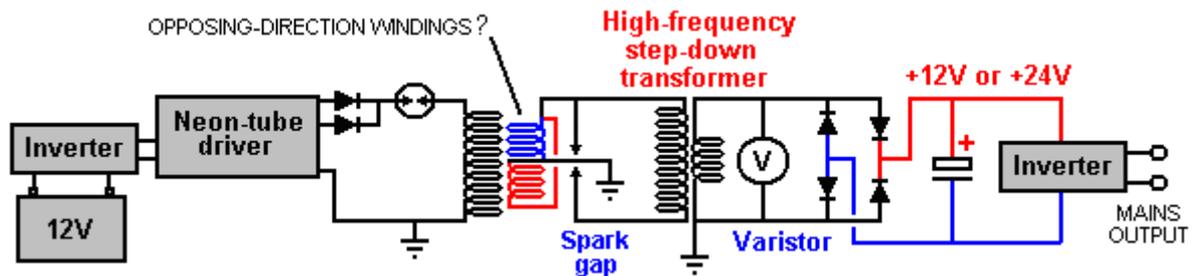
It is by no means certain that in this circuit, the red and blue windings are wound in opposing directions. The spark gap (or gas-discharge tube) in series with the primary of the first transformer alters the operation in a somewhat unpredictable way as it causes the primary to oscillate at a frequency determined by it's inductance and it's self-capacitance, and that may result in megahertz frequencies. The secondary winding(s) of that transformer **must** resonate with the primary and in this circuit which has no frequency-compensating capacitors, that resonance is being produced by the exact wire length in the turns of the secondary. This looks like a simple circuit, but it is anything but that. The excess energy is produced by the raised frequency, the raised voltage, and the very sharp pulsing produced by the spark. That part is straightforward. The remainder of the circuit is likely to be very difficult to get resonating as it needs to be in order to deliver that excess energy to the output inverter.

When considering the "length" of wire in a resonant coil, it is necessary to pay attention to the standing wave created under those conditions. The wave is caused by reflection of the signal when it reaches the end of the wire OR when there is a sudden change in the diameter of the wire as that changes the signal reflection ability at that point in the connection. You should pay attention to Richard Quick's very clear description of this in the section of his patent which is included later on in this chapter. Also, remember what Don Smith said about locating the peaks of the standing wave by using a hand-held neon lamp.

One very significant thing which Don pointed out is that the mains electricity available through the wall socket in my home, does **not** come along the wires from the generating station. Instead, the power station influences a local 'sub-station' and the electrons which flow through my equipment actually come from my local environment because of the influence of my local sub-station. Therefore, if I can create a similar influence in my home, then I no longer need that sub-station and can have as much electrical energy as I want, without having to pay somebody else to provide that influence for me.

A Practical Implementation of one of Don Smith's Designs

The objective here, is to determine how to construct a self-powered, free-energy electrical generator which has no moving parts, is not too expensive to build, uses readily available parts and which has an output of some kilowatts. However, under no circumstances should this document be considered to be an encouragement for you, or anyone else to actually build one of these devices. This document is presented solely for information and educational purposes, and as high voltages are involved, it should be considered to be a dangerous device unsuited to being built by inexperienced amateurs. The following section is just my opinions and so should not be taken as tried and tested, working technology, but instead, just the opinion of an inexperienced writer.

However, questions from several different readers indicate that a short, reasonably specific description of the steps

needed to attempt a replication of a Don Smith device would be helpful. Again, this document must not be considered to be a recommendation that you actually build one of these high-voltage, potentially dangerous devices. This is just information intended to help you understand what I believe is involved in this process.

In broad outline, the following steps are used in the most simple version of the arrangement:

1. The very low frequency and voltage of the local mains supply is discarded in favour of an electrical supply which operates at more than 20,000 Hz (cycles per second) and has a voltage of anything from 350 volts to 10,000 volts. The higher voltages can give greater overall output power, but they involve greater effort in getting the voltage back down again to the level of the local mains voltage in order for standard mains equipment to be used.

2. This high-frequency high voltage is used to create a series of very rapid sparks using a spark gap which is connected to a ground connection. Properly done, the spark frequency is so high that there is no audible sound caused by the sparks. Each spark causes a flow of energy from the local environment into the circuit. This energy is not standard electricity which makes things hot when current flows through them, but instead this energy flow causes things to become cold when the power flows through them, and so it is often called "cold" electricity. It is tricky to use this energy unless all you want to do is light up a series of light bulbs (which incidentally, give out a different quality of light when powered with this energy). Surprisingly, the circuit now contains substantially more power than the amount of power needed to produce the sparks. This is because additional energy flows in from the ground as well as from the local environment. If you have conventional training and have been fed the myth of "closed systems", then this will seem impossible to you. So, let me ask you the question: if, as can be shown, all of the electricity flowing into the primary winding of a transformer, flows back out of that winding, then where does the massive, continuous flow of electricity coming from the secondary winding come from? None of it comes from the primary circuit and yet millions of electrons flow out of the secondary in a continuous stream which can be supplied indefinitely. So, where do these electrons come from? The answer is 'from the surrounding local environment which is seething with excess energy' but your textbooks won't like that fact as they believe that the transformer circuit is a 'closed system' – something which probably can't be found anywhere in this universe.

3. This high-voltage, high-frequency, high-power energy needs to be converted to the same sort of hot electricity which comes out of a mains wall socket at the local voltage and frequency. This is where skill and understanding come into play. The first step is to lower the voltage and increase the available current with a step-down resonant transformer. This sounds highly technical and complicated, and looking at Don Smith's expensive Barker & Williamson coil, makes the whole operation appear to be one for rich experimenters only. This is not the case and a working solution can be cheap and easy. It is generally not convenient to get the very high voltage all the way down to convenient levels in a single step, and so, one or more of those resonant transformers can be used to reach the target voltage level. Each step down transformer boosts the available current higher and higher.

4. When a satisfactory voltage has been reached, we need to deal with the very high frequency. The easiest way to deal with it is to use high-speed diodes to convert it to pulsing DC and feed that into a capacitor to create what is essentially, an everlasting battery. Feeding this energy into a capacitor converts it into conventional "hot" electricity and a standard off-the-shelf inverter can be used to give the exact voltage and frequency of the local mains supply. In most of the world, that is 220 volts at 50 cycles per second. In America it is 110 volts at 60 cycles per second. Low-cost inverters generally run on either 12 volts or 24 volts with the more common 12 volt units being cheaper.

So, let's take a look at each of these step in more detail and see if we can understand what is involved and what our options are:

1. We want to produce a high-voltage, high-frequency, low-current power source. Don Smith shows a Neon-Sign Transformer module. His module produced a voltage which was higher than was convenient and so he used a variable AC transformer or "Variac" as it is commonly known, to lower the input voltage and so, lower the output voltage. There is actually no need for a Variac as we can handle the higher voltage or alternatively, use a more suitable Neon-Sign Transformer module.

However, we have a problem with using that technique. In the years since Don bought his module, they have

been redesigned to include circuitry which disables the module if any current flows out of it directly to earth, and as that is exactly what we would want to use it for, so most, if not all of the currently available neon-sign transformer modules are not suitable for our needs. However, I'm told that if the module has an earth wire and that earth wire is left unconnected, that it disables the earth-leakage circuitry, allowing the unit to be used in a Don Smith circuit. Personally, I would not recommend that if the module is enclosed in a metal housing.

A much cheaper alternative is shown here: http://www.youtube.com/watch?v=RDDRe_4D93Q where a small plasma globe circuit is used to generate a high-frequency spark. It seems highly likely that one of those modules would suit our needs:
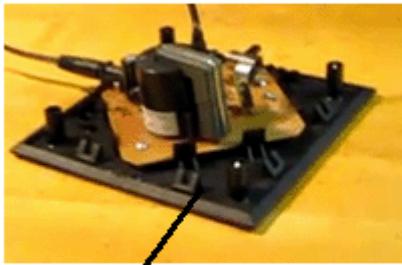
MODULE WITHOUT
THE PLASMA GLOBE

SPARK
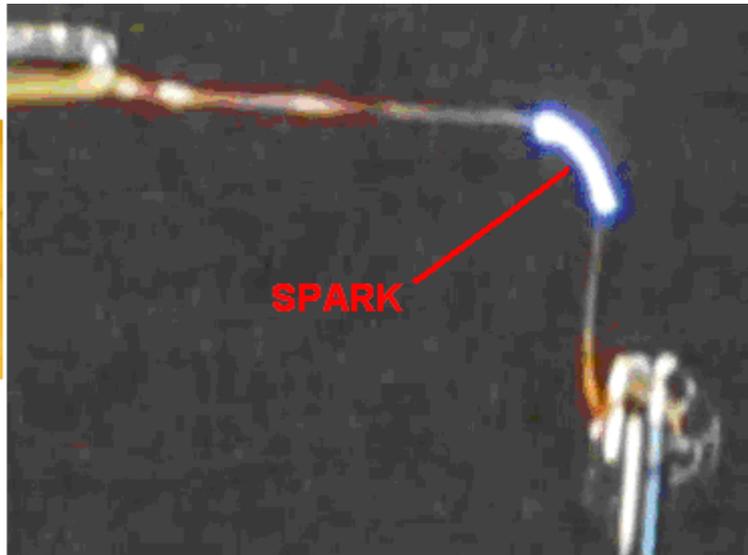
An alternative method is to build your own power supply from scratch. Doing that is not particularly difficult and if you do not understand any electronics, then perhaps, reading the beginner's electronics tutorial in chapter 12 (http://www.free-energy-info.com/Chapter12.pdf) will fill you in on all of the basics needed for understanding (and probably designing your own) circuits of this type. Here is a variable frequency design for home-construction:
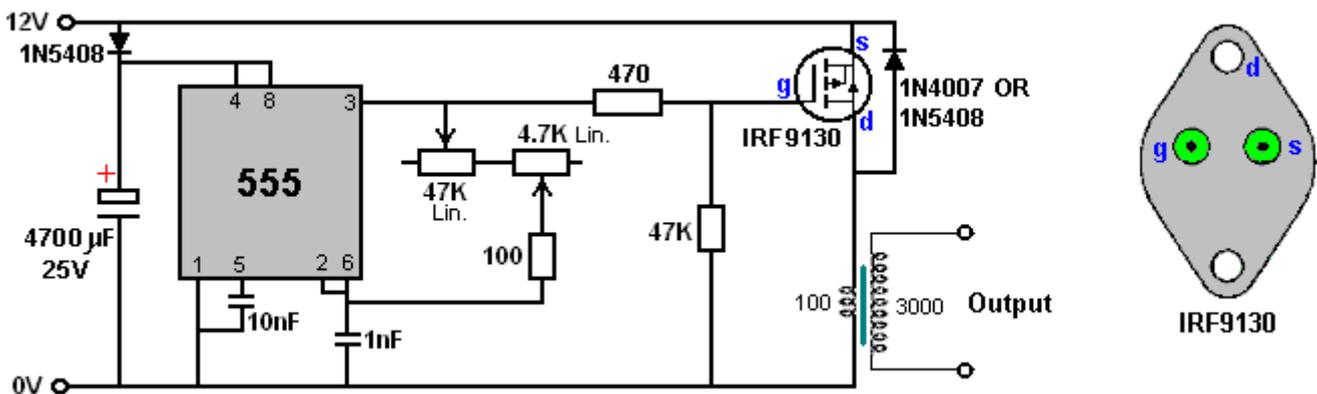
One advantage of this circuit is that the output transformer is driven at the frequency set by the 555 timer and that frequency is not affected by the number of turns in the primary winding, nor it's inductance, wire diameter, or anything else to do with the coil. While this circuit shows the rather expensive IRF9130 transistor, I expect that other P-channel FETs would work satisfactorily in this circuit. The IRF9130 transistor looks like this:

The circuit has a power supply diode and capacitor, ready to receive energy from the output at some later date if that is possible and desired. The 555 circuit is standard, giving a 50% Mark/Space ratio. The 10 nF capacitor is there to maintain the stability of the 555 and the timing section consists of two variable resistors, one fixed resistor and the 1 nF capacitor. This resistor arrangement gives a variable resistance of anything from 100 ohms to 51.8K and that allows a substantial frequency range. The 47K (Linear) variable resistor controls the main tuning and the 4.7K (Linear) variable resistor gives a more easily adjustable frequency for exact tuning. The 100 ohm resistor is there in case both of the variable resistors are set to zero resistance. The output is fed through a 470 ohm resistor to the gate of a very powerful P-channel FET transistor which drives the primary winding of the output transformer.

The output transformer can be wound on an insulating spool covering a ferrite rod, giving both good coupling between the windings, and high-frequency operation as well. The turns ratio is set to just 30:1 due to the high number of primary winding turns. With a 12-volt supply, this will give a 360-volt output waveform, and by reducing the primary turns progressively, allows the output voltage to be increased in controlled steps. With 10 turns in the primary, the output voltage should be 3,600 volts and with just 5 turns 7,200 volts. The higher the voltage used, the greater the amount of work needed later on to get the voltage back down to the output level which we want.

Looking at the wire specification table, indicates that quite a small wire diameter could be used for the oscillator output transformer's secondary winding. While this is perfectly true, it is not the whole story. Neon Tube Drivers are very small and the wire in their output windings is very small diameter indeed. Those driver modules are very prone to failure. If the insulation on any one turn of the winding fails and one turn becomes a short-circuit, then that stops the winding from oscillating, and a replacement is needed. As there are no particular size constraints for this project, it might be a good idea to use enamelled copper wire of 0.45 mm or larger in an attempt to avoid this insulation failure hazard. No part of the transformer coil spool should be metal and it would not be any harm to cover each layer of secondary winding with a layer of electrical tape to provide additional insulation between the coil turns in one layer and the turns in the layer on top of it.

A plug-in board layout might be:
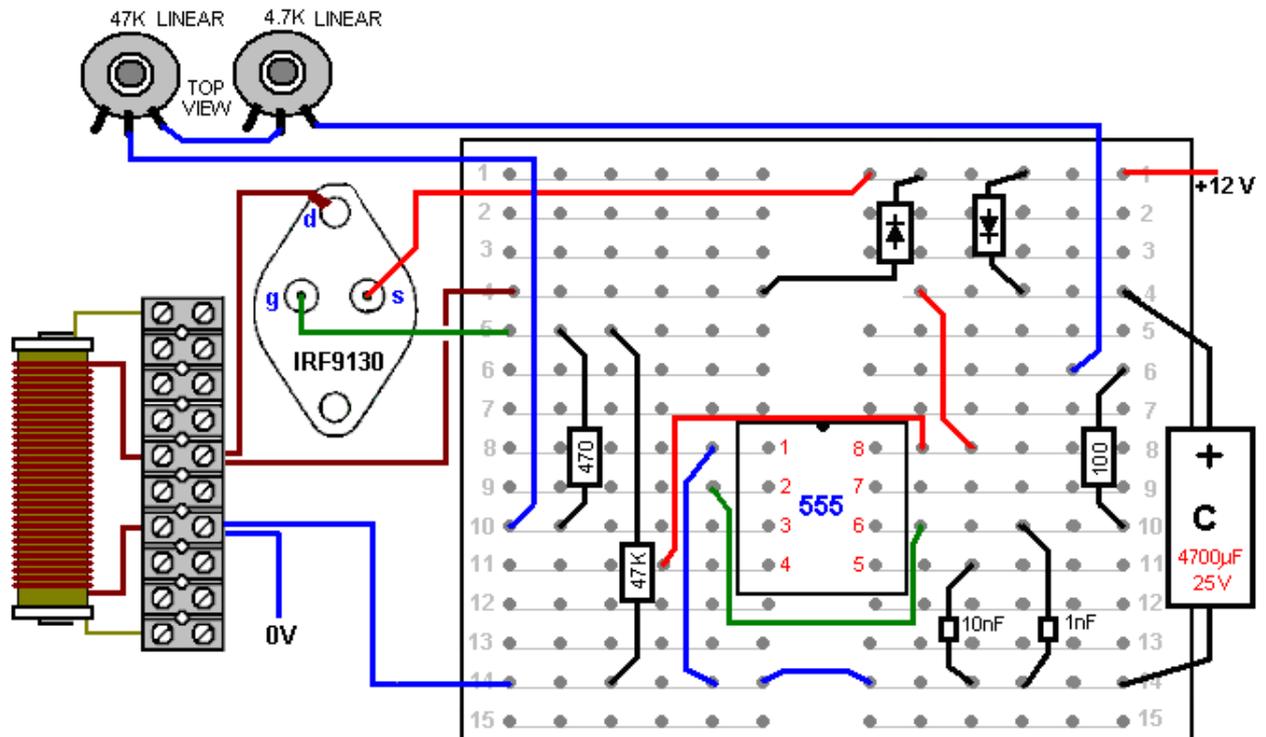
Please remember that you can't just stick your average voltmeter across a 4 kV capacitor (unless you really do want to buy another meter) as they only measure up to about a thousand volts DC. So, if you are using high voltage, then you need to use a resistor-divider pair and measure the voltage on the lower resistor. But what resistor values should you use? If you put a 10 Megohm resistor across your 4 kV charged capacitor, the current flowing through the resistor would be 0.4 milliamps. Sounds tiny, doesn't it? But that 0.4 mA is 1.6 watts which is a good deal more than the wattage which your resistor can handle. Even using this arrangement:
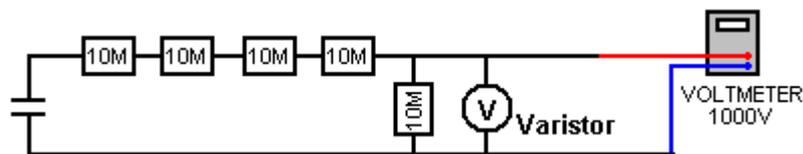
the current will be 0.08 mA and the wattage per resistor will be 64 mW. The meter reading will be about 20% of the capacitor voltage which will give a voltmeter reading of 800 volts. The input resistance of the meter needs to be checked and possibly, allowed for as the resistance in this circuit is so high (see chapter 12). When making a measurement of this type, the capacitor is discharged, the resistor chain and meter attached, and then, and only then, is the circuit powered up, the reading taken, the input power disconnected, the capacitor discharged, and the resistors disconnected. High-voltage circuits are highly dangerous, especially so, where a capacitor is involved. The recommendation to wear thick rubber gloves for this kind of work, is not intended to be humorous. Circuits of this type are liable to generate unexpected high-voltage spikes, and so, it might be a good idea to connect a varistor across the meter to protect it from those spikes. The varistor need to be set to the voltage which you intend to measure and as varistors may not be available above a 300V threshold, two or more may need to be connected in series where just one is shown in the diagram above. The varistor should not have a higher voltage rating than your meter.

2. We now need to use this high voltage to create a strategically positioned spark to a ground connection. When making an earth connection, it is sometimes suggested that connecting to water pipes or radiators is a good idea as they have long lengths of metal piping running under the ground and making excellent contact with it. However, it has become very common for metal piping to be replaced with cheaper plastic piping and so any proposed pipe connection needs a check to ensure that that there is metal piping which runs all the way into the ground.
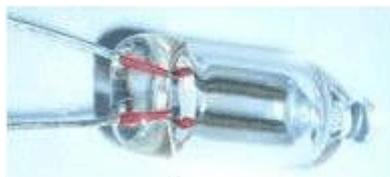
Neon   Gas-Discharge Tube

The spark gaps shown can be commercial high-voltage gas discharge tubes, adjustable home-made spark gaps with stainless steel tips about 1 mm apart, car spark plugs, or standard neon bulbs, although these run rather hot in this application. A 15 mm x 6 mm size neon bulb operates with only 90 or 100 volts across it, it would take a considerable number of them connected in series to create a high voltage spark gap, but it is probably a misconception that the spark gap itself needs a high voltage. Later on in this chapter, there is an example of a very successful system where just one neon bulb is used for the spark gap and an oscillating magnetic field more than a meter wide is created when driven by just an old 2,500 volt neon-sign transformer module. If using a neon bulb for the spark gap, then an experienced developer recommends that a 22K resistor is used in series with the neon in order to extend it's working life very considerably.

This circuit is one way to connect the spark gap and ground connection:
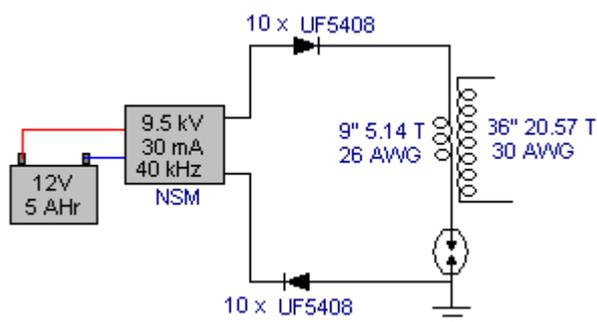
This is an adaption of a circuit arrangement used by the forum member "SLOW-'N-EASY" on the Don Smith topic in the energeticforum. Here, he is using a 'LowGlow' neon transformer intended for use on a bicycle. The diodes are there to protect the high-voltage power supply from any unexpected voltage spikes created later on in the circuit. The spark gap is connected between the primary winding of a step-up transformer and the earth connection. No capacitor is used. Seeing this circuit, we immediately think of Don Smith's large and expensive coils, but this experimenter does not use anything like that. Instead, he winds his transformer on a simple plastic former like this:
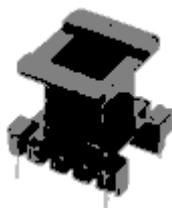
Ho Sung International. EI-2820 nylon bobbin.
Core is 10 mm x 13 mm x 10 mm high. Top
is 18.5 mm x 21.5 mm. Base is 22 mm x 26
mm. Four leads, 15 mm and 20 mm spacing

And to make matters 'worse' the primary winding wire is just 9 inches (228.6 mm) long and the secondary just 36 inches (914.4 mm) long, the primary being wound directly on top of the secondary. Not exactly a large or expensive construction and yet one which appears to perform adequately in actual tests.

This is a very compact form of construction, but there is no necessity to use exactly the same former for coils, nor is there anything magic about the nine-inch length of the L1 coil, as it could easily be any convenient length, say two feet or 0.5 metres, or whatever. The important thing is to make the

L2 wire length exactly four times that length, cutting the lengths accurately. It is common practice to match the weight of copper in each coil and so the shorter wire is usually twice the diameter of the longer wire.

The circuit above, produces a cold electricity output of high voltage and high frequency. The voltage will not be the same as the neon transformer voltage, nor is the frequency the same either. The two coils resonate at their own natural frequency, unaltered by any capacitors.

3. The next step is to get the high voltage down to a more convenient level, perhaps, like this:
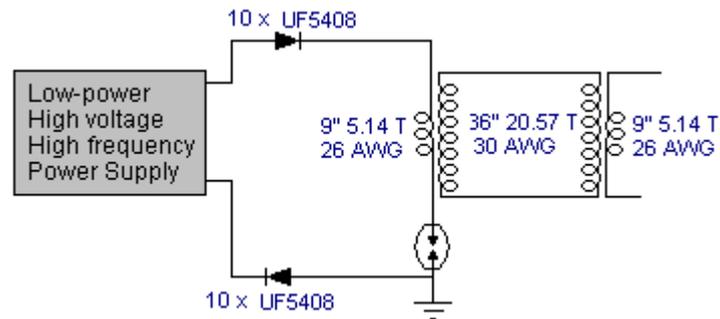
Here, an identical transformer, wound in exactly the same way, is used in reverse, to start the voltage lowering sequence. The wire length ratio is maintained to keep the transformer windings resonant with each other.

Supposing we were to wind the L2 coil of this second transformer in a single straight winding and instead of winding just one L1 winding on top of it, two or more L1 identical windings were placed on top of it – what would happen?:
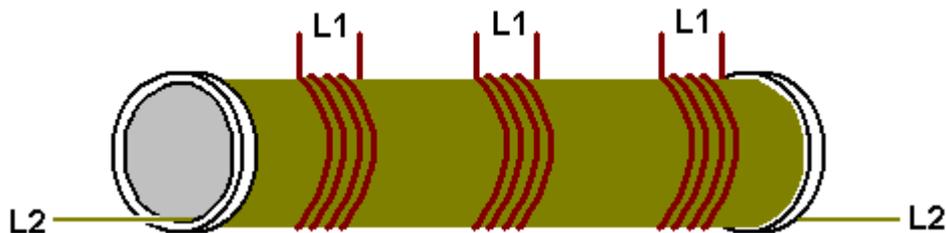
Now for a comment which will seem heretical to people steeped in the present day (inadequate) level of technology. The power flowing in these transformers is cold electricity which operates in an entirely different way to hot electricity. The coupling between these coils would be inductive if they were carrying hot electricity and in that case, any additional power take-off from additional L1 coils would have to be 'paid' for by additional current draw through the L2 coil. However, with the cold electricity which these coils are actually carrying, the coupling between the coils is magnetic and not inductive and that results in no increase in L2 current, no matter how many L1 coil take-offs there are. Any additional L1 coils will be powered for free. However, the position of the coils relative to each other has an effect on the tuning, so the L1 coil should be in the middle of the L2 coil, which means that any additional L1 coils are going to be slightly off the optimum tuning point.

4. Anyway, following through on just one L1 coil, there is likely to be at least one further step-down transformer needed and eventually, we need conversion to hot electricity:
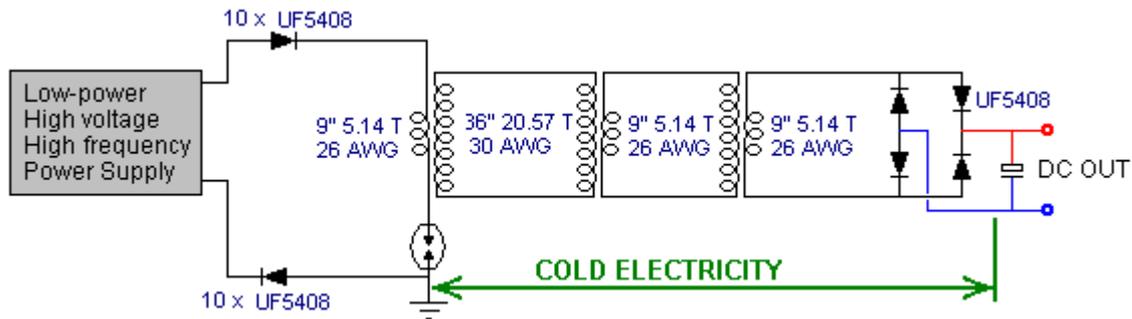
Probably the easiest conversion is by feeding the energy into a capacitor and making it standard DC. The frequency is still very high, so high-speed diodes (such as the 75-nanosecond UF54008) are needed here although the voltage level is now low enough to be no problem. The DC output can be used to power an inverter so that standard mains equipment can be used. It is not necessary to use just one (expensive) large-capacity inverter to power all possible loads as it is cheaper to have several smaller inverters, each powering it's own set of equipment. Most equipment will run satisfactorily on square-wave inverters and that includes a mains unit for powering the input oscillator circuit.

PVC pipe is not a great material when using high-frequency high-voltage signals, and grey PVC pipe is a particularly poor coil former material. The much more expensive acrylic pipe is excellent, but if using PVC, then performance will be better if the PVC pipe is coated with an insulating lacquer (or table tennis balls dissolved in acetone as show on YouTube).

However, there are some other factors which have not been mentioned. For example, if the L1 coil is wound directly on top of the L2 coil, it will have roughly the same diameter and so, the wire being four times longer, will have roughly four times as many turns, giving a step-up or step-down ratio of around 4:1. If, on the other hand, the coil diameters were different, the ratio would be different as the wire lengths are fixed relative to each other. If the L2 coil were half the diameter of the L1 coil, then the turns ratio would be about 8:1 and at one third diameter, 12:1 and at a quarter diameter 16:1 which means that a much greater effect could be had from the same wire length by reducing the L2 coil diameter. However, the magnetic effect produced by a coil is linked to the cross-sectional area of the coil and so a small diameter is not necessarily at great advantage. Also, the length of the L1 coil wire and number of turns in it, affect the DC resistance, and more importantly, the AC impedance which affects the amount of power needed to pulse the coil.

It is also thought that having the same weight of copper in each winding gives an improved performance, but what is not often mentioned is the opinion that the greater the weight of copper, the greater the effect. You will recall that Joseph Newman (chapter 11) uses large amounts of copper wire to produce remarkable effects. So, while 9 inches and 36 inches of wire will work for L1 and L2, there may well be improved performance from longer lengths of wire and/or thicker wires.

We should also not forget that Don Smith pointed out that voltage and current act (out of phase and) in opposite directions along the L2 coil, moving away from the L1 coil:
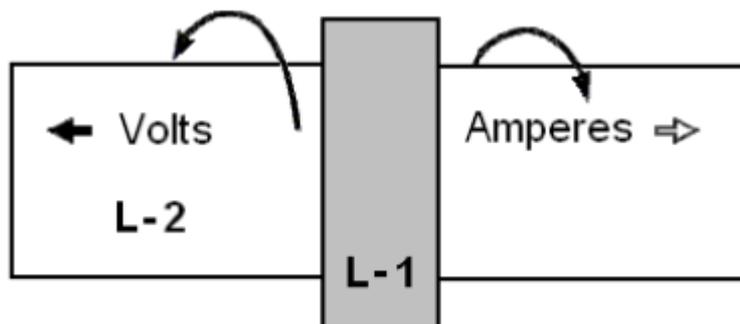
It has been suggested that a greater and more effective power output can be obtained by splitting the L2 coil underneath the L1 coil position, winding the second part of L2 in the opposite direction and

grounding the junction of the two L2 windings. Don doesn't consider it necessary to reverse the direction of winding. The result is an L2 winding which is twice as long as before and arranged like this:
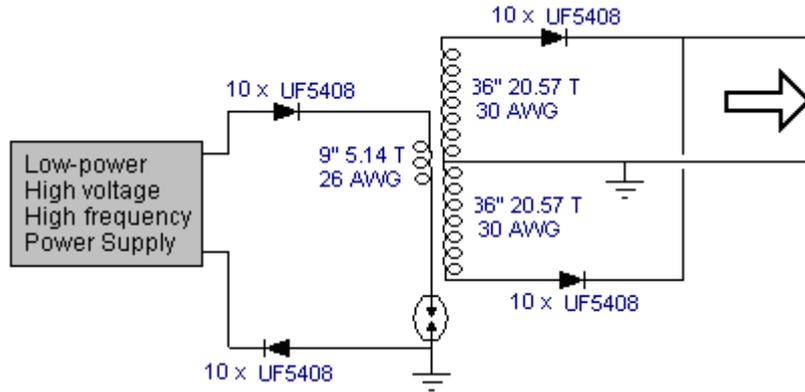
Here, the additional high-voltage diodes allow the two out of phase windings to be connected across each other.

You will notice that this arrangement calls for two separate earth connections, both of which need to be high-quality connections, something like a pipe or rod driven deeply into moist soil or alternatively, a metal plate or similar metal object of substantial surface area, buried deep in moist earth, and a thick copper wire or copper braid used to make the connection. These earthing points need to be fairly far apart, say, ten metres. A single earth connection can't be used as that would effectively short-circuit across the L1/L2 transformer which you really do not want to do.

With this arrangement, the outline circuit becomes:
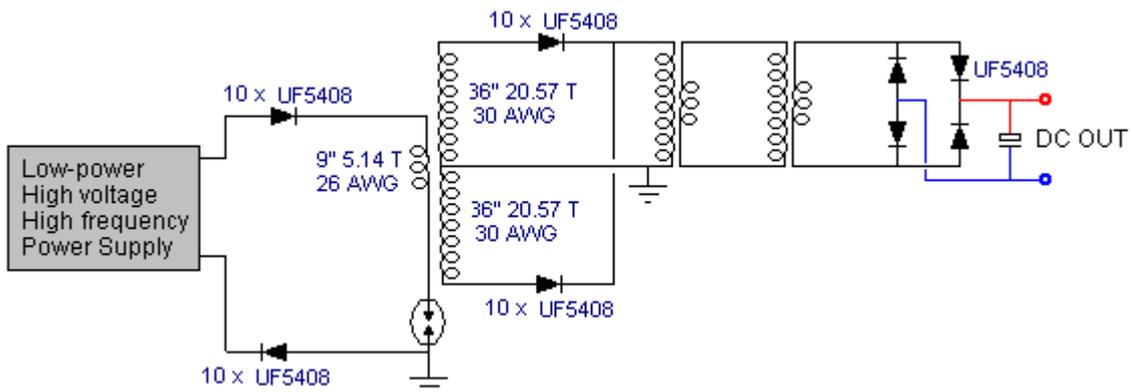
The thick earth wiring is helpful because in order to avoid the earth wire being included in the resonant wire length, you need a sudden change in wire cross-section:
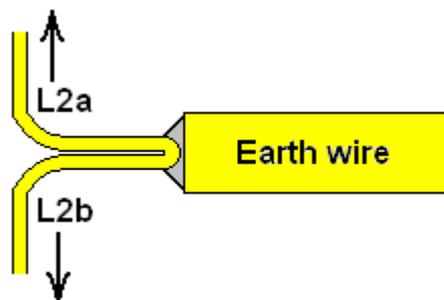
These are just some ideas which might be considered by some experienced developer who may be thinking of investigating Don Smith style circuitry.

To give you some idea of the capacity of some commercially available wires when carrying hot electricity, this table may help:

AWG	SWG	Diameter	Maximum Amps	220V kW	110V kW
1	2	7.01 mm	119	26.18	13.09
3	4	5.89 mm	75	16.50	8.25
4	6	4.88 mm	60	13.20	6.60
6	8	4.06 mm	37	8.14	4.07
8	10	3.25 mm	24	5.28	2.64
10	12	2.64 mm	15	3.30	1.65
12	14	2.03 mm	9.3	2.05	1.02
13	15	1.83 mm	7.4	1.63	801 watts
14	16	1.63 mm	5.9	1.30	650 watts
15	17	1.42 mm	4.7	1.03	515 watts
16	18	1.22 mm	3.7	814 watts	407 watts

It is recommended that the wire have a current carrying capacity of 20% more than the expected actual load, so that it does not get very hot when in use. The wire diameters do not include the insulation, although for solid enamelled copper wire, that can be ignored.

There is a most impressive video and circuit shown at http://youtu.be/Q3vr6qmOwLw where a very simple arrangement produces an immediately successful performance for the front end of Don's circuitry. The circuit appears to be:
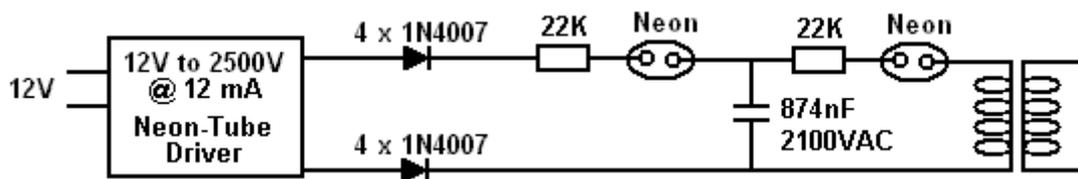
Here, a simple Neon Sign Transformer module which has no earth connection, is used to produce a 2.5 kV voltage with a frequency of 25 kHz and a maximum output current capacity of 12 mA. There is no difficulty in constructing the equivalent to that power supply unit. The two outputs from the module are converted to DC by a chain of four 1N4007 diodes in series in each of the two outputs (each chain being inside a plastic tube for insulation).

This output is fed through an optional 22K resistor via a neon lamp to a microwave oven capacitor which happens to be 874 nF with a voltage rating of 2,100 volts. You might feel that the voltage rating of the capacitor is too low for the output voltage of the neon sign module, but the neon has a striking voltage of just 90 volts and so the capacitor is not going to reach the output voltage of the power supply. The resistors are solely to extend the life of the neons as the gas inside the tube gets a considerable jolt in the first nanosecond after switch-on. It is unlikely that omitting those resistors would have any significant effect, but then, including them is a trivial matter. The second neon feeds the primary of the resonant transformer which is only shown in notional outline in the diagram above as the developer suggests that the primary acts as a transmitter and that any number of receiving coils can be used as individual secondaries by being tuned to the exact frequency of that resonating primary.

In the video showing this arrangement, the developer demonstrates the fluctuating, high-frequency field which extends for some four feet (1.2 m) around the coil. He also remarks that the single neons in his arrangement could each be replaced with two neons in series. In test which I ran, I found that I needed two neons in series ahead of the capacitor in order to get continuous lighting of the output neon. Also,

one of the diodes needed to be reversed so that one faced towards the input and one away from it. It did not matter which diode was reversed as both configurations worked.   Again, please note that this presentation is for information purposes only and it is **NOT** a recommendation that you should actually build one of these devices. Let me stress again that this is a high-voltage device made even more dangerous by the inclusion of a capacitor, and it is quite capable of killing you, so, don't build one.   The developer suggests that it is an implementation of the "transmitter" section of Don's Transmitter/multiple-receivers design shown below. However, before looking at that design, there is one question which causes a good deal of discussion on the forums, namely, if the centre-tap of the L2 secondary coil is connected to ground, then should that earth-connection wire length be considered to be part of the quarter length of the L1 coil? To examine this possibility in depth, the following quote from Richard Quick's very clear explanation of resonance in his US patent 7,973,296 of 5th July 2011 is very helpful.

However, the simple answer is that for there to be exact resonance between two lengths of wire (whether or not part, or all of those lengths of wire happen to be wound into a coil), then one length needs to be **exactly** four times as long as the other, and ideally, half the diameter as well. At both ends of both lengths of wire, there needs to be a sudden change in wire diameter and Richard explains why this is. But, leaving that detailed explanation for now, we can use that knowledge to explain the above simplified system in more detail. Here is the circuit again:
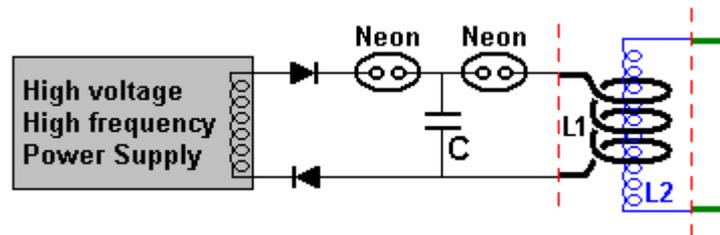
One very important point to note is that no earth connection is required and in spite of that, the performance shown on video is very impressive. While an earth connection can feed substantial power into the circuit, not needing one for the front end is an enormous advantage and potentially, opens the way for a truly portable device. Another very important point is the utter simplicity of the arrangement where only cheap, readily available components are used (and not many of those are needed). The resistors for extending the life of the neon bulbs are not shown, but they can be included if desired and the circuit operation is not altered significantly by having them there. If a higher spark voltage is wanted, then two or more neon bulbs can be used in series where these circuit diagrams show just one.

A point to note is that the lower diode is shown reversed when compared to the previous diagram. This is because the power supply shown is any generic power supply which drives a simple output coil which does not have a centre tap. The neon supply of the earlier diagram appears to have two separate outputs which will, presumably, be out of phase with each other as that is common practice for neon-sign driver modules. If you wish, the two diodes shown here could be replaced by a diode bridge of four high-voltage, high-speed diodes.

The wire lengths of L1 and L2 are measured very accurately from where the wire diameter changes suddenly, as indicated by the red dashed lines. The L2 wire length is exactly four times as long as the L1 wire length and the L2 wire diameter is half of the L1 wire diameter.

How long is the L1 wire? Well, how long would you like it to be? It can be whatever length you want and the radius of the L1 coil can be whatever you want it to be. The theory experts will say that the L1 coil should resonate at the frequency of the power feeding it. Well, good for them, I say, so please tell me what frequency that is. It is not going to be the frequency of the power supply as that will be changed by at least one of the neon bulbs. So, what frequency will the neon bulb produce? Not even the manufacturer could tell you that as there is quite a variation between individual bulbs which are supposedly identical.

Actually, it doesn't matter at all, because the L1 coil (and the L2 coil if you measure them accurately) has a resonant frequency all of its own and it will vibrate at that frequency no matter what the frequency feeding it happens to be. A coil resonates in very much the same way that a bell rings when it is struck.

It doesn't matter how hard you strike the bell or how rapidly you strike it – the bell will ring at it's own natural frequency. So the L1 coil will resonate at it's own natural frequency no matter what rate the voltage spikes striking it arrive, and as the L2 coil has been carefully constructed to have exactly that same frequency, it will resonate in synchronisation with the L1 coil.

This means that the length of the wire for the L1 coil is the choice of the builder, but once that length is chosen it determines the length of the wire for the L2 coil as that is exactly four times as long, unless the builder decides to use an arrangement which has L2 wound in both the Clockwise and counter-clockwise directions, in which case, each half of the L2 coil will be four times the length of the wire in the L1 coil, like this:
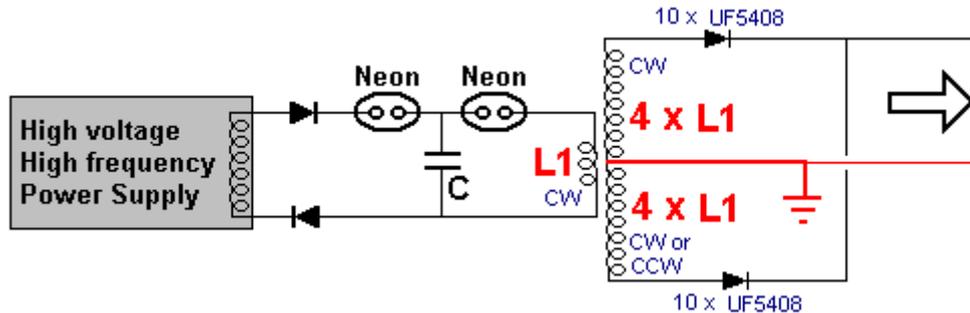
Mind you, there is one other factor to be considered when deciding what the most convenient wire length for L1 might be, and that is the number of turns in the L1 coil. The larger the ratio between the turns in L1 and the turns in L2, the higher the voltage boost produced by the L1/L2 transformer, and remember that the length of L2 is fixed relative to the length of L1.

So, a possible circuit style might be:
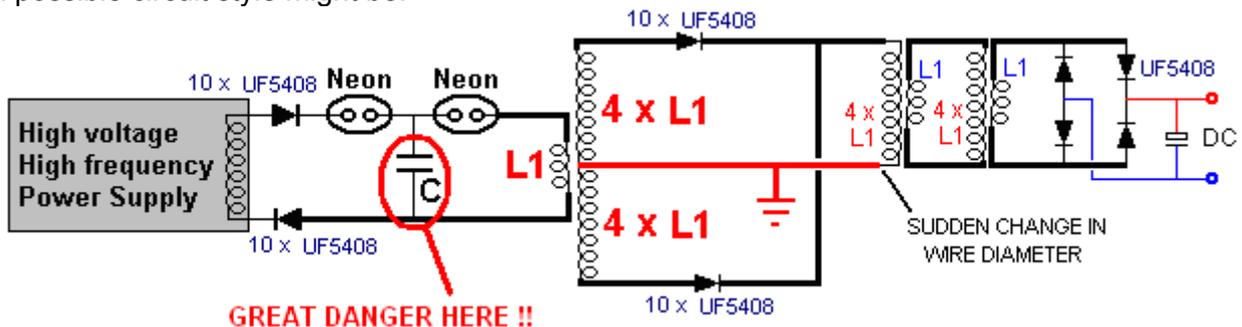
There are some important points to remember. One is that there must be a sudden change of wire diameter at both ends of each L1 coil and at the ends of each L2 coil. If there isn't, then the connecting wire length will form part of the coil and if there is some change in diameter but not very much, then it is anybody's guess what the resonant wire length for that coil will be. There can be as many step-down isolation air-core L1/L2 transformers as desired and these do not need to be particularly large or expensive.

The builder of this circuit put it together in just a few minutes, using components which were to hand, including the microwave oven capacitor marked "C" in the diagrams above. That capacitor is isolated on both sides by the neon bulb spark gaps and so it will have no modifying effect on the resonant frequency of any of the coils in this circuit. But it is vital to understand that the energy stored in that capacitor can, and will, kill you instantly if you were to touch it, so let me stress once again that this information is **NOT** a recommendation that you actually build this circuit. The DC output from the circuit is intended to power a standard inverter, which in turn, would be perfectly capable of powering the high voltage, high frequency input oscillator.

One final point is that as demonstrated in the video, the oscillating magnetic field produced by the L1 coil can power several identical L2 coils, giving several additional power outputs for no increase in input power, because the coupling is magnetic and not inductive as mentioned earlier in this chapter. Please notice that neither the L1 coil nor the L2 coil has a capacitor connected across it, so resonance is due

solely to wire length and no expensive high-voltage capacitors are needed to get every L1/L2 coil pair resonating together. One possible arrangement might be like this:
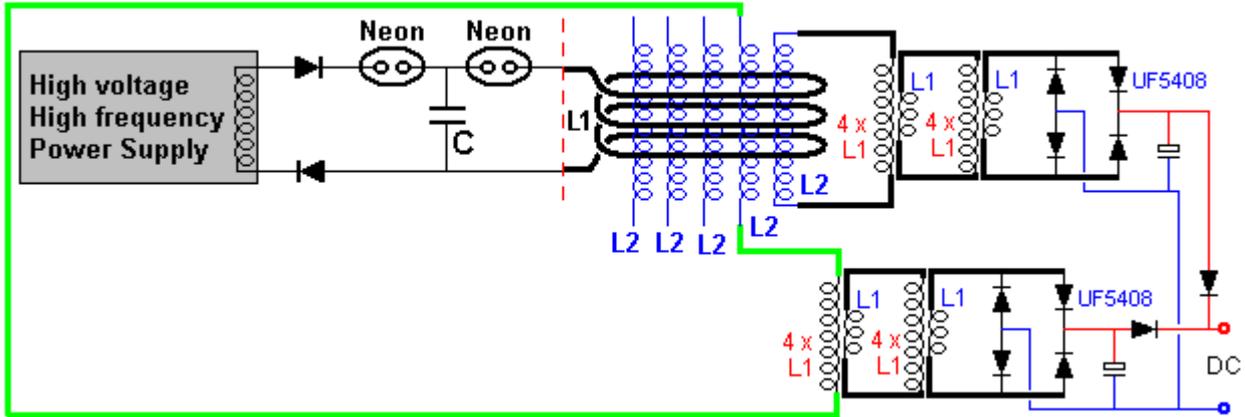
Where two of the L2 coils are shown connected together to give increased output power. This arrangement uses low-voltage inexpensive components for the output stages and there is no obvious limit to the amount of output power which could be provided. As the circuit operates at high frequency throughout, there is no particular need for additional L2 coils to be placed physically inside the L1 coil:
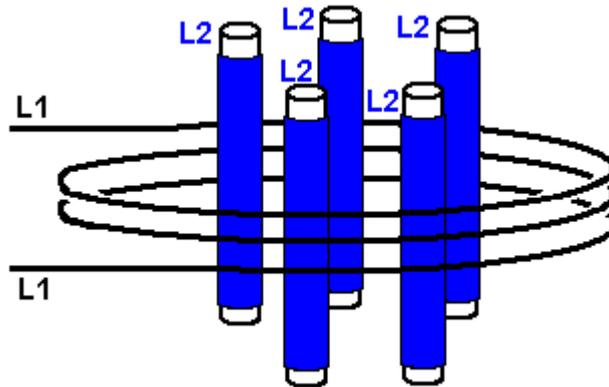
However, there can be an advantage to this arrangement in that the wire length of the L1 coil is greater, which in turn makes the wire length of each L2 coil greater (being four times longer). This gives greater flexibility when planning the turns ratio of the L1/L2 transformer. The voltage step-up or step-down of that transformer happens to be in the ratio of the turns, in spite of the fact that this is not inductive coupling and so standard transformer technology does not apply.

When you choose the number of turns and coil diameter for L1, that also gives the length of the L2 wire. In order to get the desired output voltage, if perhaps, the step-down ratio is needed to be an amount of 46:1, then you need 46 times the number of L1 turns on the L2 coil. That means that you know both the wire length and number of turns wanted in the L2 coil. But, as each turn will have a length of 3.14159 times the diameter, it follows then that the wanted diameter is the wire length per turn, divided by 3.14159. The wire sits on top of the tube on which it is wound and so has a greater diameter by one wire thickness, so the calculated tube diameter needs to be reduced by one wire diameter. For example, if the length per turn is 162 mm and the wire diameter 0.8 mm, then the tube diameter would be 162 / 3.14159 – 0.8 which is 50.766 mm (just over two inches).

Now for Richard's explanation of the resonant frequency of any length of wire:

"Quarter-Wave" Resonance; Standing Electromagnetic Waves"
One of the two main types is electrical resonance is referred to here as quarter-wave resonance. This type of resonance depends almost entirely on the length of a wire element For reasons described below, if a segment or length of wire is one quarter as long as the "voltage waves" which are travelling through the wire, then a set of

"reflected" waves will be added to the emitted waves, in a synchronised alignment which creates stronger "superimposed waves".

Accordingly, an understanding of the "quarter-wave" phenomenon will help a reader understand how a straightforward and easily-controlled factor (i.e., the length of a wire ribbon which will be used to form a spiral coil) can help create a "quarter-wave" resonant response, which will create the types of electromagnetic pulses and fields referred to as "standing waves".

The speed at which a voltage impulse is transmitted through a metal wire is extremely fast. It is essentially the same as the speed of light, which travels 300 million meters (186,000 miles) in a single second (that distance would circle the earth more than 7 times).

If wavelength (in meters) is multiplied by frequency (cycles per second), the result will be the speed of light, 300 million meters/second. Therefore, the wavelength of an "alternating current" (AC) voltage, at some particular frequency, will be the speed of light, divided by which frequency.

Therefore, using simple division, if an alternating voltage operates at a frequency of 1 megahertz (MHz), which is a million cycles per second, then the "wavelength" at that frequency will be 300 meters. If the frequency halves become 500 kilohertz, the wavelength becomes twice as long (600 meters); and, if the frequency were to increase to 2 megahertz, the wavelength drops to 150 meters.

It should be noted which the term "cycles" is what scientists call "a dimensionless unit", which drops out and becomes silent when other physical terms are multiplied or divided.

At AC frequencies of 10 kilohertz or greater, the common references to "alternating current" (AC) voltage begin using a different term, which is "radio-frequency" (RF) voltage. Accordingly, RF voltage is a form (or subset) of AC voltage, which operates at frequencies higher than 10 kilohertz. RF power generators are readily available, and are sold by numerous companies which can be easily located by an Internet search, using the term "RF power generator". For example, Hotek Technologies Inc. (hotektech.com) sells two RF power generators, called the AG 1024 and AG 1012 models, which can provide output power at frequencies ranging from 20 kHz to 1 MHz; the 1012 model has a power output of 1000 watts, while the 1024 model has a power output of 2000 watts. The output frequency of any such RF power supply can be adjusted and "tuned" across the entire range of operating frequencies, merely by turning knobs or manipulating other controls in a power supply of this type.

In a wire having a fixed and unchanging length, the easiest way to create a "standing wave" is to adjust the RF frequency emitted by a power supply with an adjustable frequency, until the "tuned" frequency creates a wavelength which is 4 times as long as the wire. This principle is well-known to physicists, and it is commonly referred to as "quarter-wave" behaviour, since the length of the wire segment must be one quarter as long as the wavelength. Since it is important to this invention, the principles behind it are illustrated in a series of drawings provided in **Fig.1** to **Fig.4**, all of which are well-known prior art.

Fig. 1

Fig. 1A Emitted waves

Fig. 1B Reflected waves

"Peak nodes"   "Null nodes"

Fig. 1C Superimposed "standing waves" (height/intensity/strength will be additive)
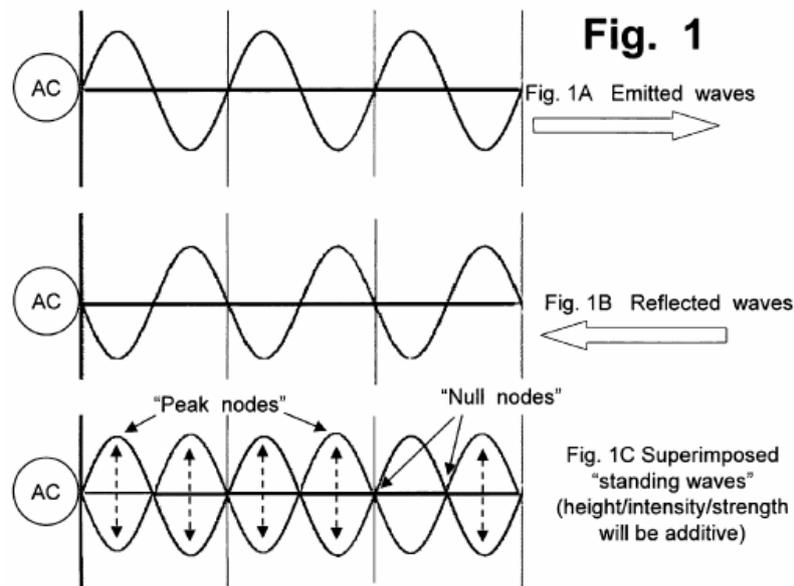
Fig.1A indicates an idealized wavelength of an alternating voltage, depicted by a sine wave which is being sent from an AC power supply (shown by a circle at the left end of a horizontal straight wire) into the "input" end of the wire. The voltage waves travel through the wire towards the right, as indicated by the block arrow in **Fig.1A**. When the waves reach the end of the wire, they cannot leave the wire (at least, not in a simplified and "ideal"

system, which is being assumed and used here to explain the principle of how a simple straight wire can create a standing wave). Therefore, the voltage wave will effectively "bounce" or "reflect" back from the tip of the wire, and the "reflected wave" will begin travelling back through the wire, going in the opposite direction, as indicated by the left-pointing block arrow in **Fig.1B**.

Because of the laws of conservation of energy, the reflection and "return travel" of these types of waves, when they bounce off the tip of a wire, is actually quite good, and rather efficient, as discussed below, provided which the wire tip does not emit sparks, arc discharges, or other forms of "escaping" electrical energy.

Accordingly, **Fig.1A** depicts a set of "emitted waves" travelling towards the right, while **Fig.1B** depicts an idealised set of "reflected waves" travelling toward the left along the same wire.

Fig.1C illustrates what happens when both sets of waves (emitted and reflected) are superimposed on each other. Since the two sets of waves are travelling at exactly the same speed, and since they have exactly the same wavelength, they will create a "standing wave" pattern when they are added together. As can be visualised from **Fig.1C**, there will be a set of locations, along the length of the wire, which can be referred to as "peak nodes", where the AC voltage reaches it's maximum.

At a location halfway between a pair of adjacent "peak nodes", there will be a spot which can be called a "null node", a "zero node", a trough or valley node, or similar terms. At each "null node" location, the AC voltage will appear to be not fluctuating at all. Those are the sites, along the length of the wire, where each "positive" hump (created by a sine wave travelling toward the right) will be counter-balanced and offset by a "negative hump" with exactly the same height, travelling at an identical speed toward the left.

As a result, this type of response within a wire creates a "standing wave". If the instantaneous voltage is measured at a "null node", it would appear that nothing is happening, in terms of fluctuating voltage. Furthermore, the "null node" will not be moving, along the length of the wire; instead, it will appear to be standing still.

This can be demonstrated, in a coil, by using a "grounded lead" to test for voltages along the length of a coil. If a "grounded lead" coupled to a volt meter is used to touch the surfaces of a series of strands in a non-insulated coil (such as a coil made of thin copper tubing, wrapped around a plastic cylindrical shape, as used in the types of large transformers used by hobbyists to create "Tesla coils" which will emit large and visually impressive electrical arcs), the "test lead" will detect no apparent voltage at a null node, which will occur at some particular strand in the coil. At a different strand of the coil, the "test lead" will detect an alternating voltage which has twice the strength and intensity of the voltage being emitted by the power supply.

If voltage is measured at a "peak node", the voltage will be doing something which can be called, using vernacular or laymen's terms, "the full-tilt boogie". The AC voltage levels will be moving back and forth, between: (i) a very high and intense positive voltage, to (ii) an equally intense negative voltage. This is indicated by the "bubble" shapes shown along the wire in **Fig.1C**.

The "bubbles" which are shown in **Fig.1C** can help someone understand how standing waves are created, and how they act in a synchronised manner. However, which drawing fails to show another result which is very important in what actually happens in a standing wave. For purposes of description and analysis at this introductory level, the system can be assumed to be "ideal", which implies a perfect "mirror-image" reflection of each wave from the right end of the wire. An "ideal" system also implies that no reflections occur at the left hand end of the wire where the power supply is located, and all "reflected" wave activity simply ceases. In real circuits and wires of this type, second and third order reflections do in fact occur, and they are used to further increase the strength and power output of these types of systems; however, those additional factors and "harmonics" should be ignored until after the basic principles of this type of system have been grasped and understood.

In an ideal system, when the reflected waves (which are travelling toward the left, in the wire segments illustrated in **Fig.1**) are "superimposed" on the emitted waves (travelling toward the right), the "peak" positive voltage which will be instantaneously reached, at the highest point of each "bubble" shown in **Fig.1C**, will occur when the positive peak of an emitted wave crosses a mirror-image positive peak of a reflected wave, travelling in the opposite direction. Accordingly, when those two "positive peak" values are added to each other, the instantaneous positive peak voltage which will occur, in the wire, will actually be twice as intense as the "positive peak" voltage being emitted by the AC power supply.

An instant later, at that exact point on that segment of wire, a negative peak voltage will be created, which will be the sum of (i) the negative peak voltage emitted by the power supply, and (ii) the negative peak voltage of a reflected wave also will pass through, travelling toward the left. At which instant, when those two negative peak

voltages are added to each other, the instantaneous negative voltage which will occur, in the wire, will be twice as intense as the "negative peak" voltage being generated by the AC power supply.

A more accurate and representative visual depiction of a "standing wave" in a wire would actually show the heights of the peaks as being twice as tall as the peaks of the emitted voltage waves, and the reflected voltage waves. However, which depiction might confuse people, so it usually is not shown in drawings of "standing waves".

Accordingly, the instantaneous response in the wire, at a location halfway between two "null nodes", is doing something which can fairly and properly be called "the full-tilt double double boogie". The "double double" phrase (note which it contains not just one but two "doubles") was added to that phrase, for two reasons:

(i) To emphasise the fact that each and every voltage peak (maximum positive, and maximum negative) will be twice as strong, and twice as intense, as the maximum positive and negative peak voltages emitted by the power supply; and,

(ii) to point out that the frequency of the superimposed "bubbles", shown in **Fig.1C**, is actually twice as fast as the frequency of the AC cycle which is emitted by the power supply, as discussed below.

The "twice the intensity" result is directly comparable to what an observer will see, if a large mirror is placed behind a light bulb in an otherwise dark room. The mirror effectively keeps the room dark, everywhere behind the mirror, so there is no "magical doubling" of the light in the room; which would violate the basic law of conservation of energy. Instead, what the mirror does is to shift light away from the backside of the mirror, and keep that light energy on the reflective side of the mirror. Anyone standing in front of the mirror will see two apparent light bulbs. Both of those light bulbs (the original bulb, and the reflected image) will have the same brightness (if the mirror is perfect). Therefore, the mirror will double the intensity of the light energy reaching the observer.

That same effect, in a circuit, will happen if the end of a wire acts like a mirror. If a wire does not have any components which will cause it to become an active "emission source" (which is the behaviour of transmission antennas and certain other components), in a way which efficiently releases voltage-created energy into the atmosphere, then the basic rules which require conservation of energy will prevent that energy from simply disappearing and ceasing to exist. As a result, even if the end of a wire is not designed to be a perfect reflector, a large portion of the voltage wave will indeed reflect off the wire tip, and travel back through the same wire, in a "second pass".

To understand adequately, the type and amount of "wave reflection" which occurs at a wire tip, consider what happens if a light bulb is shining in a room which has shiny, glossy white paint on all the walls and ceilings; then, consider how it would look if the same light bulb were located in a room with all of the walls and ceilings painted "matt black". The total amount of light which would be available, to carry out a task such as reading a newspaper, clearly would be much greater in the white room, because light reflects off white paint, even though white paint does not even begin to approach the type of "reflection quality or clarity" which a mirror creates. The difference in what happens, when light intensity in a room painted matt black is compared to a room painted a glossy white, does not arise from the presence or absence of "reflection quality or clarity"; instead, it is governed by the laws of conservation of energy. When light shines on to a surface which is painted matt black, the light energy is absorbed by the paint, and it literally warms the paint up. In contrast to that, glossy white paint will not absorb light energy, so it reflects the light back out, for a "second pass" through the air which fills a room.

Because of the laws of conservation of energy, and without depending on any "quality of reflectance" characteristic of wire tips, electrical energy cannot simply disappear, when it reaches the end of a wire. Instead, there are only two things which can happen to that energy:

(i) the electrical energy can be emitted into the surroundings, such as by emitting sparks, arcs, or radio-frequency signals which will carry energy; or

(ii) if the energy is not emitted by the tip of the wire, then, by simple necessity and because of the basic law of conservation of energy, it must be reflected back into the wire, and it will be forced to travel back through the wire again.

If a wire has a long and tapered tip, then the reflected wave might become somewhat diffused, and it might lose some portion of the "clarity" of the wave. However, since wavelengths in the frequencies of interest here are hundreds of meters long, the type of tip created by a conventional wire cutter will not create any significant diffusion, in a reflected wave. And, unlike the white-painted walls of a room, there is not a large area which is available, at the tip of a wire, which can create scatter, spread, or diffusion. As a result, the tip of a wire will be a relatively efficient mirror-type reflector, when an AC voltage is "pumped" into one end of the wire.

The second factor mentioned above, when the "double-double" boogie phrase was mentioned, relates to a doubling of the frequency of a standing wave. When a standing wave is created in a wire by reflection of an emitted AC voltage wave, the frequency of the standing wave is, quite literally, double the frequency of the emitted wave.

This can be seen, visually, by noting that in the emitted AC voltage, shown in **Fig.1A**, a single complete wavelength contains both a "positive hump" and a "negative hump". Accordingly, three complete sine waves, divided into three segments by the imaginary vertical lines, are shown in **Fig.1A**.

By contrast, each and every "bubble" shown in **Fig.1C** depicts a complete and total "wavelength", in a standing wave. Six of those standing wave "bubbles" fit into exactly the same length of wire which holds only 3 emitted wavelengths from the power supply.

The "frequency doubling" effect of standing waves is important, because AC systems can convey and release energy in a manner which increases, as the frequency of the AC voltage supply increases. To some extent, this is analogous to saying that, if a motor can be run at twice the speed (while still generating the same torque), then the work output of that motor can be twice as great, at the higher speed. That analogy is not entirely accurate, since work output from an electric device which uses AC power depends on "area of the curve" functions which occur when sine waves are involved. Nevertheless, as a general principle, if the frequency of the voltage peaks increases, then power output will also increase, in many types of electric circuit components.

In the three panels of **Fig.1**, the wire length is three times as long as the wavelength of the voltage from the power supply. However, to create standing waves, a wire length does not need to be any particular multiple of the wavelength of an AC voltage. As can be seen by considering **Fig.1C**, the same types of "bubbles" would be created: (i) if the wire length were exactly twice as long as the wavelength; or, (ii) if the wire length were the same length as the wavelength.

Fig. 2A Emitted waves

Fig. 2

Wire length = single wavelength

Fig. 2B Reflected waves

Peak nodes

Fig. 2C Superimposed waves create standing waves

Null nodes
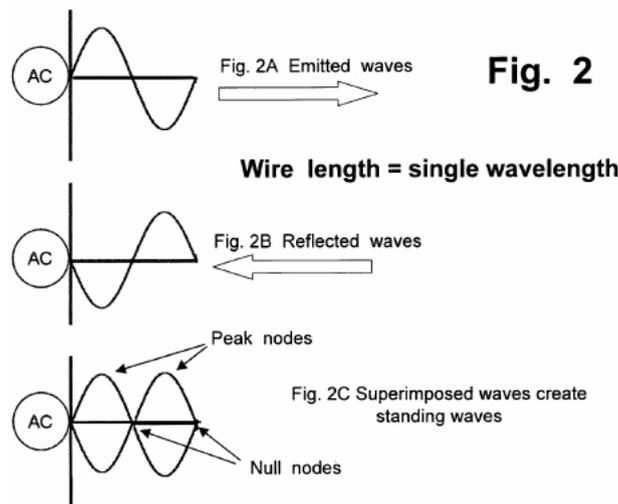
Accordingly, **Fig.2** (which includes **Fig.2A** showing an emitted wave, **Fig.2B** showing a reflected wave, and **Fig.2C** showing the superimposed "bubbles") shows what happens in a wire segment which has a length which is equal to a single wavelength from an AC voltage at a fixed frequency. A resonant standing wave will be formed, with a frequency which is double the frequency of the input AC voltage. which same result will apply, in a wire having any length which is an exact (integer) multiple (such as 1x, 2x, 3x, etc.) of the wavelength of the AC voltage being pushed (or forced, driven, pumped, etc.) into the wire segment.

Fig. 3A Emitted waves

Fig. 3

Wire Length = ½ Wavelength

Fig. 3B Reflected waves

Peak node

Fig. 3C Superimposed standing waves

Null nodes
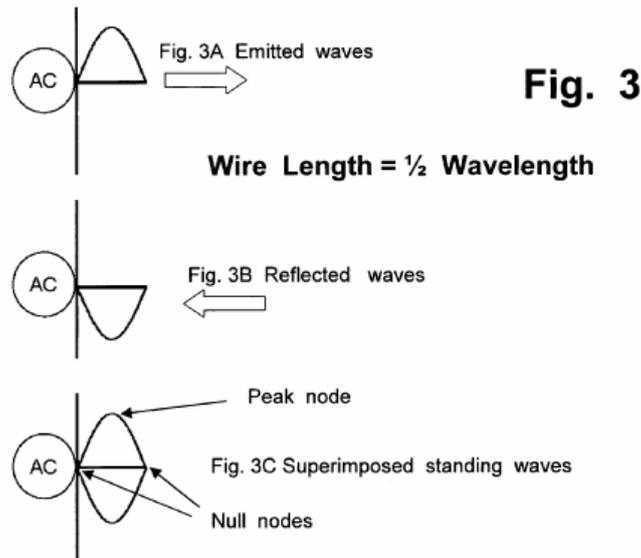
Moving to still shorter wires, the same principle also applies to any wire with a length equal to one half of an AC voltage wavelength. As shown in **Fig.3** (which includes **Fig. 3A** showing an emitted wave, **Fig. 3B** showing a reflected wave, and **Fig. 3C** showing the superimposed "bubbles"), if the wire length is one half of the wavelength, a natural and resonant standing wave will still form, with a frequency which is double the frequency of the input AC voltage.

Fig. 4A Emitted waves

Fig. 4

Smallest wire length that can create ***stable and natural*** standing waves is ¼ wavelength

Fig. 4B Reflected waves

Peak node

Fig. 4C Superimposed standing waves

Null node
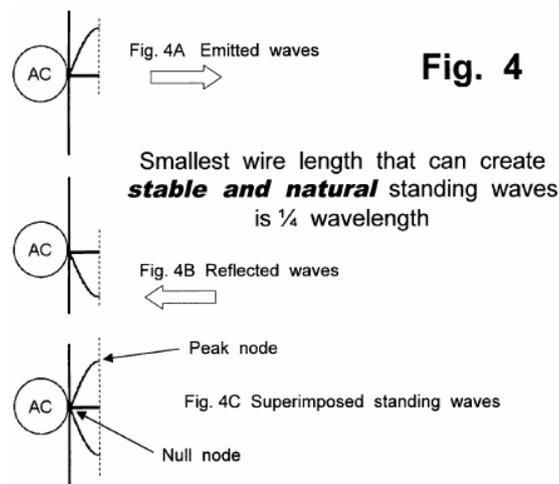
Finally, moving to a still shorter wire, the same principle also applies to any wire which has a length equal to one quarter of an AC voltage wavelength, as shown in **Fig.4A**, **Fig.4B**, and **Fig.4C** Even though it does not stretch across or cover a complete "bubble", the standing wave shown in **Fig.4C** is nevertheless a stable, natural, and resonant "standing wave", with a frequency which is exactly twice the frequency of the input AC voltage.

It is possible to create partially stable and semi-resonant responses, using one eighth, one sixteenth, or shorter lengths of wire, by using additional devices which can remove electrical power from the system, or which can generate effects which are usually called "harmonics". However, those are not the types of natural and stable responses which can be created by a simple, basic system consisting of nothing more than: (i) a wire having a fixed length and a "reflective" tip; and (ii) an AC power source with a frequency which can be "tuned" until it creates a resonant response in any wire segment having a suitable length.

Therefore, since quarter-wave wire lengths are the shortest lengths which can create natural and stable standing waves, the conventional term which is commonly used, to describe what happens when a wire creates a resonant standing-wave response, is a "quarter-wave" response.

In some devices, telescoping components (or other elements which can alter the effective length of a wire-type element) can be used to alter the ability of the element to respond to a fixed wavelength. Many types of antennas use this approach, if they need to process signals which are being transmitted on fixed and known frequencies. However, those examples are not relevant to spiral coil reactors, which will use an approach which involves

tuning and adjusting the frequency of the voltage which is being supplied to a reactor, until a resonant response is observed in coils with fixed and unchanging lengths.

It should also be noted that certain types of "tuning" elements (such as capacitors, which can have either fixed or adjustable capacitance levels) can also be coupled electrically to a wire, in a manner which "emulates" adding more length to that wire. This approach can be used to alter (or increase the range of) the frequencies to which a wire circuit will respond resonantly.

So, if we have resonant standing-wave voltages in our L2 coil and some of that signal passes through the wire connecting one end of the coil to the earth, then what will happen? The best way to check it is to test the way which a prototype behaves, however, if I may express an opinion, I would suggest that the signal passing down the earth wire will be absorbed when it reaches the earth and that will prevent the signal being reflected back to the L2 coil to upset it's operation.

The third of Don's designs which we can consider is particularly attractive because almost no home-construction is needed, all of the components being available commercially, and the output power being adaptable to any level which you want. Don particularly likes this circuit because it demonstrates COP>1 so neatly and he remarks that the central transmitter Tesla Coil on its own is sufficient to power a household.

The coil in the centre of the board is a power transmitter made from a Tesla Coil constructed from two Barker & Williamson ready-made coils. Three more of the inner coil are also used as power receivers. The outer, larger diameter coil is a few turns taken from one of their standard coils and organised so that the coil wire length is one quarter of the coil wire length of the inner coil ("L2").

As before, a commercial neon-tube driver module is used to power the "L1" outer coil with high voltage and high frequency. It should be understood that as power is drawn from the local environment each time the power driving the transmitter coil "L1" cycles, that the power available is very much higher at higher frequencies. The power at mains frequency of less than 100 Hz is far, far less than the power available at 35,000 Hz, so if faced with the choice of buying a 25 kHz neon-tube driver module or a 35 kHz module, then the 35 kHz module is likely to give a much better output power at every voltage level.

The "L1" short outer coil is held in a raised position by the section of white plastic pipe in order to position it correctly relative to the smaller diameter "L2" secondary coil.

The secondary coils are constructed using Barker & Williamson's normal method of using slotted strips to hold the tinned, solid copper wire turns in place.
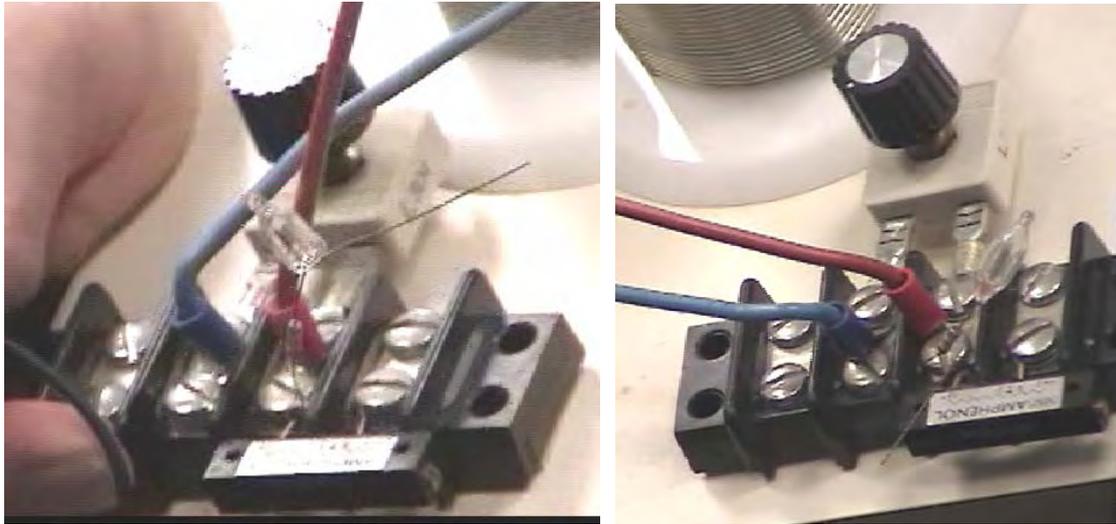
As there are very slight differences in the manufactured coils, each one is tuned to the exact transmitter frequency and a miniature neon is used to show when the tuning has been set correctly.

The key feature of this device is the fact that any number of receiver coils can be placed near the transmitter and each will receive a full electrical pick up from the local environment, without altering the power needed to drive the Tesla Coil transmitter - more and more output without increasing the input power - unlimited COP values, all of which are over 1. The extra power is flowing in from the local environment where there is almost unlimited amounts of excess energy and that inflow is caused by the rapidly vibrating magnetic field generated by the central Tesla Coil. While the additional coils appear to just be scattered around the base board, this is not the case. The YouTube video http://www.youtube.com/watch?v=TiNEHZRm4z4&feature=related demonstrates that the pick-up of these coils is affected to a major degree by the distance from the radiating magnetic field. This is to do with the wavelength of the signal driving the Tesla Coil, so the coils shown above are all positioned at exactly the same distance from the Tesla Coil. You still can have as many pick-up coils as you want, but they will be mounted in rings around the Tesla Coil and the coils in each ring will be at the same distance from the Tesla Coil in the centre.

Each of the pick up coils act exactly the same as the "L2" secondary coil of the Tesla Coil transmitter, each picking up the same level of power. Just as with the actual "L2" coil, each will need an output circuit arrangement as described for the previous device. Presumably, the coil outputs could be connected in parallel to increase the output amperage, as they are all resonating at the same frequency and in phase with each other. Each will have its own separate output circuit with a step-down isolation transformer and frequency adjustment as before. If any output is to be a rectified DC output, then no frequency adjustment is needed, just rectifier diodes and a smoothing capacitor following the step-down transformer which will need to be an air core or ferrite core type due to the high frequency. High voltage capacitors are very expensive. The http://www.richieburnett.co.uk/parts.html web site shows various ways of making your own high-voltage capacitors and the advantages and disadvantages of each type.

There are two practical points which need to be mentioned. Firstly, as the Don Smith devices shown above feed radio frequency waveforms to coils which transmit those signals, it may be necessary to enclose the device in an earthed metal container in order not to transmit illegal radio signals. Secondly, as it can be difficult to obtain high-voltage high-current diodes, they can be constructed from several lower power diodes. To increase the voltage rating, diodes can be wired in a chain. Suitable diodes are available as repair items for microwave ovens. These typically have about 4,000 volt ratings and can carry a good level of current. As there will be minor manufacturing differences in the diodes, it is good practice to connect a high value resistor (in the 1 to 10 megohm range) across each diode as that ensures that there is a roughly equal voltage drop across each of the diodes:
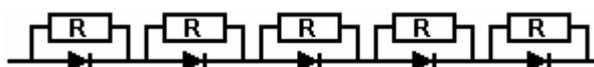
If the diode rating of these diodes were 4 amps at 4,000 volts, then the chain of five could handle 4 amps at 20,000 volts. The current capacity can be increased by connecting two or more chains in parallel. Most constructors omit the resistors and find that they seem to get satisfactory performance.

The impedance of a coil depends on it's size, shape, method of winding, number of turns and core material. It also depends on the frequency of the AC voltage being applied to it. If the core is made up of iron or steel, usually thin layers of iron which are insulated from each other, then it can only handle low frequencies. You can forget about trying to pass 10,000 cycles per second ("Hz") through the coil as the core just can't change it's magnetic poles fast enough to cope with that frequency. A core of that type is ok for the very low 50 Hz or 60 Hz frequencies used for mains power, which are kept that low so that electric motors can use it.

For higher frequencies, ferrite can be used for a core and that is why some portable radios use ferrite-rod aerials, which are a bar of ferrite with a coil wound on it. For higher frequencies (or higher efficiencies) iron dust encapsulated in epoxy resin is used. An alternative is to not use any core material and that is usually referred to as an "air-core" coil. These are not limited in frequency by the core but they have a very much lower inductance for any given number of turns. The efficiency of the coil is called it's "Q" (for "Quality") and the higher the Q factor, the better. The resistance of the wire lowers the Q factor.

A coil has inductance, and resistance caused by the wire, and capacitance caused by the turns being near each other. However, having said that, the inductance is normally so much bigger than the other two components that we tend to ignore the other two. Something which may not be immediately obvious is that the impedance to AC current flow through the coil depends on how fast the voltage is changing. If the AC voltage applied to a coil completes one cycle every ten seconds, then the impedance will be much lower than if the voltage cycles a million times per second.

If you had to guess, you would think that the impedance would increase steadily as the AC frequency increased. In other words, a straight-line graph type of change. That is not the case. Due to a feature called resonance, there is one particular frequency at which the impedance of the coil increases massively. This is used in the tuning method for AM radio receivers. In the very early days when electronic components were hard to come by, variable coils were sometimes used for tuning. We still have variable coils today, generally for handling large currents rather than radio signals, and we call them "rheostats" and some look like this:

These have a coil of wire wound around a hollow former and a slider can be pushed along a bar, connecting the slider to different winds in the coil depending on it's position along the supporting bar. The terminal connections are then made to the slider and to one end of the coil. The position of the slider effectively changes the number of turns of wire in the part of the coil which is being used in the circuit. Changing the number of turns in the coil, changes the resonant frequency of that coil. AC current finds it very, very hard to get through a coil which has the same resonant frequency as the AC current frequency. Because of this, it can be used as a radio signal tuner:
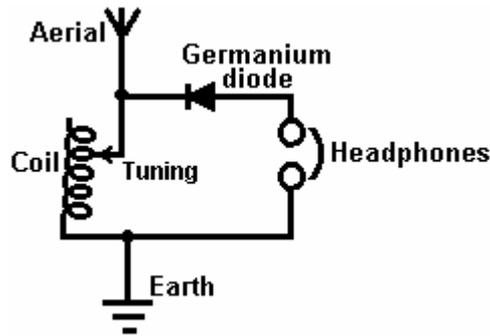
If the coil's resonant frequency is changed to match that of a local radio station by sliding the contact along the coil, then that particular AC signal frequency from the radio transmitter finds it almost impossible to get through the coil and so it (and only it) diverts through the diode and headphones as it flows from the aerial wire to the earth wire and the radio station is heard in the headphones. If there are other radio signals coming down the aerial wire, then, because they are not at the resonant frequency of the coil, they flow freely through the coil and don't go through the headphones.

This system was soon changed when variable capacitors became available as they are cheaper to make and they are more compact. So, instead of using a variable coil for tuning the radio signal, a variable capacitor connected across the tuning coil did the same job:
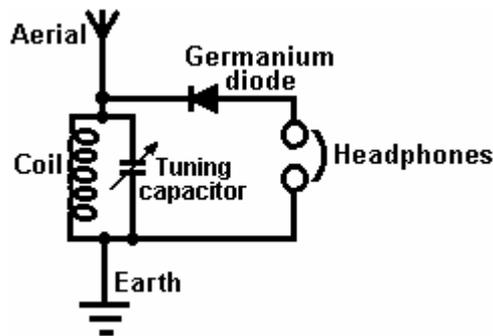
While the circuit diagram above is marked "Tuning capacitor" that is actually quite misleading. Yes, you tune the radio receiver by adjusting the setting of the variable capacitor, **but**, what the capacitor is doing is altering the resonant frequency of the coil/capacitor combination and it is the resonant frequency of that combination which is doing exactly the same job as the variable coil did on it's own.

This draws attention to two very important facts concerning coil/capacitor combinations. When a capacitor is placed across a coil "in parallel" as shown in this radio receiver circuit, then the combination has a very high impedance (resistance to AC current flow) at the resonant frequency. But if the capacitor is placed "in series" with the coil, then there is nearly zero impedance at the resonant frequency of the combination:
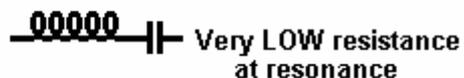
This may seem like something which practical people would not bother with, after all, who really cares? However, it is a very practical point indeed. Remember that Don Smith often uses an early version, off-the-shelf neon-tube driver module as an easy way to provide a high-voltage, high-frequency AC current source, typically, 6,000 volts at 30,000 Hz. He then feeds that power into a Tesla Coil which is itself, a power amplifier. The arrangement is like this:
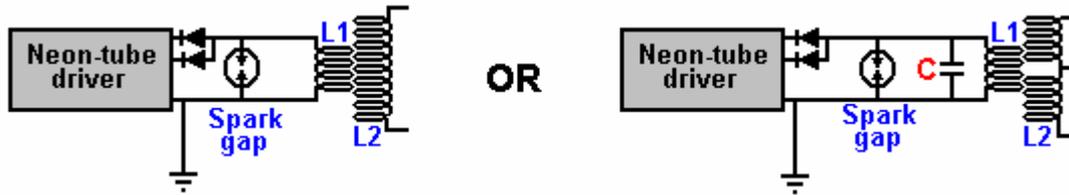
People who try to replicate Don's designs tend to say "I get great sparks at the spark gap until I connect the **L1** coil and then the sparks stop. This circuit can never work because the resistance of the coil is too low".

If the resonant frequency of the **L1** coil does not match the frequency being produced by the neon-tube driver circuit, then the low impedance of the **L1** coil at that frequency, will definitely pull the voltage of the neon-tube driver down to a very low value. But if the **L1** coil has the same resonant frequency as the driver circuit, then the **L1** coil (or the **L1** coil/capacitor combination shown on the right, will have a very high resistance to current flow through it and it will work well with the driver circuit. So, no sparks, means that the coil tuning is off. It is the same as tuning a radio receiver, get the tuning wrong and you don't hear the radio station.

This is very nicely demonstrated using simple torch bulbs and two coils in the YouTube video showing good output for almost no input power: http://www.youtube.com/watch?v=kQdcwDCBoNY and while only one resonant pick-up coil is shown, there is the possibility of using many resonant pick-up coils with just the one transmitter.

With a coil (fancy name "inductor" and symbol "L"), AC operation is very different to DC operation. The coil has a DC resistance which can be measured with the ohms range of a multimeter, but that resistance does not apply when AC is being used as the AC current flow is **not** determined by the DC resistance of the coil. Because of this, a second term has to be used for the current-controlling factor of the coil, and the term chosen is "impedance" which is the feature of the coil which "impedes" AC current flow through the coil.

The impedance of a coil depends on it's size, shape, method of winding, number of turns and core material. It also depends on the frequency of the AC voltage being applied to it. If the core is made up of iron or steel, usually thin layers of iron which are insulated from each other, then it can only handle low frequencies. You can forget about trying to pass 10,000 cycles per second ("Hz") through the coil as the core just can't change it's magnetic poles fast enough to cope with that frequency. A core of that type is ok for the very low 50 Hz or 60 Hz frequencies used for mains power, which are kept that low so that electric motors can use it.

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Here is a copy of Don Smith's pdf:

RESONANCE ENERGY METHODS

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September 23, 2002

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Rotating Seperator Coil

Capacitors
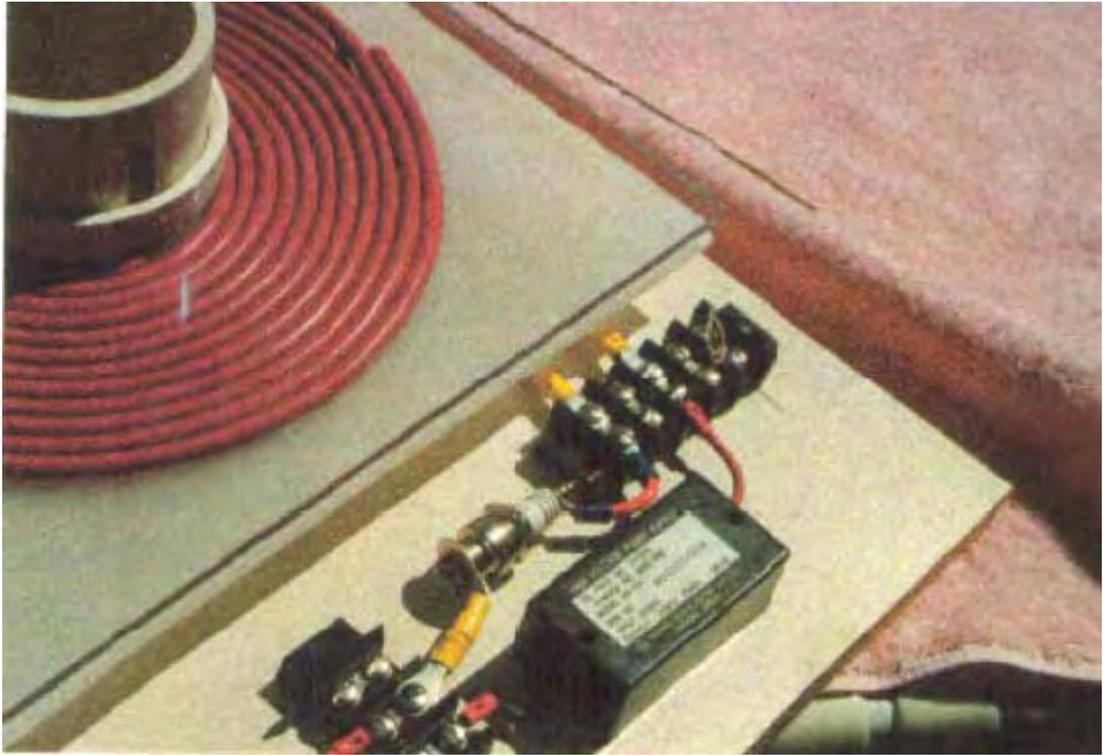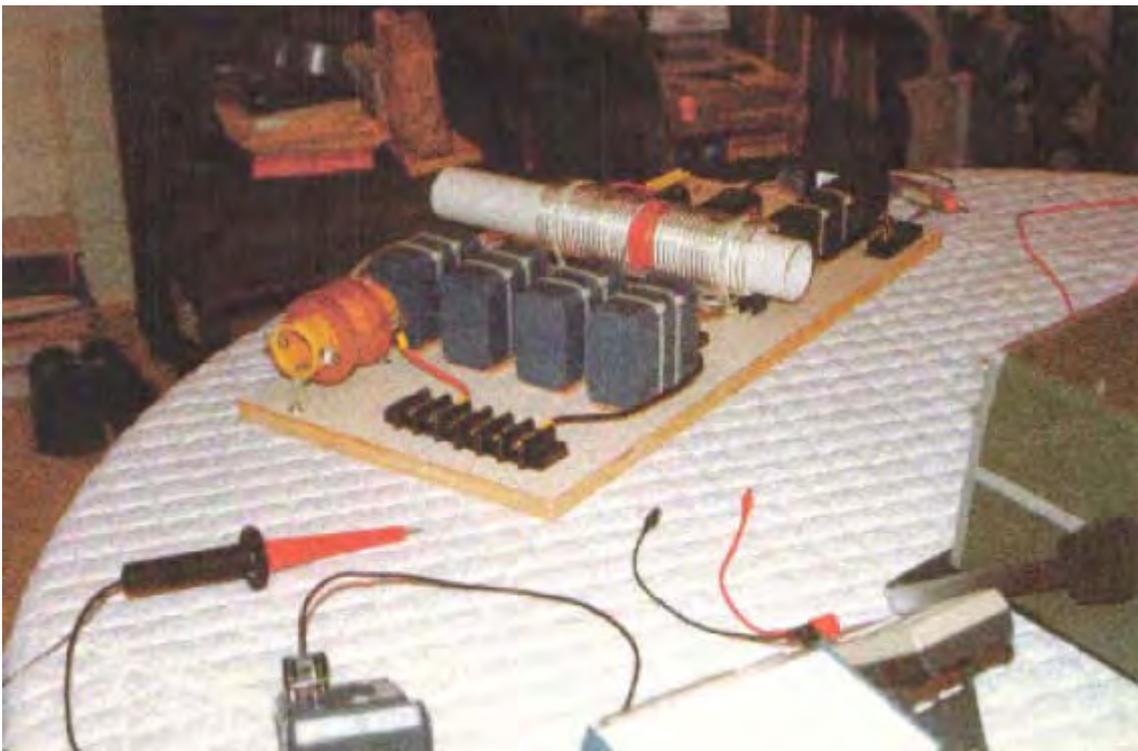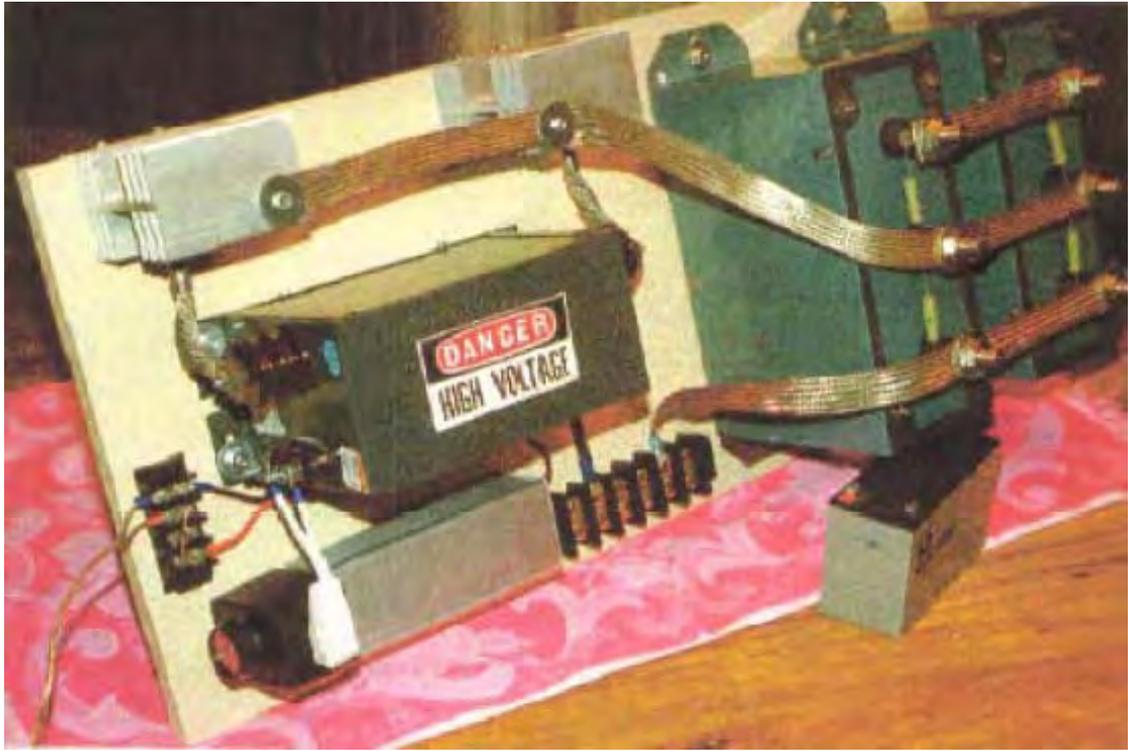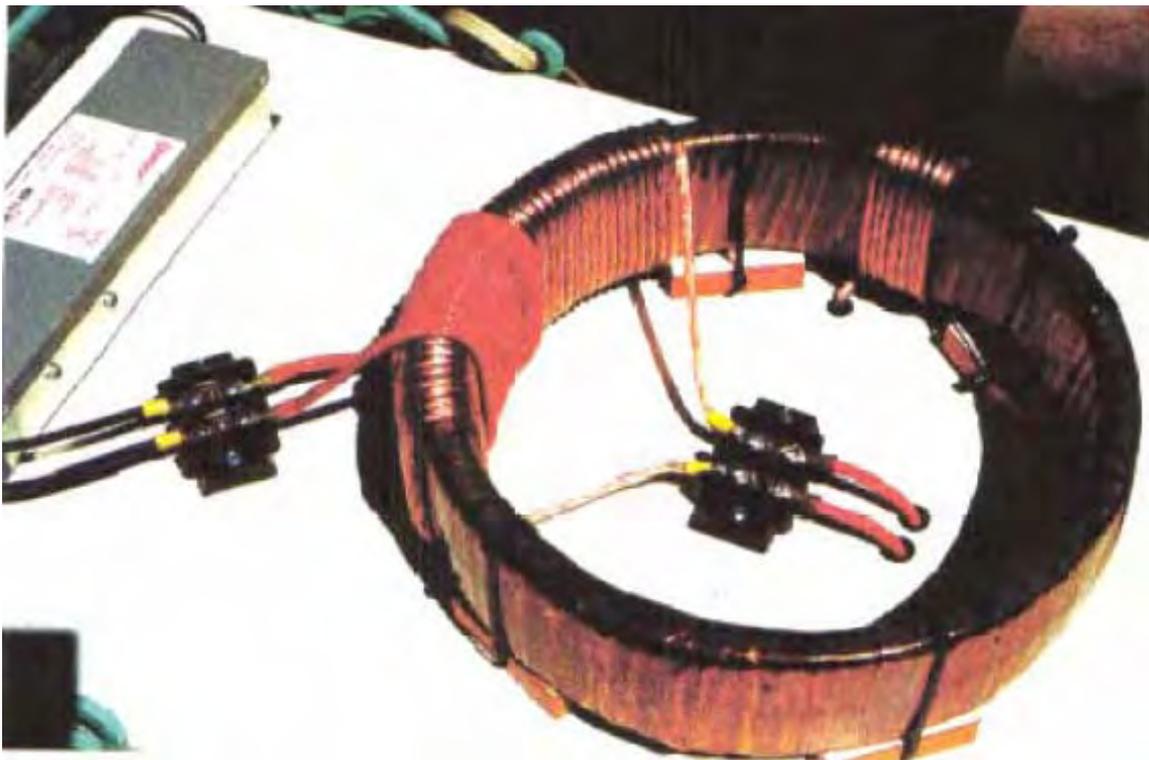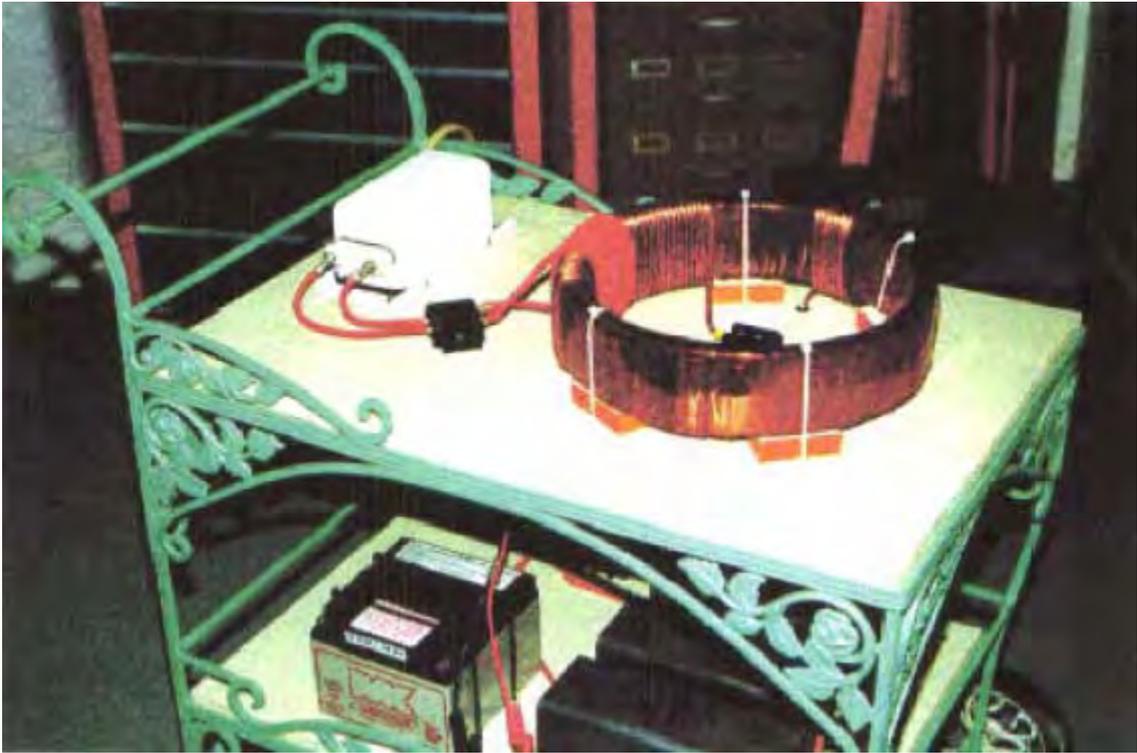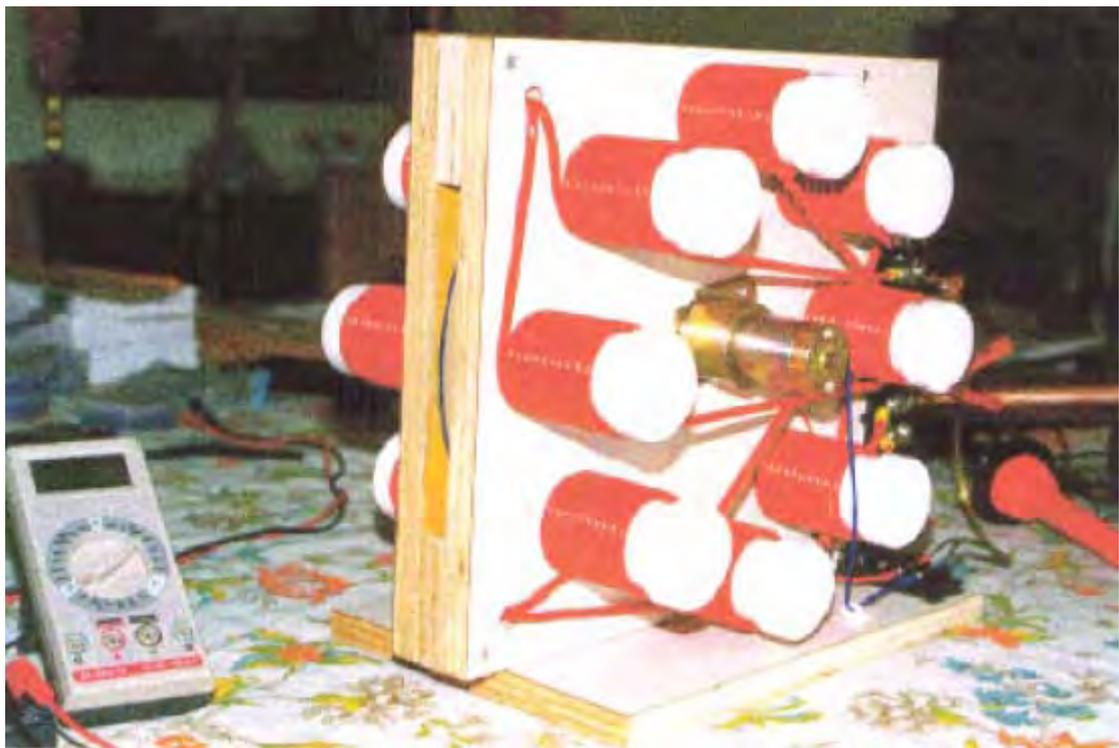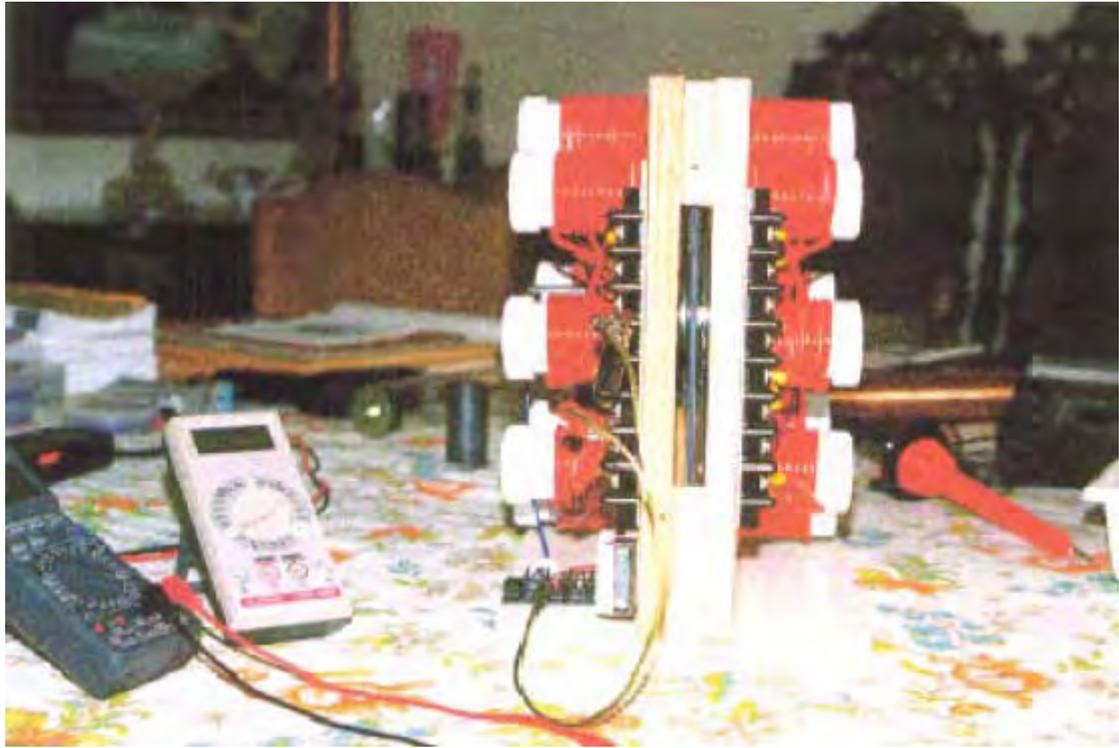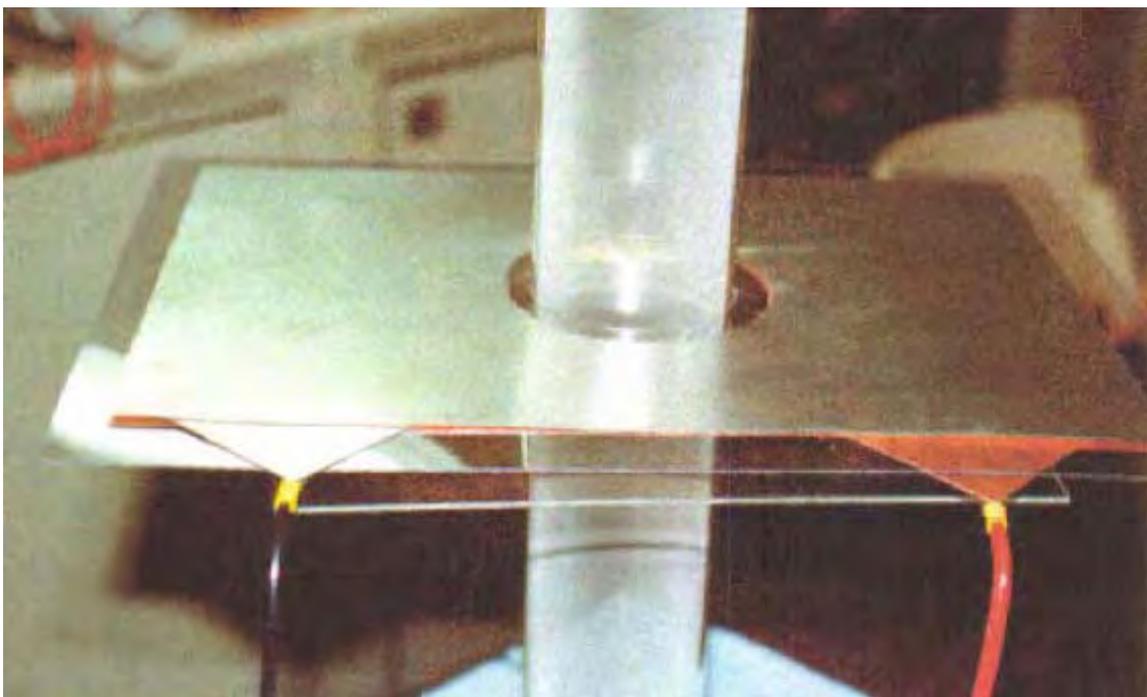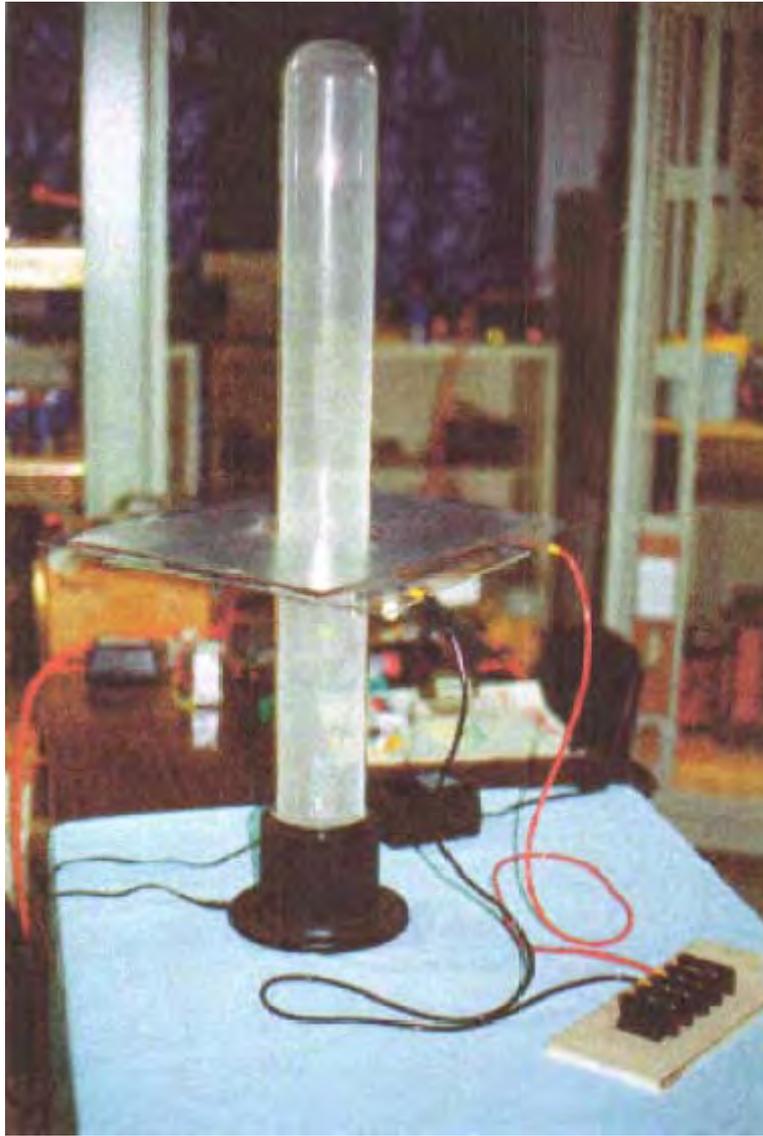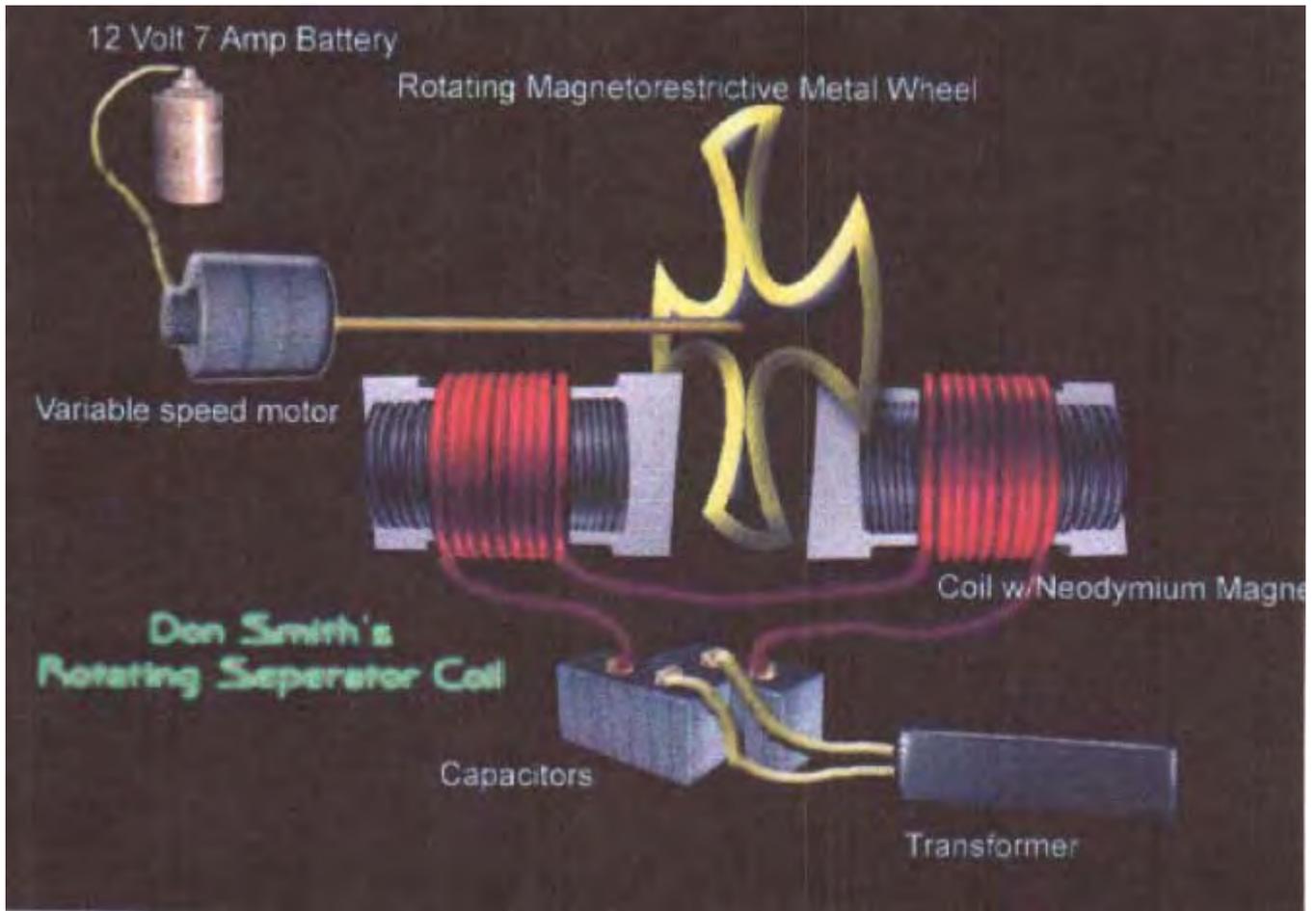
Transformer

DIPOLE TRANSFORMER GENERATOR
DESCRIPTION

TECHNICAL FIELD:

The Invention relates to loaded Dipole Antenna Systems and their Electromagnetic radiation. When used as a transformer with an appropriate energy collector system it becomes a transformer generator. The invention collects and converts energy which, with conventional devices, is radiated and wasted.

BACKGROUND ART:

An International search of Patent Databases for closely related methods did not reveal any prior Art with an Interest in conserving radiated and wasted magnetic waves as useful energy.

DISCLOSURE OF INVENTION:

The Invention is a new and useful departure from transformer generator construction, such that radiated and wasted magnetic energy changes into useful electrical energy. Gauss Meters show that much energy from conventional electromagnetic devices is radiated back into the ambient background and wasted. In the case of conventional transformer generators, a radical change in the physical construction, allows better access to the energy available. It is found that creating a dipole and

Inserting capacitor plates at right angle to the current flow, allows magnetic waves to change back to useful electrical (coulombs) energy. Magnetic waves passing through the capacitor plates do not degrade and the full impact of the available energy is accessed. One, or many sets of capacitor plates, may be used as desired. Each set of plates makes an exact copy of the full force and effect of the energy present in the magnetic waves. The originating source is not depleted or degraded as is common in conventional transformers.

BRIEF DESCRIPTION OF THE DRAWINGS:

The Dipole at right angle allows the magnetic flux surrounding it to intercept the capacitor plate, or plates, at right angles. The electrons present are spun in such a way that the electrical component of the electrons is collected by the capacitor plates. Essential parts are the South and North component of an active Dipole. Examples presented here, exist as fully functional prototypes, and were engineer constructed and fully tested for utility by the Inventor. Corresponding parts are utilized in each of the three examples as shown in the Drawings.

DRAWING 1 OF 4: VIEW OF THE METHOD
 N = North and S = South of the Dipole
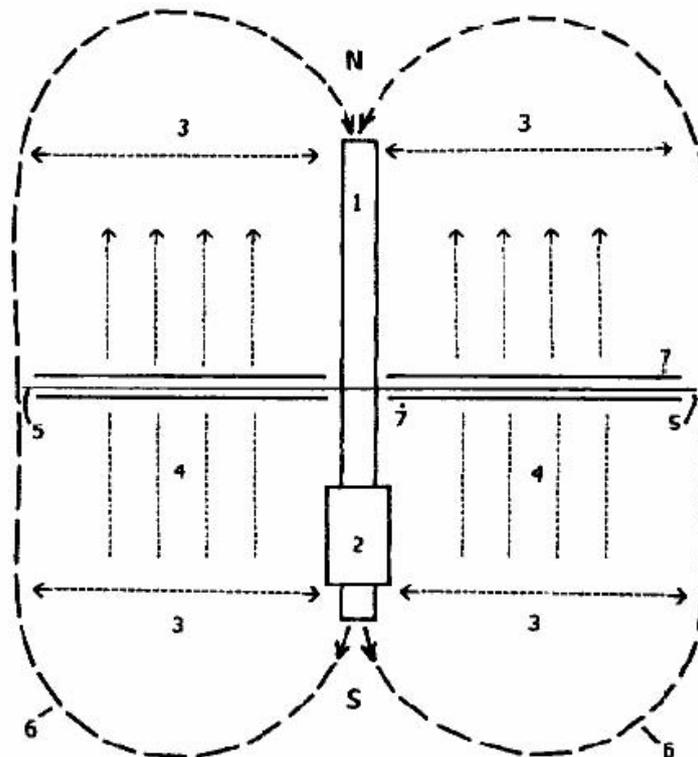
1. North and South component of the Dipole.
2. Resonate High Voltage induction coil.
3. Dipole's electromagnetic wave emission.
4. Heaviside current component.
5. Dielectric separator for the capacitor plates.
6. For purposes of the drawing, a virtual limit of the electromagnetic wave energy.
7. Capacitor plates with dielectric in between.
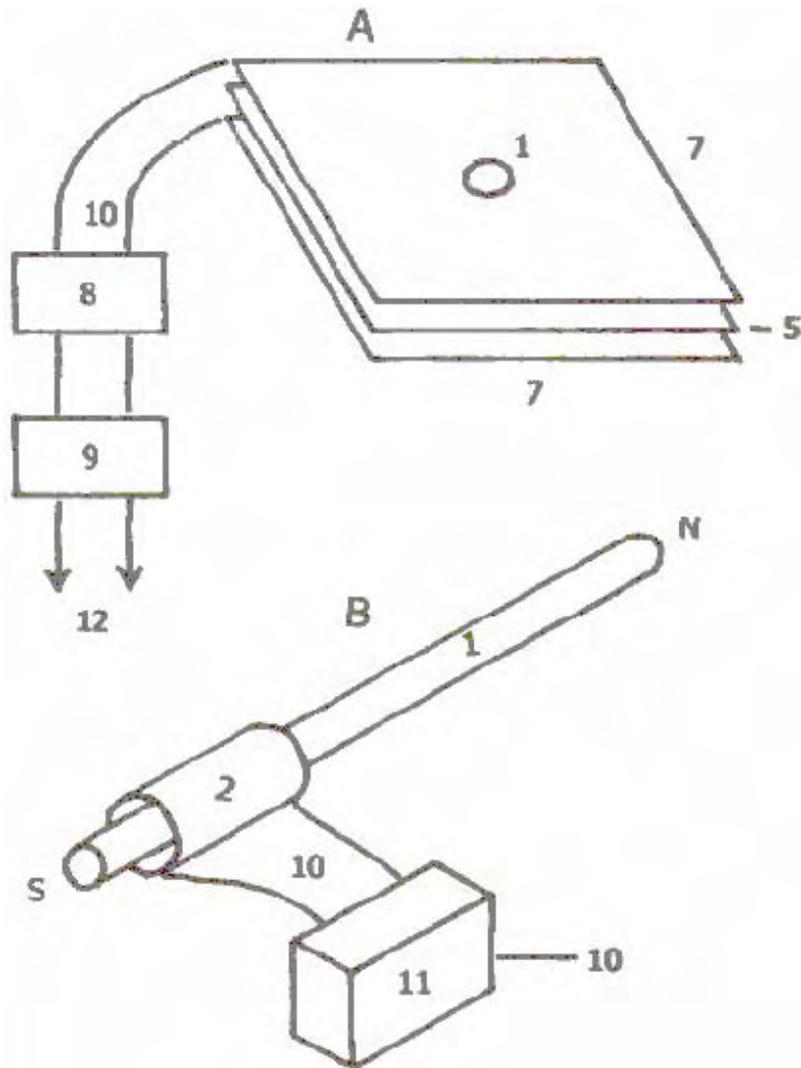
Fig.2-A:
1. Hole for mounting Dipole **B-1**.
2. Resonate high voltage induction coil.
5. Dielectric separator, a thin sheet of plastic separating the capacitor pl
7. Capacitor plates, upper plate is aluminium and lower plate is copper.
8. Battery system, deep cycle.
9. Inverter. Input: Direct Current, output 120 Volts at 60 cycles per second.
10. Connector wires.
11. Output to point of use being the load

Fig.2-B   N = North and S = South component of the Dipole
1. Metal rod, being soft magnetic metal such as iron.
2. Resonate high voltage induction coil.
10. Connector wires.
11. High Voltage input energy source such as a neon tube transformer.

DRAWING 3 OF 4 : Proof of Principle Device, using a Plasma Tube as an active Dipole.
   N = North and S = South Components of the active Dipole.
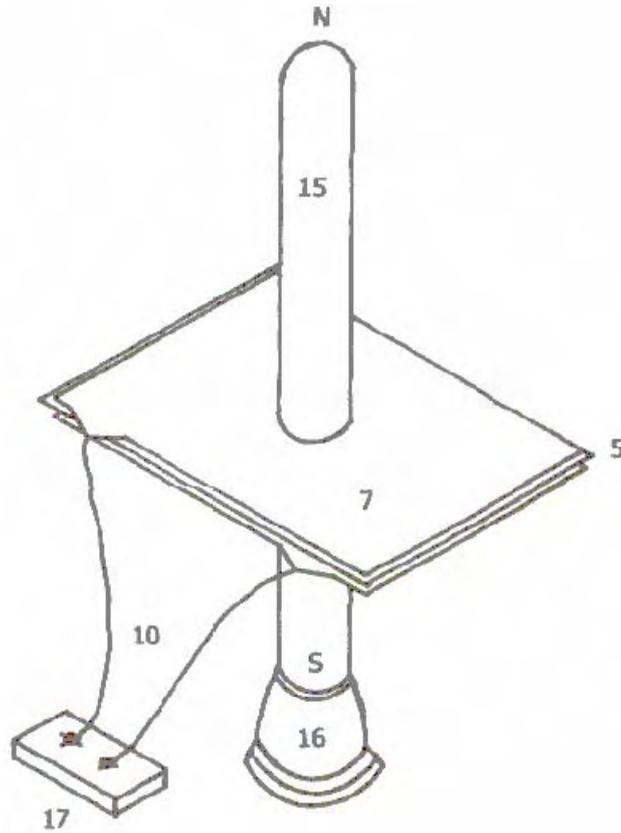
5. Dielectric separator of the capacitor plates.
7. Upper capacitor plate: upper plate is aluminium and lower plate is copper.
10. Connector wires.
15. Plasma Tube, 4 feet long and 6 inches in diameter.
16. High Voltage Energy source for the active Plasma Dipole.
17. Connector block: outlet for testing and use.

DRAWING 4 OF 4: Manufactures Prototype, Constructed and fully tested.
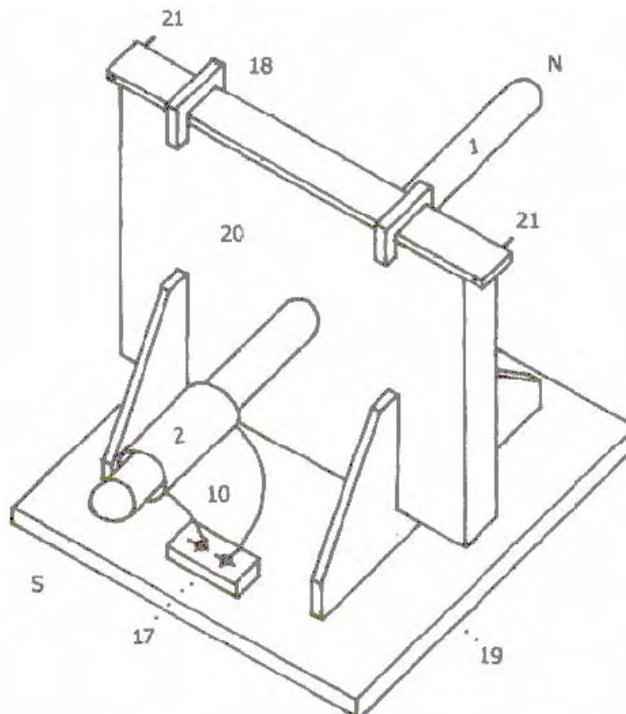
1. Metal Dipole rod.
2. Resonate High Voltage induction coil.

10. Connector wires.
17. Connector block for Input from high voltage energy source.
18. Clamps for upper edge of capacitor packet.
19. Support Device for The Dipole Transformer Generator.
20. Packet of Capacitor Plates.
21. Output connectors of the capacitor, producing energy into a deep cycle battery which then powers the inverter.

BEST METHOD OF CARRYING OUT THE INVENTION:

The Invention is applicable to any and all electrical energy requirements. The small size and high efficiency makes It an attractive option. It is particularly attractive for remote areas, homes, office buildings, factories, shopping centres, public places, transportation, water systems, electric trains, boats, ships and all things small or great Construction materials are readily available and the skill level required is moderate.

CLAIMS:

1. Radiated magnetic flux from the Dipole, when intercepted by capacitor plates at right angles, changes to useful electrical energy.
2. A Device and method for converting for use, normally wasted electromagnetic energy.
3. The Dipole of the Invention is any resonating substance such as Metal Rods, Coils and Plasma Tubes which have interacting Positive and Negative Components.
4. The Resulting Heaviside current component Is changed to useful electrical energy.

ABSTRACT

An Electromagnetic Dipole Device and Method, wherein, radiated and wasted energy is transformed into useful energy. A Dipole as seen in Antenna Systems is adapted for use with capacitor plates such that the Heaviside Current Component becomes a useful source of electrical energy.

TransWorld Energy
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September 23.2002

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Dear Reader:

TransWorld Energy is dedicated to improving the Human Condition in the Field of Energy which, at the same time, makes possible Healthy Water and increases the food Supply. A never-ending source of energy found throughout the universe is easily accessed with the minimum of effort and cost. The technology for doing this has been around since the 1820s. Selfish special interests have made sure that the technology remains discredited. People who control the Energy Sources control the World.

Extensive research and development by TransWorld and Associates has been progressing for more than 15 years. Numerous successful Energy Producing Devices have been produced and demonstrated throughout the World. Some of these can be viewed by the Web Site located using any major search engine (such as Lycos, Yahoo, Altavista, NorthenLight and more than 2,000 others throughout the World).

The Book which You are viewing has more than 40,000 copies in circulation. It has been translated and distributed in all major languages including Japanese, Arabic, Portuguese, French, Italian, Russian, Chinese, German, Spanish and many more. There are seven editions in circulation. An enormous interest is evident in the subject matter. An average of about fifty e-mails per day are received from the

ends of the Earth (that is about 1,500 per month).

Once the Web Site and the book are viewed, it will become evident that abundant, self- sustainable energy is available everywhere for the taking. This is natural energy which does not harm the environment or those using it. The proper Device for Collecting is all that's required.

The Good News is that the problem is solved and with assistance, an ultimate source of energy which is environmentally benign, abundant throughout the universe and inexpensive to capture, is there for the taking.

Thank You for your consideration

_____

Donald L. Smith, CEO

Electrical Energy Generating System

Description and Function:
The Generation of Electrical Power requires the presence of electrons with various methods of stimulation, yielding magnetic and electrical impulses, collectively resulting in Electrical Energy (Power). In place of the mechanical - coils and magnet system, present in conventional electrical power generation, visible moving parts are replaced by resonate magnetic induction, using radio frequency. Transfer of energy by resonate induction is related to the ratio of the square of the cycles per second.

The Energy System, presented here, operates at millions of cycles per second verses the conventional 60 C.P.S. This tells us that it has a frequency advantage over conventional methods. This same advantage applies to the amount of electrical energy output. Therefore the Device is small in size and produces large amounts of Electrical Energy. The Electrons acquired, are from the surrounding Air and Earth Groundings, being the same source as in conventional methods. This is accomplished by magnetic resonate radio induction.

Applications:
This Electrical System adapts nicely to all Energy Requirements. It is a direct replacement for all existing Energy Systems. This includes such things as Manufacturing, Agricultural, Home Usage, Office Complexes, Shopping Centers, Rail Transportation, Automobiles, Electrical Power Grids, Municipalities, Subdivisions, and Remote Areas. Briefly, the only limiting factor is the imagination.

Economic Possibilities:
No Historical Reference Point exists for a comparison of the Possibilities of this System. One can see from the impacted applications listed above, that the magnitude exceeds any known invention, presently

a part of the Human Experience.

Present and Future Plans:
The Energy System has been in the developmental stage during the past seven years. It is Patent Pending # 08/100,074 with the Patent Office. No prior art exists according to the Patent Office's response. The System is presently being introduced into the World Market.

Useful energy occurs as the result of imbalances in the ambient background energy, which is a transient phenomena. In the electrical field, it is a closed system subject to heat death, which severely limits it's utility. The flip side of the electron, produces magnetic waves which are an open system, not subject to heat death. These waves, being unrestricted, are the universal source of energy when unlimited resonate duplicates from this one source are available. Therefore, the key to unlimited energy, is Magnetic Resonance. In order to understand this, requires putting a stake through the Heart of Antique Physics. Non-linear and Open Systems are universally available in Magnetic Resonance Systems, Explosions of any sort [including Atomic Explosions] and Combustibles of any type. Mechanical equivalents would be levers, pulleys and hydraulics. A highly obvious example is the Piano where the Key impacts the one note giving one sound level, which resonates with it's two side keys providing a much higher sound level. Magnetic Resonance Energy clearly amplifies itself, demonstrating more energy out, than in.

Ohmic resistance does not apply to Magnetic Resonance which travels unrestricted for great distances, therefore multitudes of electrons are disturbed, and their back-spin translates magnetic into usable electric energy. The right angle component which the magnetic flux provides, translates into useful electrical energy. Taken at right angles, the Magnetic Dipole provides an unlimited source of electrical energy. The writer is recognized world-wide for his knowledge and experience. See his Web Site at altenergy-pro.com .

Gravity is a function of spin phenomenon as observed in gravity separation of liquids. When spun, milk and cream separate. Therefore, relative specific gravity is function of mass versus spin. Magnetics and gravity are both spin related. In part, a top levitates when spun. Therefore, spinning magnetic fields are a functional motor source as in flying saucers.

ABSTRACT: Technology of New Energy:

Developments in the understanding of Electricity, along with Materials which were not previously available, allows the construction of Devices which collect energy in large quantities, from the Earth's Ambient Electrical Background. This Energy is naturally occurring, environmentally benign and is available everywhere. It is available wherever and whenever it is required. New Devices use Resonate Magnetic Waves which replicate upon spinning the locally present electrons, providing multiple duplicate copies of the Energy Present. Each electron when spun yields both magnetic and electric waves in equal proportion. The electrical component is a closed system limited by Ohms Law. The magnetic component is an open system not limited and it replicates multiple copies of the energy present.

Special materials and recent developments allow the magnetic energy to reproduce, through resonance, unlimited duplicate copies acquired from the ambient background. These Devices harvest the energy that has been, and is always present universally. Conventional methods consist of coils and magnets systems. Upon moving past each other, the magnetic flux field disturbs electrons which yield electricity, which is collected by the coils system. This is accomplished electronically with the new technology, without any moving parts and the energy is multiplied such that the Device becomes self-sustaining once

it is started. This Technology, already presented Worldwide, will be shown at the Conference.

Dr. Smith
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"Putting a stake through the Heart" and thus removing the mental block created by antique physics is required. Conditions wherein this becomes necessary are non-linearity, resonance and explosions of any sort. Combustibles of any sort such gasoline and atomic explosions are good examples wherein more energy out than in, is obvious. You can add to that the non-linearity found in pulleys, hydraulics, steam power and suchlike. Magnetic resonance is a highly obvious source for multiplying energy output. The sound system present in the piano, demonstrates this very clearly. Energy amplification clearly present in the above, demonstrates the silliness attested to by many Physicists.

Ohmic resistance does not apply to magnetic resonance which travels unrestricted for great distances, therefore multitudes of electrons are disturbed, and their back-spin converts from magnetic energy to usable electric energy. These same electrons have been around from the beginning of time and they are undiminished and will remain so until the end of time.

ELECTRICAL ENERGY SYSTEMS PREFACE

Useful Electrical Energy is obtained directly from electron spin induced by incoming magnetic waves, or indirectly through mechanical exchange as in dynamo type devices. Simply put, electron spin converts from magnetic to electrical energy and vice versa. Nature provides grand scale magnetic wave induction throughout the universe, for free. In Electrical Systems, movement is at right angles to the direction of current movement. This explains the rotary movement of the Earth and other related Systems. The rate of Spin for the Earth is known as well as the mass (5.98×10^{24} Kg - "Physics for Scientist and Engineers", by Raymond A. Serway, Saunders College Publishing, 2nd Ed. page 288, Table 14.2), therefore the amount of incoming Electrical Energy which produces this action can be calculated.

It can be seen quite easily, that the incoming magnetic wave energy is Vast and Continuous. As an accretion mass, the Earth is an Energy Sink, getting it's energy from elsewhere, being Cosmic, Galactic and Solar. Conversion of incoming magnetic waves into electrical energy provides an unending, inexpensive and environmentally friendly source available to all. Cosmic and Galactic Energy is available twenty four hours per day. Large amounts of this Energy accumulates in the Earth's radiation belts. This Giant Energy Storage, when properly understood, provides a major source of free unending electrical energy. Each of My Inventions plugs into this vast energy source.

A perverse, Intentional Ignorance on the part of the Establishment, prevents recognition of the importance of the Energy Systems shown here. Any new system which is favourable towards the masses, is considered as disruptive, and therefore not allowed. Those who have the (Gold) Energy Rule (Golden rule) Mandated Destruction of all Humanity is not a consideration.

This Presenter will remove some of the Fog placed with the intention of preventing the recognition of this unending, environmentally clean, electrical energy Source, which is present everywhere throughout

the Universe. The Cost of Harvesting and Using this Free Energy is a function of Human Stupidity.

RESONANCE CIRCUITS DEMO
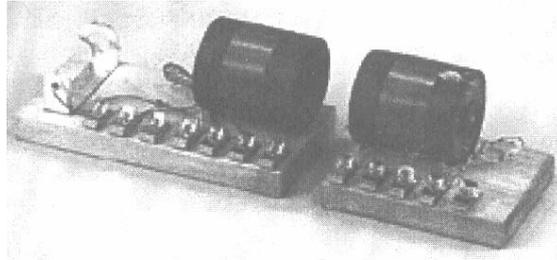
Used to demonstrate electromagnetic radiation between two UC circuits - one a transmitter and the other a receiver. When the 1.5 volt power transmitter is pulsed, the radiated signal is picked up by the remote receiver circuit which then lights up a 70 volt neon lamp.

With this apparatus, the student quickly understands some basic principles governing wireless communication, broadcasting, etc.

Kit: #10-416 $49.95

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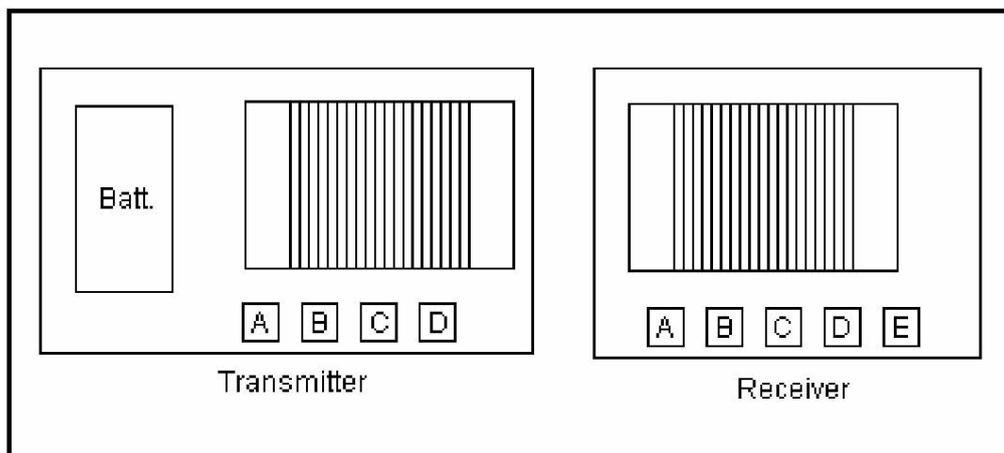
Diagram of transmitter and receiver coils

ULTIMATE ENERGY SOURCES

A human is a speck of dust on Earth, the Solar System is a speck of dust in the Galaxy and in turn, the Galaxy is a speck of dust in the Universe (Cosmos). All of these respectively represent vast ambient energy reservoirs. Awareness of the Sun, opens doors into other energy sources. Electromagnetic Energy which is present everywhere throughout the Universe, is accessed by catalytic activity, directly as in Solar Cells or indirectly as by mechanical means. Resonate, Magnetic Waves (Faraday's "Action at a Distance") allow Energy Activation Transfer to remote points of usage. The method of capture and use of this Energy is optional, and therefore it's cost is a function of Human Stupidity (Free-Energy).

Direct access is more desirable, and technology transfer from Solar Cell-type Devices provides the Catalyst. Enormously high Ambient Energy Levels are not detected by instruments that use the Ambient Background as a Reference Plane. A spoonful of water lifted from the Ocean does not define the Ocean. Incoming magnetic waves are reflected, Deflected or absorbed. Deflected Magnetic Waves spin electrons sideways producing useful Electrical Energy. Absorbed Wave Energy produces heat, therefore a hot interior for the Earth. In Electrical Systems physical movement is in the direction of current flow, <u>frictional drag from inflow current defines gravity</u>. Accretion masses resulting from Energy Sinks, provide all solid entities with their respective gravitational effect.

Increasing the tolerance level for Intellectual Awakening opens Doors of Reality. These doors blink into, and out of existence, and upon recognition, benefit Mankind. Opening some of these Doors, which at the present time are seen through a deep fog, is our purpose. Exploring Unrecognized Energy Sources, which are a Part of the Ambient Background, is another goal. Our Available Instruments do not use reference planes which allow recognition of this energy, as we shall see, vast Energy Sources that totally surround us are available through Technology Transfer. They are inexpensive (Free), fully self-renewable and environmentally benign.

Incoming Magnetic Wave Energy with Faraday's "action at a distance" will be looked at closely. Particle Physics will be left for the Astrophysics. Excited Electrons at point "A" the Sun (including the Galaxy and Cosmos) do not travel to point "B" the Earth, however a corresponding action occurs at point "B". The Electrons being disturbed at the Central Power Plant, in the same manner excite the Electrons at Your House, upon switching into an Earth grounding (known as "flipping the switch"). Correspondingly, there are Four Major Power Sources providing enormous amounts of Ambient Background Magnetic Wave Energy. They are The Cosmic, Galactic, Solar and Earth's Ambient Electromagnetic Backgrounds. The Earth's Electromagnetic Field comes from reflection, deflection and absorption as a result of action at a distance from the above.

Prescription Physics mandates that the Earth's background is of little interest. When we have Considered the evidence herein, it will become obvious that Special Interest's effort at keeping the People ignorant has, until now, largely succeeded.

Information for the entire World is available regarding the Magnetic Flux Background of the Earth's Surface (United State's Geological Survey, Colorado, USA, Office). When examined and properly understood, these Maps yield important information regarding reflection, deflection and absorption of incoming Magnetic Waves, plus action at a distance. When properly understood, these Maps reveal a very large Ambient Electromagnetic Energy Source. This is the Part of the Earth's Energy System that relates to the Bird on the High Voltage Line. When deflected, magnetic flux from electrons changes to electrical flux, providing the Motor System that spins or rotates the Earth. Physical movement by electrical systems is from inflow current movement. What level of current movement is required to spin the Earth? The Earth's Mass is 5.98×10^{24}. From this Information, the Watts of Electricity Required may be calculated! Absorbed microwave flux energy heats from the inside out, therefore a hot interior

of the Earth results. Water is strongly diamagnetic, and on windless days, ocean waves provide visible Proof of the overhead incoming magnetic flux. From the information above, the Earth's weight and rate of spin allows the calculation of the amount of incoming ambient background energy required. As You can see, it is not inconsequential as Prescription Physics mandates.

Astrophysicist are concerned with charged particles that whiz by, once every one hundred years, rather than Wave Phenomenon associated with action at a distance. This highly Active Wave Energy translates into Electrical Energy at point "B". The Galaxy is alive With Energy which is billions of times greater than that of the Sun. Visible Light is a very tiny part of the Electromagnetic Energy Spectrum. Frequencies present in the Galaxy and Cosmos allow Radio Telescope photographs of their existence and magnitude. One such 408 MHz photograph of the Electromagnetic Energy Spectrum shows that the Earth is a tiny speck of dust in this Enormous Ocean of Energy, and can be seen near the left end of the Central High Energy Area.

This Energy extends in all directions. Accretion and formation of Planets, Suns and Galaxies are results of energy sinks and variable sized black holes. Mass retains heat, and is cooked from the inside out by the microwave background energy provided by the Universe. Flux movement into energy sinks, provides the frictional force know as gravity. Spinning mass in the presence of incoming flux amplifies the gravitational effect.

At present, only Solar Energy is recognized. It is inconsistent, flaky and a very small Part of the Magnetic Wave Energy Present. Technology Transfer from Solar Power provides uncomplicated and inexpensive, direct access to the Other Greater Energy Sources. All Electromagnetic Energy harvesting methods include a Catalyst, a Collector and a Pump. Catalysts include sensitization through doping with certain elements, air and earth groundings. Collectors include temporary storage as in Capacitors, Coils and Transformers. The Pump System includes induced movement onward to the point of use. Conventional rotating coils and magnet systems activate electrons present, such that action at a distance can occur, therefore it is an energy activation pump. In Direct Access Systems such as Solar Cells, the same occurs without mechanical action. Direct access occurs when Magnetic Waves impact a catalyst, spinning the local electrons sideways, producing useful electrical energy.

Indirect acquisition of electrical energy by mechanical means is wasteful, troublesome, expensive and degrades the environment. The dynamo is a combination collector and pump of energy which is collected from the Earth's Ambient Energy Background. Generators do not. make electricity, they collect it from the Ambient Background and forward it, as in Faraday's "action at a distance". Energy Conservation Laws relating to these systems, relate to grey areas, and when understood, are excluded because of the existence of External forces, open and non-linear systems as per Einstein. The Knowledge Base just viewed, provides a Direct Understanding of the Requirements for Harvesting of unending, fully renewable, environmentally benign Sources of Electrical Energy.

Magnetic Resonance Power System
Suggestions for Construction

This is the Basic Sonar Power System which permits submarines to see approximately 50 miles distance. What is not commonly known is that it works better at higher frequencies in the Gigahertz range. Any Device that can radiate 50 miles plus, is producing an enormous electromagnetic disturbance from a small input into a rod of magnetostrictive material. Disturbing the Earth's Ambient Background plus the strong dipole being produced, turns the magnetostrictive rod into a combination of a receiving antenna and a vastly superior output transformer.

The Drawing is only the Key Unit. A power input module and an output inverter circuit (diode bridge plus output transformer) are also required. The metal core and the wire size of the output transformer, plus adjusting the Earth Grounding of the Load, will determine the Amperage.

The Ideal rod material is Terfenol-D (check the internet). However a 1.5" diameter 10" long rod, costs over $5,000 each. Less expensive alternatives are obvious. When constructing, use PVC tubing with removable caps. Wind the coils on it and insert the experimental rod. Use only magnetostrictive material. When you get it right, you will have exactly what the Doctor ordered:

Magnetic Resonance Power System for Water Systems
Donald L. Smith
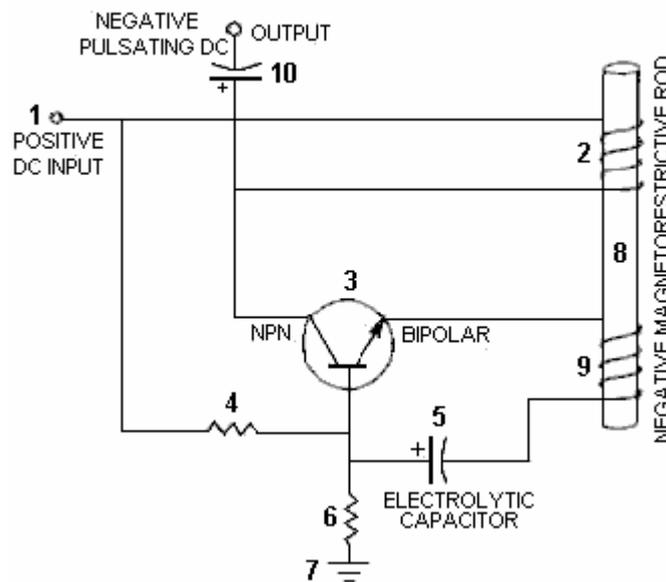
Magnetostriction oscillators work by magnetic resonance in a rod of magnetostriction material. This rod serves two purposes: It vibrates at the frequency of resonance oscillation, and it becomes the feedback transformer. Frequency is determined by items 4, 5, 6 and 8. The diameter, length and volume of the rod and output windings, determines the output. Item 2 provides feedback into the system. The negative magnetic character of item 8 plus the windings 2, in reaction to the magnetic flux field provided by 9, increases (amplifies or magnifies) the output. Magnetic permeability is the counterpart of negative resistance. Resonating with negative magnetic resistance, it pumps energy from the Earth's ambient background. Magnetic permeability is the ratio of flux density (Earth's B field) to the magnetizing force (H) in oersteds.

Magnetostrictive materials are piezoelectric in character, and have a very high resistance to electrical current flow. Examples are:
1. Permealloy Negative Magnetic Permeability > 80,000
2. Sendust Negative Magnetic Permeability 30,000 -120,000
3. Metglas Negative Magnetic Permeability > 200,000
4. Iron with (34%) Cobalt Magnetic Permeability 13,000
5. New Technology Magnetic Permeability > 1,000,000

ELECTRICAL ENERGY SYSTEMS METHODS

1. DIRECT - Faraday's "Action at a Distance" incoming magnetic wave conversion to useful electrical energy. This includes Cosmic, Galactic, Solar and Magnets. Technology Transfer is from Solar Cell Technology.

2. INDIRECT - Electron Stimulation-Induced Electron Spin Systems, Electron Avalanche Pumping Systems

Primitive, Indirect Conversion from another form of energy. Coils and Magnet as in Dynamo Systems (Closed Systems). Chemical Systems, Atomic, Pons & Fleischman and etc.

Advanced, Direct Conversion, Magnetic Wave (Open Systems).
Ambient Sources
Air Core Coil Systems
Gaseous Tube Systems,
Solid State Marx Generator Avalanche Type Systems.
Leyden Bottle Capacitor Types inserted in Lakes and other.
Magnet Systems
Electron Beam Antenna Systems

3. TRANSFER MECHANISMS

<u>Solids</u> - as in metal conductors

<u>Gaseous</u> as in radio wave transmission, a form of ionization.

<u>Sensitizing</u> of Systems by use of Trace Doping with Radioactive elements, includes metal surfaces.

<u>Open Systems</u>, non-linear with external forces. Albert Einstein in a direct quote from his biography states that these are excluded from the conservation of energy laws.

<u>Closed Systems</u> Maxwellian Type Systems. Mathematics are predictable requiring deductive reasoning. Ohm's Law is King, and Establishment Intellectuals being comfortable with this, brand all else as a violation of the Laws of Nature by obtaining something for nothing. This is Dishonesty grand mal.

AMBIENT ENERGY SOURCES

Radiation System	*Diffusion Method*	*Magnetic Wave Energy*
1. Cosmic	**Reflection, Deflection and Absorption**	**Ultraviolet**
2. Galactic	**Reflection, Deflection and Absorption**	**Infrared**
3. Solar	**Reflection, Deflection and Absorption**	**Visible Light**
4. Earth	**Reflection, Deflection, Absorption, Faraday's "Action at a Distance" also, a Composite of all of the above**	**Earth's Electrical**

A deep fog pervades the entire Scientific Community with regards to the Significance of the Above Energy Sources. Magnetic Waves convert directly into Electrical Waves (useful electricity). Two sides of the electromagnetic system are always present and never separate. Local electron spin provides (action at a distance) the flip side of the incoming magnetic wave energy.

Enormous amounts of incoming magnetic wave energy becomes a part of the Ambient Background, and as such, cannot be measured directly. Reconstruction from indirect information, allows us to establish

the actual energy levels which are present. Instruments provided by the Scientific Community measure only point "A" to "B", and when both are ambient, no potential energy is shown. This is the "bird sitting on the million volt power line and sensing nothing" approach. The Earth's actual ambient background has as it's Energy level multi-billions of Volts, which are conveniently and obliviously ignored by the scientific community. When properly understood, this enormous, never-ending source of environmentally-friendly energy becomes available.

ELECTRICAL ENERGY GENERATING SYSTEM

Patent Pending 08 / 100,074

1. Gelcel, 6 or 12 Volt.
2. Diode. Pass. use a Varactor.
3. High Voltage Module. Constituting the L-1 and L-2 Coils.
4. Capacitor, TDK 10.9 Pf., 30 KV.
5. Spark Gap, Small Engine Spark Plug, Gap = .0025 in.
6. Induction Transfer Coil L-3.
7. Induction Receiving Coil L-4.
8. Voltage Control Shunt.
9. Frequency Adjustor, prevents derailing by Diode Bridge.
10. Diode Bridge, 200 Nanosecond, R.F., > 100 KV.
11. Voltage Divider Circuit, corrects voltage for next stage.
12. Capacitor, electrolytic, smooths out DC + ripple effect.
13. Earth Ground.
14. Voltage Divider Curcit, corrects voltage for Transformer
15. Inverter Circuit, DC + in and 60 CPS to Transformer
16. Output from Transformer to Load (Work).
17. Center Tap

17 JANUARY, 1977

Electrical Energy System

Don L. Smith, Energy Consultant

At a meeting between J.P. Morgan, Edison and Tesla, Tesla proposed an Electrical Energy System which could he connected into directly, without using a meter. Tesla's Idea of "Free Energy" was not compatible with their thinking. Courtesy of Morgan and Edison, from that day foreword, a complete and total bastardization of the Idea has been in progress. Agents for Morgan and Friends include the U.S. Patent Office and Academia. Academia's bad habit of incestuous quoting of each other, eliminates them as a possibility in cleaning up the mess. This selective ignorance, permeates throughout the study of electricity.

Many people, otherwise known as "intellectuals", have a total blackout and become jabbering idiots when "free-energy" is mentioned. The term has been amended to say, "something which was never there is being harvested and that this violates the laws of physics". For the selectively ignorant, this seems the way to run. Those who choose Morgan's drum beat, have severely limited the possibilities built into electricity.

This paper will be an exercise in creative understanding, in placing updated knowledge at your disposal. Whether it becomes a useful tool or is selectively ignored is your choice.

Electrons are defined as being the practical source of electrical and magnetic energy. The electron as a particle, was postulated by professor J. Thompson in early 1900's. It is now universally accepted that the electron exists and that it is the source of electricity. When the electron is agitated it produces magnetic and negative electrical energy. Physics as it exists today, cannot explain why the electron remains intact and is not diminished by the energy it releases. This is a part of the built-in ignorance provided by the Morgan and Edison Camp.

One volts worth of electrons, when cycled, yields one volts worth of electricity. This can be repeated continuously forever and it never deplete or diminishes the electrons in question. They simply return to their air and/or earth source, waiting to do the whole thing again and again. Therefore, electrical energy is available, anywhere and everywhere humans go. People who intercede for profit, set the cost of electrical energy. Otherwise, all electrical energy is free, Morgan and Edison be damned.

Improving upon Professor Thompson's postulation, other obvious characteristics can be seen to further define the electron. It has both magnetic and electrical emanations resulting from a right-hand and left-hand spin. Since magnetism and amperage come as one package, this suggest, that electrons in their natural non-ionic state, exist as doublets. When pushed apart by agitation one spins and supplies electricity and the other spins and provides magnetic (amperage) energy. When they reunite, we have Volts x Amperage = Watts. This Idea, until now, has been totally absent from the knowledge base.

The number of times that an electron is cycled, sets the collective energy potential present. The electrical equivalent of $E = mC^2$ is $E = (Volts \ x \ Amperes) \ x \ (Cycles \ Per \ Second)^2$. Those who choose, are now free to head for the bushes and make their usual contribution to humanity.

Prior to Tesla, there was a large group of people in Europe, who were building resonant coil systems for medical use. Amperage was dangerous in their coil systems. The Tesla Coil is only the Voltage half of their coil system, as will be demonstrated.
A short list of those (from 1860 onwards) active in resonate high frequency coil systems include; the Curies, Roentgen, Ruhmkoff, Oudin, Hertz, Levassor, Dumont, D'Arsonval and many others.

Peugeot, Panhard-Levassor, Bollee, Renault and others had successful electric automobiles in

production using A C. motors. Various electrically-powered airships, including the Dirigible "France" were in service.

D'Arsonval, Professor of Experimental Medicine at the College of France, invented the electrocardiograph, oscilloscope, amp and volt meters, thermography and numerous other medical applications of high frequency electricity. As early as 1860, he was building high frequency coil systems, which he used in his experimental work. There is a strong connection between the work of Tesla and the people mentioned above.

Electric vehicles of all sorts, dominated until the 1920s, when the electric starter motor made the internal combustion engine practical. Prior to that, upon cranking, it frequently would break the owner's arm. At that point the use of batteries as a source of power was replaced by oil.

The establishment's carpet has some rather large lumps under it. Coulomb's and Newton's inverse square law is politely ignored and it's opposite is allowed to have only the most abstract status. Without opposites we have no definition.

The source value of a remote flux reading, requires the squaring of the distance, times the remote reading, to obtain the original value. The opposite of this, being the derivations relate to Energy equals Mass times the Velocity constant squared. The electrical equivalent, being Energy equal capacitance times voltage squared and Energy equals induction times amperes squared. Flux lines increase as the law of squares and then activate electron energy which was not previously a part of the sum. The cumulative capacitance and inductance increase as the outer ends of a Tesla coil are approached, and this results in output energy being greater than the input energy present. This Energy is real. It can be safely measured by magnetic flux methods and electrostatic voltmeters, based on the inverse square law

As seen above, flux lines result both from induction-henrys-amperage and capacitance-coulombs-volts, and define electrical energy. The non-linearity of this system does not obey Ohm's law, which is replaced with impedance and reactance for alternating current systems. Impedance is the sum of the system's resistance to AC current flow, and this becomes zero at resonance. In resonant induction systems, a cycles-per-second increase, invokes a second round for the law of squares.

The degree to which flux lines are present, disturbs an equal amount of electrons, upsetting the ambient background energy, resulting in useful electrical energy being obtained. The frequency at which the disturbance occurs, increases the useful energy available, and it obeys the law of squares. Two square-law components, *flux density* and *frequency* are involved. Enter resonance which cancels the resistive effect.

Only the electrical energy which is either above or below the ambient level is useful. For the Central U.S. going east to west, ambient as approximated by electro-static voltmeters and flux methods is 200,000 volts on a solar-quiet day. At night time, the ambient energy level drops to about one half of the daytime value. On a solar-active day, it may reach more than five times that of a solar-quiet day. Ambient background energy at the polar regions, is approximately 500,000 volts on a solar-quiet day. The background energy varies as it relates to the North-South component and the East-West continuum.

This leaves us with an interesting problem. Electrons, when disturbed, first produce magnetic flux and then produce electrical flux when they spin back to their normal position. Therefore any electron movement produces above ambient energy, being over unity.

ELECTRICAL ENERGY WITH ASSOCIATED PHENOMENA

1. Current-amperes results from the unequal distribution of negativity (electrons).

2. Electron spin causes electrical current and magnetic lines of force.

3. Magnetic imbalance causes the gravitational effect. This is evidenced in electric motors by magneto-gravitational displacement of mess, which causes the motor to rotate.

<u>ENERGY LINES OF FLUX (FORCE)</u>
<u>FIELDS & WAVES</u> *
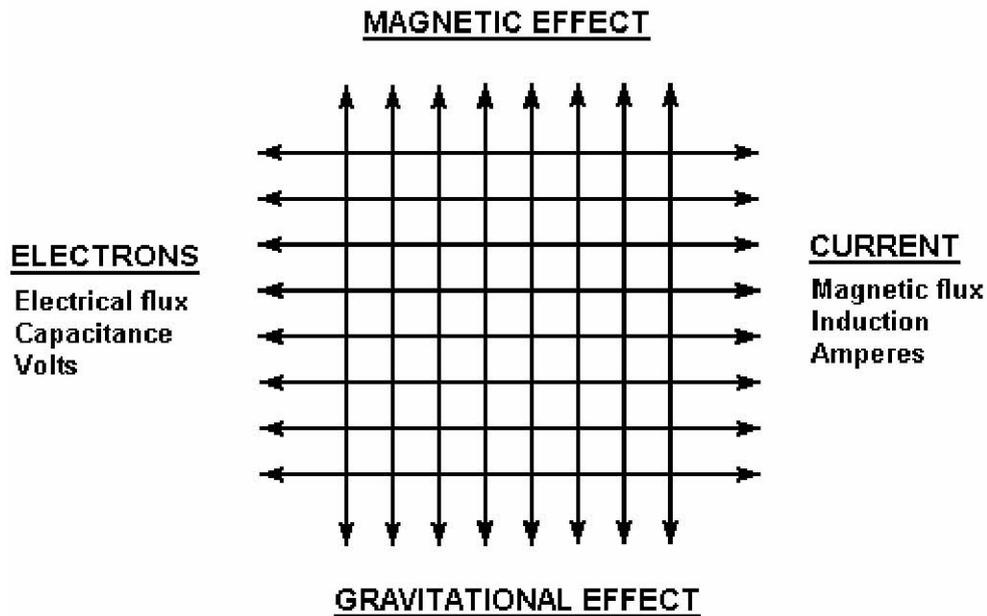
* Below 20,000 Cycles Per Second = **Fields**
Above 20,000 Cycles Per Second = **Waves** (Radio Frequency)

Derivation of Magnetic and Electrical Power

<u>Analogous Relationships</u>:

1. Potential Power is present in a bar magnet as shown:

BLOCH WALL (Space)
(Area of Electron Spin Seperation)

More Negative   S   N   Less Negative

Domain has:
Left hand spin
(= Source of Volts)

Domain has:
Right hand spin
(= Source of Amperes)
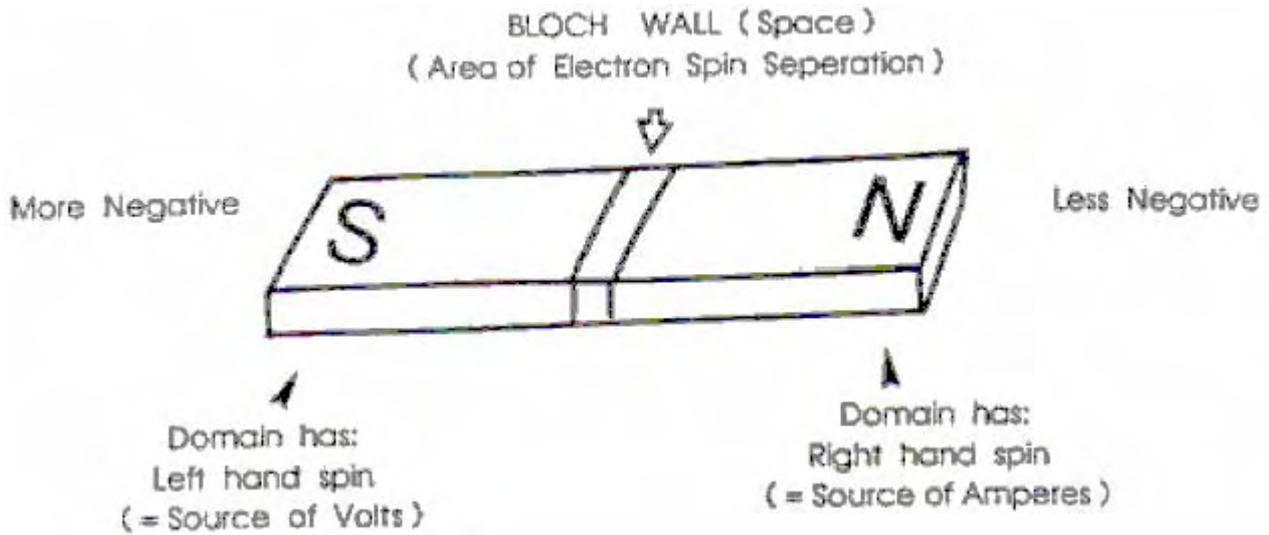
2. The Source of these Electrons being from the Solar Plasma, are non-ionic and occupy all Free Space. They are commonly obtained from Earth and Air Groundings. They exist in Doublet Pairs, one being more negative than the other. The more negative one has a Left Hand Spin. The less negative one has a Right Hand Spin.

3. Resonate Electrical Coil Systems (Tesla) are Analogous to the System observed in the Bar Magnet (above). The Bloch Wall Area is Located at the base of the L-2 Coil. The Left Spin portion of the coil (Voltage Only) Coil predominates. The Right hand Spin portion of the coil (Magnetic-Amperage) is mostly absent.

Tesla   Coil   Geometry *

Electrons-Volts   Current-Amperes

< —   < —

Correct Method of Measurement
Use the inverse square law with
an Electrostatic Volt Meter to
measure from a safe distance.
they are frequency nonspecific.

◄ Volts

L - 2

L - 1

Amperes ⇨

Correct Method of Measurement
Use the inverse square law with
Hal-Effect devices to measure from
a safe distance, they are normally
frequency nonspecific. The
magnetic field they measure
converts directly to Amperage

Volts dominate if the L-1 Coil is far right
Volts and Amperes about equal if L-1 Coil centered

This End Has Greater Voltage
Distributive Capacitance at Maximum
Capacitance-Coulombs-Voltage
Voltage has Electrons spinning to Left

This End Has Greater Amperage
Distributive Inductance at Maximum
Induction-Henrys-Amperage
Amperage has Electrons spinning to Right

Volts represent the more negative and Amperes the
less negative. Therefore the electrical charge of more
negative must seek the less negative to regain ambient.

* Contains proprietary information related to Patent Procedure
Geometry – properties of lines, surfaces and solids

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Induced Electrical Energy System

Collection and transfer of energy requires temporary storage, which occurs as capacitors and coils of a resonant circuit are cycled, on and off. The frequency at which the capacitors and coils are pumped, determines the amount of electrical energy that moves onward.

The amount of Energy transferred relates directly to the density of lines of flux present. The Kinetic Energy Formula is helpful in establishing the amount of energy present. This formula squares the velocity times mass. In the case of electrical energy, the intensity of voltage and amperes multiplied by the cycles per second, replace the velocity component.

Note that the "acceleration" of the Voltage "E" and Amperage "I", which increase as non-linear components, then obeys the Law of Squares.

Each unit of increase, causes a squaring of the flux lines present. The amount of energy transfer caused by this increase in flux lines is demonstrated below.

Increase in Flux Lines Present Symbolized

One Volt   Two Volts = Four   Four Volts = Sixteen
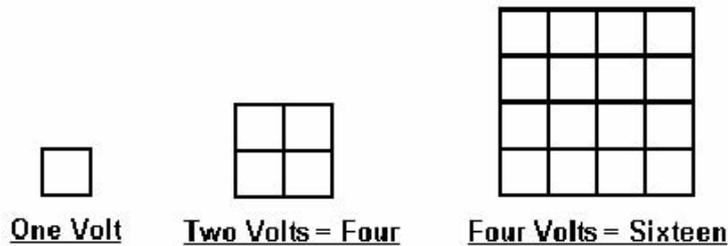
In resonant air-core coil energy transfer, the increase in flux lines present disturbs more electrons than previously, resulting in over-unity energy being present and available.

Energy stored, times the cycles per second, represents the energy being pumped by the system. Capacitors and inductors store electrons temporarily.

Capacitor formula: **W = 0.5 x C x E x Cycles per second**   where:

> **W** = energy in Joules (Watt Seconds)
> **C** = capacitance in farads
> **E** = applied potential in volts squared.

Inductor (Coil) formula: **W = 0.5 x L x I x Cycles per second**   where:

> **W** = energy in Joules (Watt Seconds)
> **L** = inductance in henrys
> **I** = current in amperes squared

Both one henry, and one farad, equal one volt. The higher the cycles per second, including the squaring of the flux lines, cause a large increase in the amount of energy being produced.

The above combined with a resonant energy induction system (where all electrons are moving in the same direction at the same time), make the next move into over-unity practical.

The dampening process of conventional electrical power generation, has all the available electrons bouncing randomly, mostly cancelling out each other. In that System, the useful energy available is a very small percentage of the energy which is present.

In the resonant induction system, a very high percentage of the energy present is useful. At resonance, (ohms-impedance-Z) becomes zero and all of the energy present is not degraded and becomes available to do useful work. "Ohms" is load or wasted energy, and "amperes" is the rate of that wasting of energy.

Using the previous information, if we now apply it to an air-core coil, resonant transformer energy system. L-1 and L-2 coils are now present. L-1 has a smaller number of turns and is several times the diameter of L-2. Input from a 12 volt high-voltage laser driver source, produces 8,000 volts with a low level of wasted energy, pushing amperage into, say, 4 turns of coil L-1. Each turn of the L-1 coil then acquires 2,000 volts of resonant potential. Consequently, each turn of L-2 is then exposed to the electric flux of 2,000 volts. Each turn at the bottom end of L-2 acquires 2,000 volts. The flux lines are squared and are additive as the voltage and amperage progresses towards the top end of L-2's large number of turns.

A huge number of additional flux lines which were not previously present become present at the top end of the L-2 coil. These flux lines excite the nearby electrons in it's earth and air and groundings. This high level of excitement above the ambient, causes a large number of electrons which were not previously a part of the energy present, to become available for use. At this point over-unity is present in large amounts.

The "bubble gum between the ears" response to this is: "this must be lots of volts but no amperes". Please recall that amperage is wasted energy, and that until that wasting occurs, there are no amperes. A good way to demonstrate this, would be to let the bubble gum crowd put their hands on the high-voltage end of the device while standing on wet ground (a people zapper). **Note: don't do this.**

This over-unity device produces energy at radio frequencies which range into the megahertz band. This allows the device to be small in size, and yet produce large amounts of energy. A megawatt-sized unit will sit comfortably on a breakfast table. This energy is changed to Direct Current and then switched to produce the desired working frequency AC.

Power Triangle
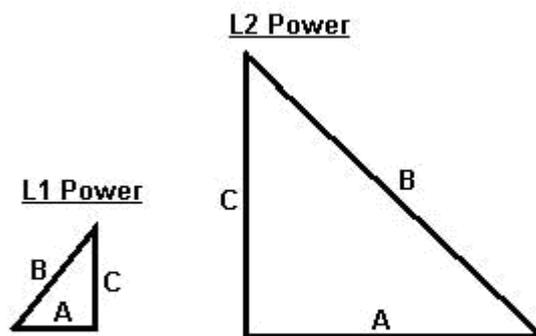
A: Volts x Amperes (the Available Power)

B: Volts x Ampres x Time (the Used Power)

C: Volts x Amperes x Recative (the Resonant Power)

1. Random movement of electrons in "A" and "B", mostly cancel each other out. This dampening, or wasteful concept of energy, is a source of much pleasure for the establishment.

2. "C" (Volt, Amperes, Reactive "V.A.R."), is the situation where all of the electrons move in the same direction at the same time. This results in near-unity energy output by resonant induction transfer.

3. Resonant induction transfer from one isolated power system, allows other resonant induction systems to duplicate the original source, which in no way diminishes the original source. Air-core coils (isolation-transformers) confirm this when they are a part of one of these functioning systems. A less perfect illustration would be the fact that the number of radio sets tuned to a particular radio

transmission, does not alter the power required at the radio transmitter.

4. Resonant induction transfer, disturbs a large number of adjacent electrons which were not a part of the original input power source. The pulsating-pumping effect then draws in the newly available additional electrons into the on-going energy generation system. A near unity energy system of resonant air-core coils and the extra acquired electron-energy source constitute an over-unity system.

Electrical Power Generation / Points of Reference

Useful Electrical Power is Generated when Electrons from Earth and Air Groundings are disturbed by the movement of coils and magnets with reference to each other. The resulting electrical and magnetic energy is then changed to joules [watt-seconds: Volts x Amps x Seconds]. Each forward electron movement results in a magnetic impulse and each return movement causes an electrical impulse. The composite of the electrical energy impulses from these electrons yields useful energy [Power].

Let the above electron movement be represented by a room full of ping pong balls bouncing randomly. Most of the energy present cancels out by random impacts. This is the Classic Under-Unity approach to Electrical Power Generation, sanctioned by the Establishment.

In contrast to that, in the Electrical Energy Generation System presented here, the resonant Electrons are all moving in the same direction at the same time. This allows Near-Unity Electrical Power to Develop. This is the room-temperature equivalent of super conductivity.

The Energy System presented here, consists of a properly-adjusted and functional resonant air-core coil tank. The magnetic energy is stored in the coil system and the Electrical Energy is stored in capacitors. From Maxwell and others, we know that electrical-related energy has an equal amount of magnetic energy associated with it.

"The formula which establishes the Useful Energy of the System":

$$\text{Joules} = 0.5 \text{ x } \mathbf{C} \text{ x } \mathbf{V^2} \text{ x } (\textbf{Cycles Per Second})^2$$
 units:
Joules (Volts x Amps x Seconds) Watt Seconds where

$\mathbf{C}$ = Capacitance in microfarads
$\mathbf{V}$ = Potential in Volts

The transfer of Electrical Power by Resonant Induction is a direct function of the squaring of the cycles per second. For example, square 60 C.P.S. and then square the radio frequency C.P.S.s of the System here presented. Obviously, One Million Cycles per Second transfers more energy than Sixty Cycles per second. The Sanctioned Method of Electrical Power Generation uses the 60 C.P.S. Method. Using 60 C.P.S. and the random scattering of the Electrons System, assures the Establishment of it's desired Under-Unity Goal.

This random bouncing of the Electrons is the Ohms of Ohm's Law and is used to establish the rate of dissipation and/or Load [Work].

In the Resonant Tank Induction Energy Transfer System presented here, Impedance [system resistance] replaces the conventional ohm's usage. At Resonance, impedance becomes zero and the full force and effect of the Energy Transfer occurs. This is superconducting conditions at room temperature. At radio

frequency the Electrons do not pass through the conductor as they do at lower frequencies. Instead, these Electrons encircle the conductor and are free of the conductor's resistance.

Let the Establishments Power Generation System be called 'A" and the System presented here be called "B".

With "A": Given 60 C.P.S. at 120 Volts using a 10 microfarad Capacitor:

$$\textbf{Joules} = [0.5 \times 0.000010 \times 120]^2 \times (C.P.S)^2$$

(120 x 120 = 14,400)
[0.000010 x 14,400 = 0.144]
[0.144 x 0.5 = .072]
(0.072 x 3,600 = **259.2**]

Using the Inventor's Resonant Induction System, the Electrical Power available would then be 259.2 Joules [Watt-Seconds]. Using the Establishment's method only permits less than 10 Watt-Seconds of Useful Electrical Energy.

"B". Given One Million Cycles per second at 100,000 Volts, using a 10 microfarad Capacitor.

$$\textbf{Joules} = [0.5 \times 0.000010 \times 100,000]^2 \times (C.P.S.)^2$$

(100,000 x 100,000 = 10,000,000,000)
[0.000010 x 10,000,000,000 = 100,000]
(100,000 x 0.5 = 50,000]
(50,000 x One Million squared = **50,000,000,000,000,000**)

The useful Electrical Energy available is greater than 50 Mega Watts. Since the Resonant Electrons are non-impacting, all of the Energy is available for direct usage.

Benefits of the Inventor's System

1. Induction Energy transfer is enhanced by the squaring of the cycles per second produced by the System.

2. Induction Energy transfer is enhanced by the squaring the input voltage and amperage.

3. The increase of the flux lines occurring from the above, disturbing more electrons, causes more electrical energy to become available.

4. Resonant Induction has all of the Electrons moving unimpeded, resulting in superconductor conditions at room temperature.

5. A smaller amount of energy is used to disturb a larger number of Electrons. Electrons not originally a part of the System then contribute their energy, resulting in a net gain in available usable power.

6. The physical size of the System [Device] is small. The Device described in "B" sits comfortable on a breakfast table.

7. A small energy source is used to start the device and that source remains fully charged at all times by the System.

The Evidence Against Under Unity

1. Use of Logarithmic Scales on electrical measurement instruments. Linear measurement works fine where Ohm's Law applies (direct current). In alternating current, ohms are replaced by impedance and the measurements become non-linear.

2. Infinite "Q" at resonance confirms that voltage and amperage is squared, as in the kinetic energy formula. See the formulas of this report.

3. Square waves are clipped infinite "Q"s.

4. Maxwell and others show that magnetic-inductance-amperage and electrical-capacitance-voltage are two sides of the same coin. Magnetic-inductance is directly equal to amperage. Both obey the Law of Squares, which has over-unity built in.

5. Magnetic and electrical flux are present in enormous amounts at the outer ends of an operating Tesla Coil.

6. Ignorance of how to measure and relate magnetic and electrical flux, is the chief weapon of the under-unity gaggle.

7. The Cumulative inductance and capacitance of the Tesla Coil grounds itself out, if not properly utilized. See this report for the temporary energy storage accessible, when properly managed.

8. The Patent Office refers devices related to over-unity to their metering group, which is a sure indication that they are aware and accept the logarithmic measuring devices. This is direct and absolute evidence that they accept the square law as it relates to kinetic energy. This also indicates they are aware that over-unity exists. Since their bureaucratic brain is improperly motivated they continue to badger inventors who are working in the over-unity arena. Their level of intellectual dishonesty is sanctioned by, and is a real part of doing business with, a government which prides itself in being a hooliganistic bureaucracy.

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An Answer to America's Energy Deficit

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Energy, energy everywhere and not a Joule to Jounce.   Conventional wisdom, when properly tuned will appreciate the nature of energy, as here presented. The basic unit of electricity (the electron) upon encountering a moving magnetic field (or wave) spins, giving off an electric impulse. When this impulse collapses, it spins back to it's natural position, giving off a magnetic impulse. Therefore, magnetic and electric are two sides of the same coin. When the magnetic side is pulsed, it yields electricity and conversely, pulsing of the electrical side yields a magnetic field. Moving one in relation to the other produces useful energy.   When done consecutively, each cycle pushes (current) forward, while pulling electrons into the system... in much the same way as a water pump moves water. These electrons are obtained from Earth and air grounding.

The word "electric" comes from the Latin word electron "amber". When rubbed, amber develops an electrical charge, which can be transferred to a dissimilar substance. During the seventeenth and eighteenth centuries, a great deal of attention was centered on this attribute of amber. Amber was used to differentiate the non-metals. Carbon-related substances and other non-metals, when subjected to friction, give up negative electrical charges. On the other hand, metals when subjected to friction, simply conduct the charge. It is important to note that approximately 70% of the Earth's exposed crustal portions (surface) consist of silicone-related non-metals (electron donors) and become a direct source of electrical energy when properly agitated.

Useful electrical energy can be obtained by grounding into the Earth's non-metal crust and into it's atmosphere as

a natural source of electrons. These electrons have accumulated from the solar plasma during the aging of the Earth for more than 4.5 billion years, at a rate exceeding 3.9 exajoules per year This indicates that the Earth's electrical field contains in excess of 17.6×10^{18} of cumulative exajoules of energy. One exajoule is the approximate energy equivalent of 125 million barrels of oil. The electrical energy in one display of lightning is approximately ten trillion joules. During each 24 hour period, the land portions of Earth's surface yields in excess of 200,000 emissions, which involves more than 2,000 quadrillion watts.

C.F. Gauss (1777-1855) and H.C. Oersted (1777-1851) were each separately trying to define the Earth's electrical field with all external influences removed. These external influences being solar-quiet periods and being remote from the land's surface. The air electricity background which they measured varies with latitude. Their European measurements correspond to approximately the latitude of Washington. D C. They were measuring magnetic field flux as an indicator of negative electron energy active and present. A related family of measurement are now presented. Units of measurement used to define flux fields include Gauss (one unit = 100,000 volts), Oersted (one unit = 50,000 volts), Tesla (one unit = 10,000 Gauss) and Gamma (one unit = 1/10,000 of a Gauss). Much confusion exists in electrical related publications about these units. As presented here they are correct with values taken from their original definitions.

The entire surface of the Earth has been surveyed by aerial magnetometer, in most cases using gamma or nano teslas. One gamma is the magnetic flux equivalent of 10 active volts of electricity. When the data is corrected for flight height it becomes obvious that there are numerous areas where the gamma readings exceed one trillion gammas. Lightning strikes from the ground up are in that energy range. With knowledge of these electron enriched areas, the quality of Earth grounding, becomes enhanced. The correction necessary for land surface data when acquired from aerial magnetometer maps (using Coulomb's law) requires that the remote distance be squared and then multiplied by the remote reading. As an example, if the remote reading is 1,600 gammas and the flight height being 1,000 feet. Take 1,000 x 1,000 = 1,000,000 x 1,600 gammas = 1.6 trillion gammas x 10 volts = 16 trillion volts equivalent for land surface data. Present day methodology requires mechanical energy in exchange for electrical energy. Once obtained, this energy is subject to Ohm's Law. Present Methodology obtains it's electrical energy from it's non-metal and air groundings.

This same energy can be obtained without the wasteful mechanical approach and at a much, much lower cost. Any required amount of electricity is available by resonant induction transfer from the Earth's magnetic and electrical fields. The major difference is in the functioning of Ohm's Law in relation to resonant circuits. In the resonant induction system suggested here, system resistance (Z) becomes zero at resonance.

Therefore, Volts and Amperes are equal (V.A.R.) until work (load) is introduced.

Each cycling of this resonant induction system pulls in additional electrons from the Earth's electrical field, generating electrical energy in any required amount. In this system, a small amount of electrical energy is used to activate and pull a much larger amount of energy into the system.

This electrical advantage corresponds to the pulley and lever of the mechanical world. The electrical system presented here is extremely efficient. Using present methodology as a basis for comparison, with it's 60 cycles per second system. The resonant induction system, cycling at 60 million times per second produces one million times the energy which is produced by the present energy systems. A single small size unit of the resonant induction system has more usable electrical output than a major conventional unit. The radio frequency energy produced is easily changed to Direct Current, and then to the present 60 cycles per second system in preparation for commercial usage.

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The Patent Pending on this system is #08/100,074, "Electrical Energy Generating System", dated 4 February, 1992.

Definitions:
One **Joule** is one watt for one second
One **Watt** is one volt ampere
V.A.R. is Volt Amperes Reactive

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ALTERNATING IMPACT ENERGY TRANSFER ANALOGY

ENERGY TRANSFER BY SWINGING STEEL BALLS

ELECTRICAL ENERGY TRANSFER BY INDUCTION PULSED (IMPACTED) ELECTRONS

IMPACT ENERGY CURRENT

OFF - ON GROUNDING SWITCH

POINT A

POINT B

ELECTRONS

ENERGY CURRENT

PULSED-INDUCED-IMPACTED ELECTRONS OUTPUT

INPUT ENERGY FROM "A"

IN ALTERNATING ELECTRICAL ENERGY SYSTEMS, ONLY THE POTENTIAL-IMPACT LEVEL REPLICATES IT'S SELF AT POINT "B". ELECTRONS DO NOT TRAVEL FROM POINT "A" TO POINT "B".

E.E.S. II, BACKGROUND INFORMATION & CONCEPT

With alternating electrical current, electrons do not move from point "A" to point "B" as commonly envisioned! Electrical potential (oscillating electrons) at point "A", results in harmonic electron activity at point "B", when the grounding switch (circuit) is closed. That is to say, point "B" supplies it's own electrons and mirrors the activity of point "A". Impulsing (turbulence) by magnetic induction causes electrons to be pulled into the system, which then oscillates. When the magnetic field collapses (becomes absent) the electrical potential returns to it's natural background level.

Several major flaws are present in the conventional 60 cycles per second method of electrical power generation and it's iron core transformer system. ***This system is handcuffed by the inverse relationship of volts to amperes.*** This represents a stodgy, inflexible inheritance, courtesy of Mr. T.A. Edison and his concept of electrical power generation.

Nikola Tesla stood, almost alone, against Edison and managed to prevail with his Alternating Current system. Without the alternating current system, electronic things in the modern sense would not exist.

This report will be concerned with some of the extensions and benefits of the alternating current electrical system. ***This study will limit it's scope to air core coil transformers at radio frequency and upwards. The electrical power produced by this method is inverted to Direct Current and then to Alternating Current as required for popular usage.*** There are several important advantages of this system over conventional power generation.

Start with two coils (separate-apart), one being a reactor coil (L-1) and a second coil (L-2), being the reactant coil. Magnetic field fluxing (off-on of the electrical source) causes inductive reactance of L-1 which replicates by induction in L-2. Pulsing of the magnetic field (from L-1) in the presence of L-2, generates electrical potential. For example, should the L-1 coil have ten turns, with an imposed AC. potential of 1,200 volts. This results in each turn of L-1 acquiring 120 volts of potential. This induced magnetic field, then replicates itself in each turn of the L-2 coil. The L-2 coil may have one or many hundreds of turns. Modern encapsulation techniques makes high frequency and high energy controllable.

Let's take another important step in this air-core transformer process. For purpose of discussion, let the value of inductive reactance at 60 cycles per second, equal one. Each time the frequency is doubled, the effectiveness of induction is squared. At about 20,000 Hz, *when radio frequency is achieved, the electrons begin spinning free, outside of the inductor and they become increasingly free of the inverse relationship of volt-amperes.* From this point on, they replicate by the inductive process as V.A.R.. *That is to say, volts and amperes are equal, until resistance (work) is introduced. Therefore, additional, not previously available electrons become incorporated for a very large net gain in potential. This gain is real !*

The quality of the grounding system determines the effectiveness of this method of producing electricity. A handy reference to locate the negative grounding areas for power generation can be found in the Aeromagnetic Map Studies of the US Geological Survey. They provide an excellent method for locating the best sites for optimum negative grounding areas.

When this method is combined with the induction coil system, already described, it provides an electrical power generating system millions of times more efficient than any known conventional method.

This new system ("E.E.S. II") is uncomplicated, physically small and it is inexpensive to build. The technology required for it's construction already exists. Maintenance is near zero, as there are no moving parts. Once operating, this system could last forever.

Small mobile E.E.S. II units are already available as replacements for the batteries used in electric automobiles. Larger E.E.S. II units can be provided as a replacement source of power for hotels, office buildings, subdivisions, electric trains, manufacturing, heavy equipment, ships, and generally speaking, any present day application of electrical power.

Earth Electrical System II, Modular Units

The system consists of three separate modules. Reverse engineering is used in matching the modules to the desired usage.

HIGH VOLTAGE INDUCTION TRANSFORMER MODULE:

1. Preferably an off-the-shelf-unit similar to a TV flyback and/or automobile ignition type related coil (transformer).

2. Ratio of input to output may be from less than 1:100 to greater than 1:1,000 A voltage tripler may then be used.

3. A connection allowing the high voltage output to pass onward through the induction coil L-1 and then to it's grounding.

AN AIR CORE INDUCTION COIL TRANSFORMER MODULE:

1. There are two coils: the reactor coil L-1 and the reactant coil L-2. L-1 has a high voltage radio frequency capacitor between it and it's grounding.

2. Input into the L-1 inductor is divided by the number of turns in it. The magnetic flux field provided from each turn of L-1 replicates itself as an electrical potential in each turn of L-2.

3. L-2 may have one turn or many hundreds of turns. The net gain depends upon the number of turns in L-2. Output from L-2 is in V.A.R. **With this type of output, volts and amperes are the same until work(resistivity) is introduced.**

THE INVERTER MODULE:

1. Inverts to direct current (D C.)

2. Inverts to alternating current (A C), as desired.

3. Provides customized output of electrical power ready for designated usage

EARTH ELECTRICAL SYSTEM II, DOMESTIC USE RANGE MODULE
UP TO TWO MILLION VOLT-AMPERES-REACTIVE OUTPUT *
PLAN "A", WITH VARIABLE CONTROLS
NOT TO SCALE
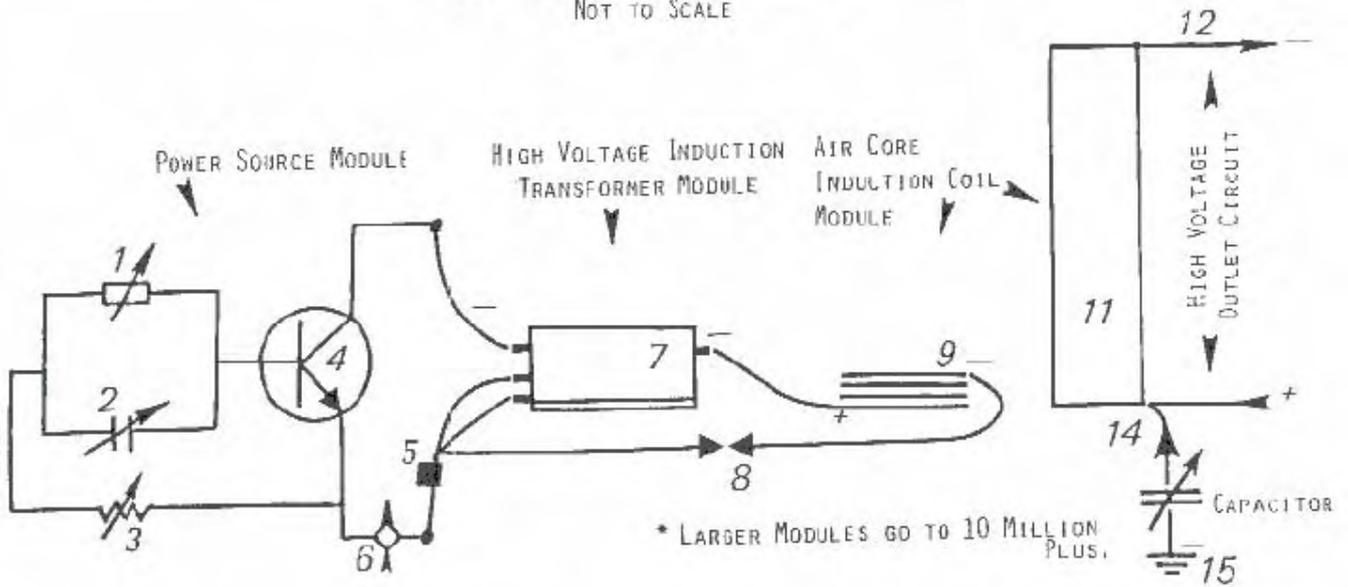
PARTS: 1, COIL, VARIABLE. 2, CAPACITOR, VARIABLE, 3, RESISTOR, VARIABLE, 4, TRANSISTOR, R.F.,
5, BATTERY, RECHARGEABLE, 6, OFF-ON SWITCH, VARIABLE, 7, HIGH VOLTAGE TRANSFORMER,
8, FEED BACK WITH SPARK GAP, 9, REACTOR, INDUCTION COIL, 10, FEED BACK WITH SPARK GAP,
11, REACTANT COIL. 12, OUTPUT FOR # 1, 13, INPUT FOR ELEVEN, 14, GROUNDING FOR ELEVEN.

EARTH ELECTRICAL SYSTEM II. DOMESTIC USE RANGE MODULE
UP TO TWO MILLION VOLT-AMPERES-REACTIVE OUTPUT *
PLAN "B". ELECTRICAL AUTOMOBILE ENERGY SOURCE
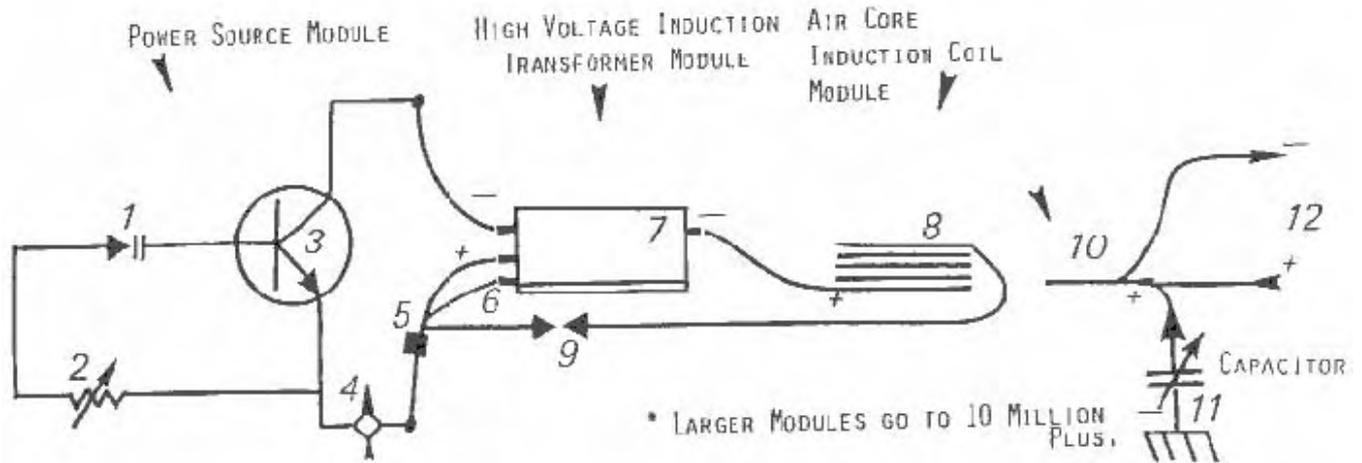
PARTS: 1. VARACTOR, RADIO FREQUENCY. 2. RESISTOR. 3. TRANSISTOR, RADIO FREQUENCY.
4. OFF-ON SWITCH, MULTI-POSITION. 5. BATTERY, RECHARGEABLE. 6. TRANSFORMER GROUNDING.
7. HIGH VOLTAGE INDUCTION TRANSFORMER. 8. REACTOR, INDUCTION COIL. 9. FEED BACK WITH
SPARK GAP. 10. REACTANT, INDUCTION COIL. 11. GROUNDING FOR # 10. OUT-PUT CIRCUIT,
IN VOLT-AMPERES-REACTIVE.
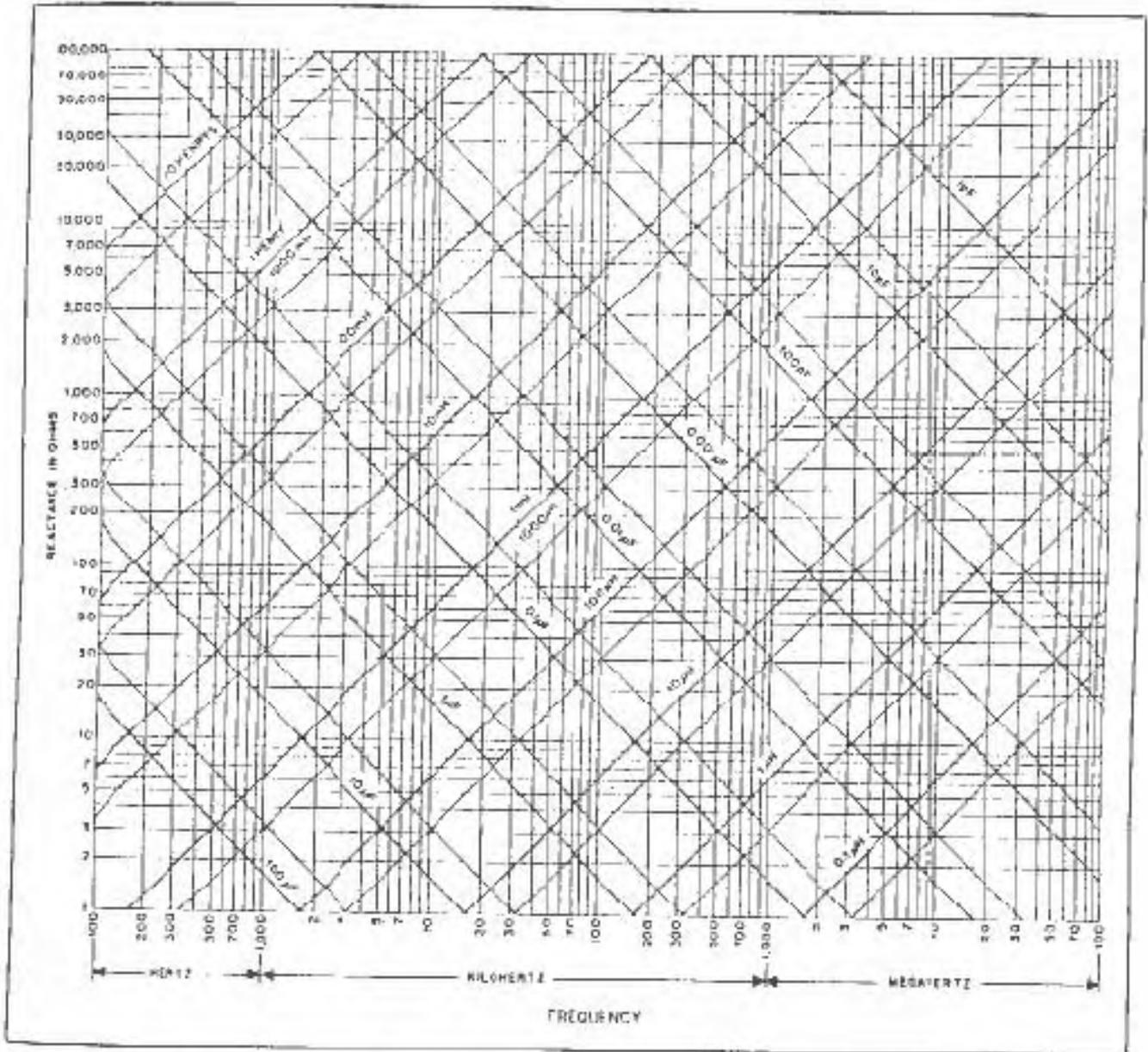
Fig. 44 — Inductive and capacitive reactance vs. frequency. Heavy lines represent multiples of 10. Intermediate light lines multiples of five. For example, the light line between 10 μH and 100 μH represents 50 μH; the light line between 0.1 μF and 1 μF represents 0.5 μF, and so on. Intermediate values can be read within the chart range. For example, the reactance of 10 henrys at 60 Hz can be found by taking the reactance of 6 henrys at 600 Hz and dividing by 10 for the 10 x times decrease in frequency.

CHART, COURTESY OF A.R.R.L., 1992 ED.

**Speech presented the evening of 23 July. 1994 at the
International Tesla Society Convention at Colorado Springs. Colorado.**

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ELECTRICAL ENERGY REFERENCE POINTS
Electrical Energy Generating System
Patent Pending # 08/100.074. 2/4/92

The word "electric" comes from the Latin word electron "amber". When rubbed, amber develops an electrical charge, which can be transferred to a dissimilar substance. During the seventeenth and eighteenth centuries, a

great deal of attention was centered on this attribute of amber. Amber was used to differentiate the non-metals. Carbon-related substances and other non-metals, when subjected to friction, give up negative electrical charges. On the other hand, metals when subjected to friction, simply conduct the charge. It is important to note that approximately 70% of the Earth's exposed crustal portions (surface) consist of silicone related non-metals (electron donors) and therefore becomes a direct source of electrical energy when properly agitated.

Useful electrical energy is obtained by grounding into the Earth's non-metal crust and into it's atmosphere as a natural source of electrons. These electrons have accumulated from the solar plasma during the aging of the Earth for more than 4.5 billion years, at a rate exceeding 3.9 exajoules per year. This indicates that the Earth's electrical field contains in excess of 17.6×10^{18} power of cumulative exajoules of energy. One exajoule is the approximate energy equivalent of 125 million barrels of oil. The electrical energy in one display of lightning is approximately ten trillion joules. During each 24 hour period, the land portions of the Earth's surface yields in excess of 200,000 emissions, which involves more than 2,000 quadrillion watt-seconds of active energy on display.

This physical phenomenon indicates that the Earth's crust is an unending source of electrical energy. The surface area involved is a very small portion of the Earth's crust.

J.C. Maxwell (1891) suggested that an active electron field gives rise to an associated magnetic field. Therefore, both are present with pulsating current. Early studies, involving observation of compass needles by microscopy, revealed that the needle vibrates as with alternating current. More recent studies by A. Nishida and others, confirm that alternating current is common in the Earth's crust.

C.F. Gauss (1777-1855) and H.C. Oersted (1777-1851), both were separately trying to define the Earth's electrical field with all external influences removed. These external influences being solar-quiet periods and being remote from the land's surface. The air electricity background which they measured varies with latitude. Their European measurements correspond to approximately the latitude of Washington, D.C. They were measuring magnetic field flux as an indicator of negative electron energy active and present.

A related family of measurement is now presented. Units of measurement used to define flux fields include Gauss (one unit = 100,000 volts), Oersted (one unit - 50,000 volts), Tesla (one unit = 10,000 Gauss) and Gamma (one unit = 1/10,000 th of a Gauss). Much confusion exists in electrical related publications about these units. As presented here, they are correct with values taken from their original definitions.

The entire surface of the Earth has been surveyed by aerial magnetometer, in most cases using gamma or nano teslas. One gamma is the magnetic flux equivalent of 10 active volts of electricity. When this data is corrected for flight height, it becomes obvious that there are numerous areas where the gamma readings exceed one trillion gammas. Lightning strikes from the ground up are in that energy range. With knowledge of these electron enriched areas, the quality of Earth grounding, becomes enhanced.

The correction necessary for land surface data when acquired from aerial magnetometer maps (using the inverse square law) requires that the remote distance be squared and then multiplied by the remote reading. For example, if the reading is 1,600 gammas and the flight height is 1,000 feet. Take 1,000 x 1,000 = 1,000,000 x 1,600 gammas = 1.6 trillion gammas x 10 volts = 16 trillion volts equivalent for land surface data.

Present day methodology requires mechanical energy to be expended in exchange for electrical energy. Any required amount of electricity is available by resonant induction transfer from the Earth's magnetic and electrical fields. Each cycling of this resonant induction system pulls in additional electrons, generating energy in any required amount. A small amount of electrical energy is used to activate and pull into the system a much larger amount of energy.

ENERGY VERSUS MASS

```
        Steady State                              Unsteady State
     Static "Pre-Energy "                         Kinetic 'Energy'
  Mass attracts Mass, Gravity              Expanding, Magnetic Energy
  Dominates                                Dominates
                                                Electrons moving apart
                                                Pressure decreasing
                                             Cooling effect dominates
                                                Less scattering of Energy
                                             Negative resistance

                                           Contraction, Electrical Energy
                                           Dominates
                                                Electrons moving together
                                                Pressure increasing
                                             Heating effect dominates
                                             Scattering of Energy
                                             Positive resistance
```

Functions of active Electrons

Electrons become active when placed inside the critical distance allowed by their negativity.

Active Electrons provide:
    1. Electricity
    2. Magnetics
    3. Gravitational thrust as in Electric Motors
    4. The source of Visible Light
    5. It's charge is Negative

They move in a closed loop as seen in the Icon for infinity, not in a circle as shown in many books. One half of the loop consist of a magnetic impulse and the return half consist of the electrical impulse. This is seen as the classic sine wave of alternating electrical energy.

A flash of light occurs when two electrons suddenly find they are too close together. Daylight results from the impingement of Electrons in the Earth's atmosphere with the Electrons of the Solar Plasma.

My Concept of the Forces of Nature differs from the conventional. It consist of a weak and a strong force, each being additionally composed of electrical, magnetic and gravitational (fields and waves). Any two of the three constitute the third member; Gravity "B" of the weak force competes with humans on a daily basis. Gravity "A" of the strong force is the force that holds the Solar System and the Universe in place. Energy from the Electrons represent the weak force. Energy inside the Atom represents the strong force "A". Controlled resonant induction of any two of the three, changes into the third and is the motor that runs the Universe. We see this in the electrically-induced magnetic thrust against gravity in electric motors.

Weak force is required to dislodge electrons and strong force (atomic) to dislodge protons. Unless dislodged, these particles are of little value in producing Conventional Electrical Energy.

Therefore, in conventional electrical energy production, the particle of importance is the negative electron. Electrons have a "grudging" relationship with other electrons. They like each other, especially at arms length. Like potentials repel each other, and unlike potentials attract. To demonstrate this, take two batteries of the same type, but of a different charge level (unequal potentials). Put the plus and minus ends facing the same direction. Then with a volt meter, measure the electrical potential between the two negative ends and then the two positive ends. It is obvious that the "more negative" moves to the "less negative" is the correct concept for electrical energy generation. Electrical Energy flow consist of a higher concentration of electrons moving to an area of lesser concentration.

OHM'S LAW WITH CORRECTIONS:

A major obstruction in reference to the correct function of electrical energy is the establishment's incorrect interpretation of Ohm's Law. The corrected version is:

> **Volts** = Energy Available (Potential)

> **Ohm** = Scattering, dissipation of Energy (Load)

> **Ampere** = the rate of, dissipation / scattering of energy

It is important to note that Ohm and Ampere are after the fact, and are not decisive except for the dissipation factor. High Voltage at low amperage simply means that the High Voltage is still intact for future usage. In no way is the potential diminished by low amperage.

EXAMPLES OF OVERUNITY

Dominos did not exist in England when the Laws of Conservation were originally put in place. Otherwise they might have been very different.   For example, let us take a long row of upright dominos, (many thousands) and flip number one. The Energy required to flip the first domino must now be added with that of thousands more in order to have a correct assessment.

The Electron itself is an excellent example of over-unity. The electron provides various forms of energy continuously throughout eternity and is in no way diminished. It simply cycles through the system and is available thereafter.

In Electrical Systems, Electrons active at point "A" are not the same Electrons active at point "B". That is to say, the Electrons activated at the Central Electrical Energy Station are not the ones used at your house.   When you ground your system by flipping the wall switch, you use your own electrons. In closed energy systems, electrons communicate with and replicate the activity of the overbalanced potential, when provided with Earth and or Air Groundings.

The number of Radio sets and Television sets running at any one time do not diminish, in any way the electrical output of the source station.

For example, let now use an Air Coil Resonant Induction System for the purpose of flipping some electrons. The flipping device (reactor coil L-1) is pulsed, which then provides a resonant induction pulse. In turn, this flips the electrons present at the (reactant L-2) Coil. The energy input in L-1 is divided by the number of turns present. The induced magnetic pulsing in turn flips the electrons in each turn of L-2. If more turns are present in L-2 than L-1, there is a net gain in the Energy present, as demonstrated by the dominos above. The farads and henrys of the resonant system provide the resonant frequency when pulsed by an external energy system. A system shunt in the resonant circuit sets the containment level for energy potential.

The Induction Process itself provides an excellent example of over-unity. When comparing rate of induction, the cycles per second must be squared and then compared to the square of the second System. Let us then compare the 60 Hz System with my 220 MHz Device. Energy produced at radio frequency has several major advantages over the conventional system. Ohm's Law does not apply to a resonant air-core radio frequency system.

For example: When the system is resonant, the following is true:

EXPECTED RESULTS

$$\frac{\text{Energy Potential as Volts}}{\text{Dissipation}} = \text{Rate of Dissipation}$$

ACTUAL RESULTS
Superconductor Conditions take over

$$\frac{\text{Energy Potential as Volts}}{(\text{Dissipation})^*} = (\text{Rate of Dissipation})^*$$

* OHMS / DISSIPATION IN AIR-COIL RESONANT INDUCTION
SYSTEMS: RESISTIVITY BECOMES ZERO AT RESONANCE

This is named the V.A.R. (Volt Amperes Reactive) System.

When compared to the Conventional Under-Unity iron-core transformer system, the results are over- unity. It is strange that mechanical advantage as in pulleys, gears, levers and others which correspond to the electrical advantage above mentioned, are not considered over-unity devices.

Let us take a closer look at resonant induction. As an example, let a room full of ping pong balls randomly bouncing at a high speed represent the Conventional method of under-unity energy generation. Suppose that by resonant induction the balls all move in the same direction at the same time. When this occurs a huge amount of energy not previously available is present. The resonant air-core coil system lines up the electrons in such a manner that the energy factor is nearly 100 % , and not the 2% or 3% of Conventional under-unity devices sanction by the establishment.

Some other devices where overunity is common would be resonant induction circuits present in conventional radio tubes (high plate voltage), negative-feedback systems found in Op-Amps and possibly others.

SUMMARY

Useful electrical energy is achieved when the electron density at point "A" becomes greater than at point "B", (being the more-negative moving to the less-negative concept). Coils moving through a magnetic field or vice versa causes this imbalance.

The mindset of the professional Electrical Engineer is restricted to non-resonant and iron-core coil resonant systems. Ohm's Law, when applied to resonant air-core induction systems, becomes, system resistivity (impedance, Z). "Z" becomes zero at resonance. Therefore, in this system, volts and amperes are equal until load (resistivity) is introduced. This is called the Volt Ampere Reactive (V.A.R.) System. With impedance being zero, the System grounding is coupled directly into the Earth's immense electrical potential. Efficiency of induction relates to the square of the cycles per second. Compare the ratio of the conventional 60 c.p.s. System and the 220 million plus cycles of my Earth Electrical System II.

Electrons which cycle through this system, after being used, are returned intact to their former state for future usage.

Electron spin causes electrical current and magnetic lines of force

The effect of current, results from the unequal distribution of negativity (electrons).

Magnetic imbalance causes the gravitational effect. This is evidenced in electric motors by magnet-gravitational displacement of mass which causes the motor to rotate.

The System is an extension of present technology.

The System and it's source utilizes magnetometer studies.

This System (Earth Electrical System II. "EES.II") utilizes a fully renewable energy source.

This System utilizes a non-polluting energy source.

This System utilizes an universally available energy source.

Endorsement and Certification of The System can be anticipated by States with pollution problems.

AIR CORE INDUCTION COIL BUILDERS GUIDE

DONALD L. SMITH

Energy Consultant

1. Decide frequency. Considerations are: (economy of size)

   a. Use radio frequency upward (above 20,000 Hz).

   b. Use natural frequency (coils have both capacitance and inductance), that is match the wire length of the wire in the coil to the desired frequency.

   c. Wire length is either one quarter, one half or full wave length.

   d. To obtain the wire length (in feet) use the following: If using one quarter wave length divide 247 by the desired frequency (megahertz range is desirable). If using one half wave length divide 494 by the desired frequency. If using full wave length divide 998 by the desired frequency.

2. Decide number of turns, ratio of increase in number of turns sets the function. In the case of the L-1 coil, each turn divides the input voltage by the number of turns. In the case of L-2 coil, the resulting voltage in each turn of L-1 is induced into each turn of L-2, adding up with each turn. For example if the input into L-1 from a high voltage, low amperage module is 2,400 volts, and L-1, for example, has 10 turns, then each turn of L-1 will have 240 volts of magnetic induction which transfers 240 volts of electricity to each turn of L-2.   L-2 may be one turn or many turns, such as 100 to 500 or more turns. At 100 turns, 24,000 volts would be produced.   At 500 turns, 120,000 volts would be produced.

3. Decide the height and diameter of the coil system. The larger the diameter of the coil, the fewer turns are required, and the coil has a lesser height. In the case of L-2 this results in lowering the amplification of the induced voltage from L-1.

4. For example, if 24.7 MHz is the desired frequency output from L-2. One quarter wave length would be 247 divided by 24.7 which equals 10 feet of wire. The number of turns will be the amplification factor. The coil may be wound on standard size P.V.C. or purchased from a supplier. The supplier is normally a ham radio supply source. Once the length is determined and the number of turns decided, move to the next step.   For example, let each turn of L-1 have 24 volts and desired output of L-2 be 640 volts. Therefore L-2 needs 26.67 turns. It has been determined that the wire length for one quarter wave length is 10 feet. The number of inches in 10 feet is 120. Using Chart "A" supplied look for next higher number of turns showing (being between 20 and 30 turns with a 2" diameter coil). This tells us to use a 2 inch coil. If ready-made as in the case of Barker and Williamson, 10 Canal Street, Bristol, Penna., 215-788-5581, the coils come in standard sizes of 4, 6 and 10 turns per inch. For higher "Q" use wider spacing of the turns. These coils come in a ready-made length of 10 inches. Select from the coil 30 turns and put input clamps on the base of the coil and at 30 turns. For exact determination of the correct position of the output clamp, use an externally grounded voltage probe. The node of maximum intensity, being the natural resonant point. Off the shelf multimeters are not radio frequency responsive. The easiest way to accomplish the above is to get from the hardware store or Radio Shack a voltage detector having a neon bulb system (Radio Shack Cat. No. 272-1100b, NE2-Neon

Lamps) will work. With your hand as a ground, move the wire extension of the neon lamp along the coil surface until the neon is brightest. This is the desired point of resonance and it is the optimum connection point.

5. The input power now needs consideration. A 2,400 High Voltage module has been previously selected. This module can be made from a diode bridge or any combination of voltage amplifiers. The one used here is an off-the-shelf type, similar to those used for laser technology.

6. Construction of the input L-1 coil. It has already been decided that there will be 10 turns. The length of the wire here is not critical. Since the L-2 coil is 2-inches in diameter, the next off-the-shelf larger size may be used for L-1. Use a 3 inch diameter off-the-shelf coil which has 10 turns to the inch. Remove (cut) a 10 turn portion from the larger coil. Use an L.C.R. meter and measure the natural farads (capacitance) and henrys (inductance) values of the L-2 coil. Now do the same for the L-1 coil. It will be necessary to put a capacitor across the voltage input of L-1 in order to match the L-1 coil to the L-2 coil. A spark gap across L1 is also required to deal with the return voltage from L-1. A tuneable capacitor of the pad ("trimmer") type for L-1 is desirable.

7. The performance of the L-2 coil can be further enhanced by having an Earth grounding from the base of the coil. The maximum voltage output will be between the base and the top of the L-2 coil. Lesser voltages can be obtained at intermediate points along the length of the L-2 coil.

SUPPLY SOURCES
    1. HAM RADIO SUPPLY STORES
    2. COILS, AIR INDUCTOR IN HOUSTON
    3. BAKER AND WILLIAMSON (READY MADE), BRISTOL. PENNA.
  ALSO R.F. DUMMY LOADS AND WATTMETERS.

NOTES
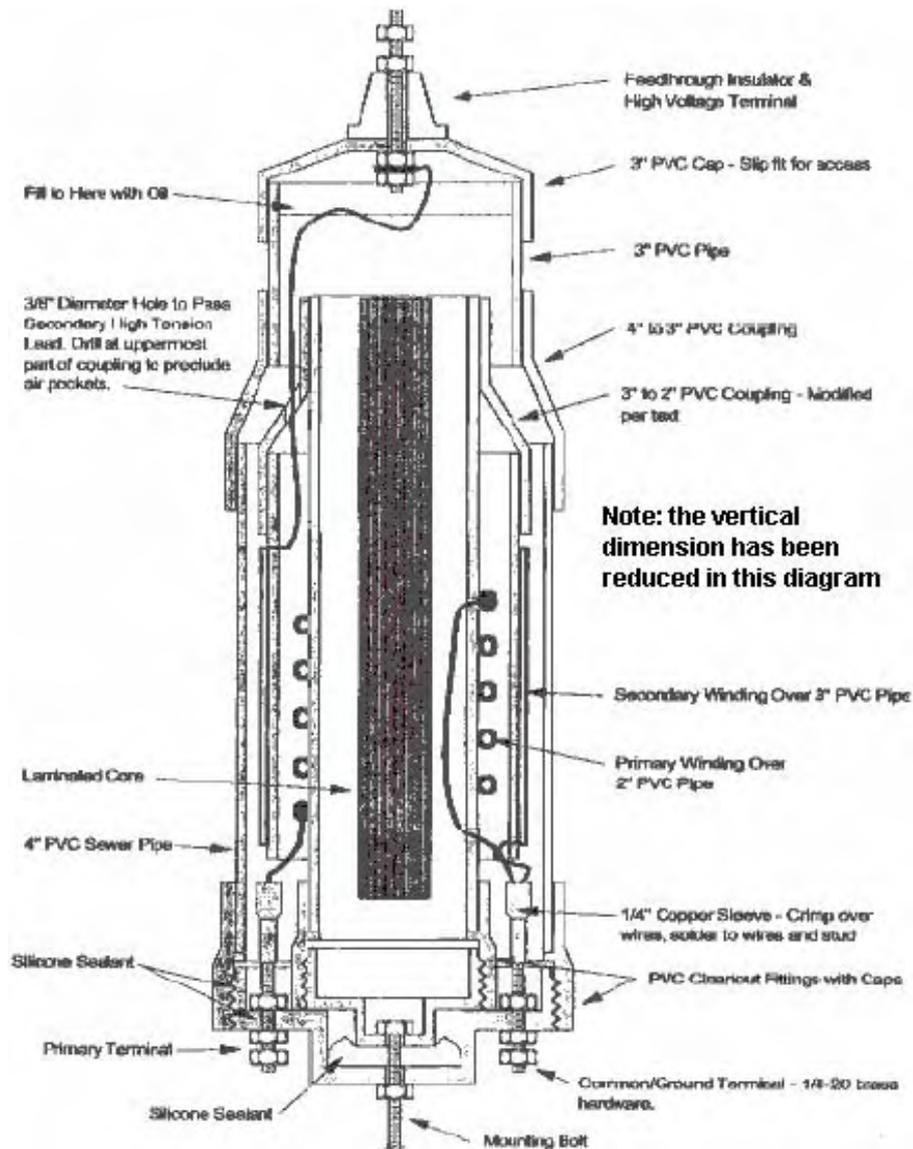
Impulse Transformer Assembly

The figure is labeled with the following callouts:

Feedthrough Insulator & High Voltage Terminal

3" PVC Cap - Slip fit for access

Fill to Here with Oil

3" PVC Pipe

3/8" Diameter Hole to Pass Secondary High Tension Lead. Drill at uppermost part of coupling to preclude air pockets.

4" to 3" PVC Coupling

3" to 2" PVC Coupling - Modified per text

Note: the vertical dimension has been reduced in this diagram

Laminated Core

Secondary Winding Over 3" PVC Pipe

Primary Winding Over 2" PVC Pipe

4" PVC Sewer Pipe

1/4" Copper Sleeve - Crimp over wires, solder to wires and stud

Silicone Sealant

PVC Cleanout Fittings with Caps

Primary Terminal

Silicone Sealant

Common/Ground Terminal - 1/4-20 brass hardware.

Mounting Bolt

ELECTRICAL PRINCIPLES: TERMINOLOGY & SAFETY

The use of electricity is so commonplace that most people assume that it will always be available on demand. To fully realize our dependence upon electricity, consider the ways in which electricity is being used each day in the home, on the farm and the ranch. Electricity is doing more to increase work efficiency and promote enjoyable living than any other single factor. The use of electricity has grown to the extent that an increasing portion of the home or business budget, is used in paying for this source of energy.

1. Definition of Electricity

Electricity can be defined in several ways. The layman defines electricity as a source of energy that can be converted to light, heat, or power. Electrical Engineers define electricity as a movement of electrons caused by electrical pressure or voltage. The amount of energy produced depends on the number of electrons in motion.

2. The Manufacture and Distribution of Electricity

Electricity is produced from generators that are run by water, steam, or internal combustion engines. If water is used as a source of power to turn generators, it is referred to as hydroelectric generation. There are a number of this type located in areas where huge dams have been built across large streams.

Steam is used as a source of power for generating much of today's electricity. Water is heated to a high temperature, and the steam pressure is used to turn turbines which generate electricity. These are referred to as thermal-powered generators. Fuels used to heat the water are coal, natural gas, and/or fuel oil.

Generators at the power plant generate from 13,800 to 22,000 volts of electricity. From the power plant, electricity is carried to a step-up sub-station which, through the use of transformers, increases the voltage from 69,000 to 750,000 volts. This increase in voltage is necessary for the efficient transmission of electricity over long distances. From the step-up sub-station, the electricity is carried on transmission lines to a step-down sub-station which reduces the voltage to 7,200 to 14,000 volts for distribution to rural and city areas.
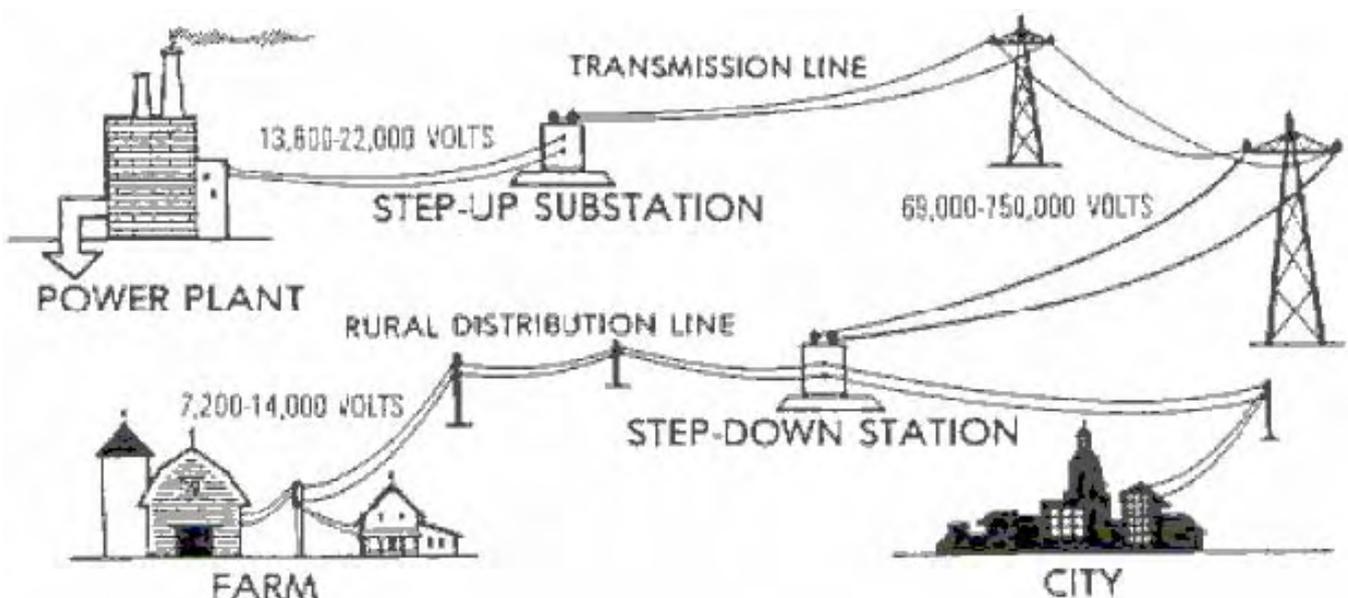
Transformers at the business or residence reduce the voltage to 120 or 240 volts to supply the meter of the customer:

HOT

120-240 V. SERVICE SERVICE

7,200-14,000 VOLTS

NEUTRAL

120 V. HOT   240 V.

NEUTRAL

HOT
120 V.

KILOWATT HOUR METER

DISTRIBUTION PANEL

FUSES

TRANSFORMER

TO GROUND

TO GROUND

120 V.   240 V.   120 V.
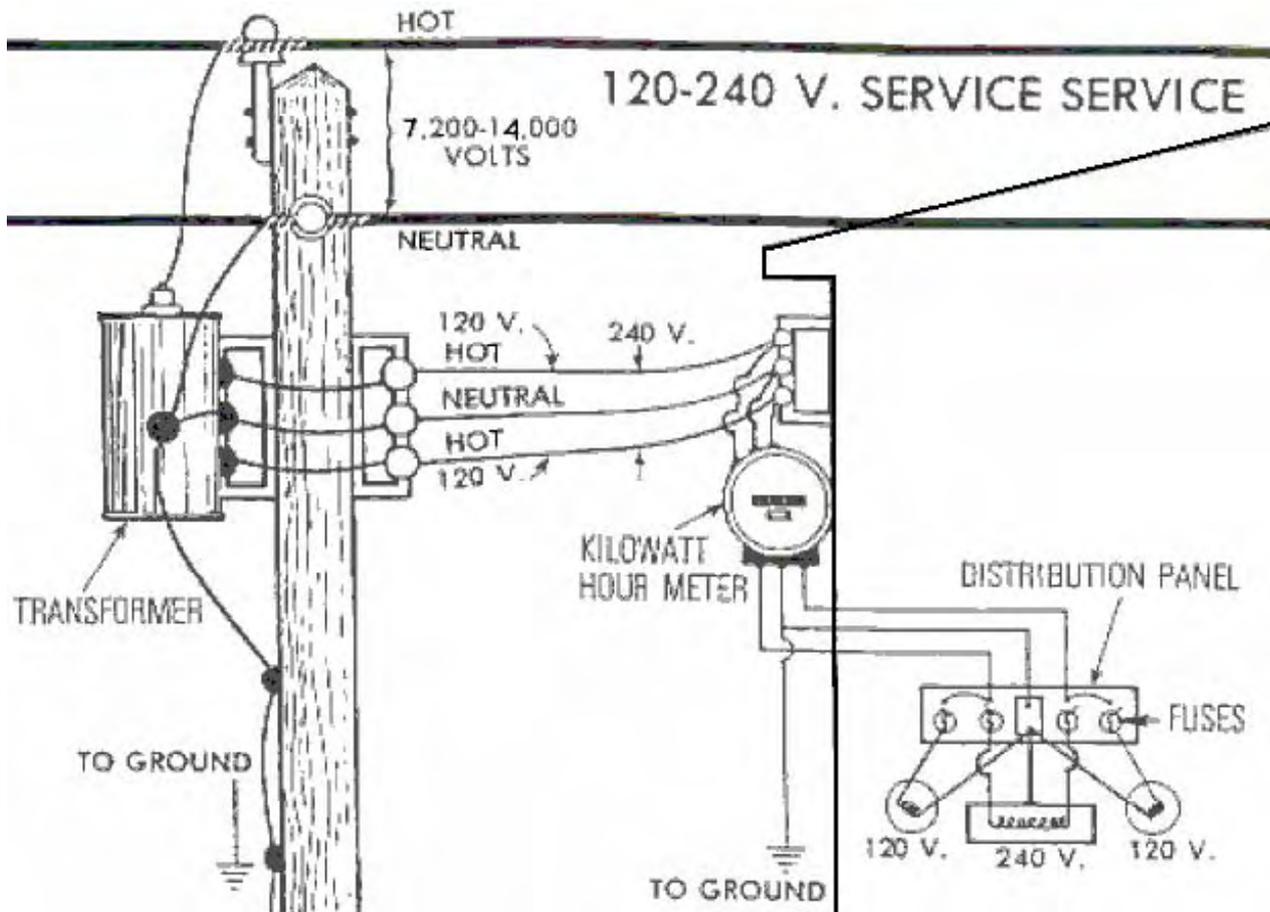
3. Common Electrical Terms

In order to work safely and efficiently with electricity and have the ability to converse on the subject, the following terms should be understood:

Ampere (Amp) - A measurement in units of the rate of flow of electrical current. This may be compared with the rate of flow of water in gallons per minute.

Example: A 60-watt incandescent lamp on a 120V circuit would pull 1/2 ampere of electricity (60 divided by 120 = 0.5 or 1/2, Formula: Amperes = Watts / Volts

Volt (V) - A unit of measure of electrical pressure. A given electrical pressure (V) causes a given amount of electrical current (Amps) to flow through a load of given resistance. Voltage may be compared to water pressure in pounds per square inch in a water system. Common service voltages are 120 volts for lighting and small appliance circuits and 240 volts for heating, air conditioning, and large equipment circuits.

Watt (W) - A unit of measure of electrical power. When applied to electrical equipment, it is the rate that electrical energy is transformed into some other form of energy such as light. Watts may be compared to the work done by water in washing a car. (Formula: Volts x Amps = Watts)

Kilowatt (KW) - A unit of measurement used in computing the amount of electrical energy used. Kilowatts are determined by dividing the number of watts by 1000 as 1 kilowatt = 1,000 watts.

Kilowatt-Hour (KWH) - A measure of electricity in terms of power in kilowatts and time in hours. One KWH is 1000 watts used for one hour.

Alternating Current (A.C.) - Electrical current that alternates or changes direction several times per second. The direction current moves depends on the direction in which the voltage forces it.

Cycle - The flow of electricity in one direction, the reverse flow of electricity in the other direction, and the start of the flow back in the other direction. The cycles per second are regulated by the power supplier and are usually 60 in America. Most electric clocks are built to operate on the mains frequency. More or fewer cycles per second would cause mains-operated clocks to gain or lose time. The present practice is to use the term Hertz (Hz) rather than "cycles per second".
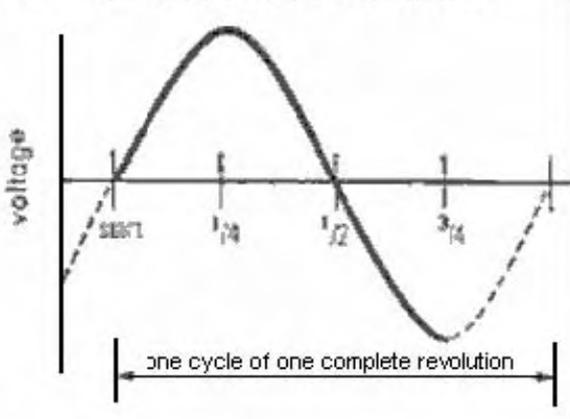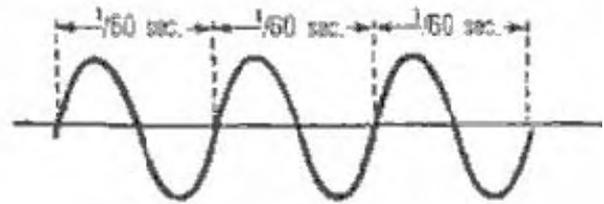
Direct Current (D.C.) - Electrical current flowing in one direction. Example: electrical circuits in automobiles and tractors.

Transformer - A device used to increase or decrease voltage.
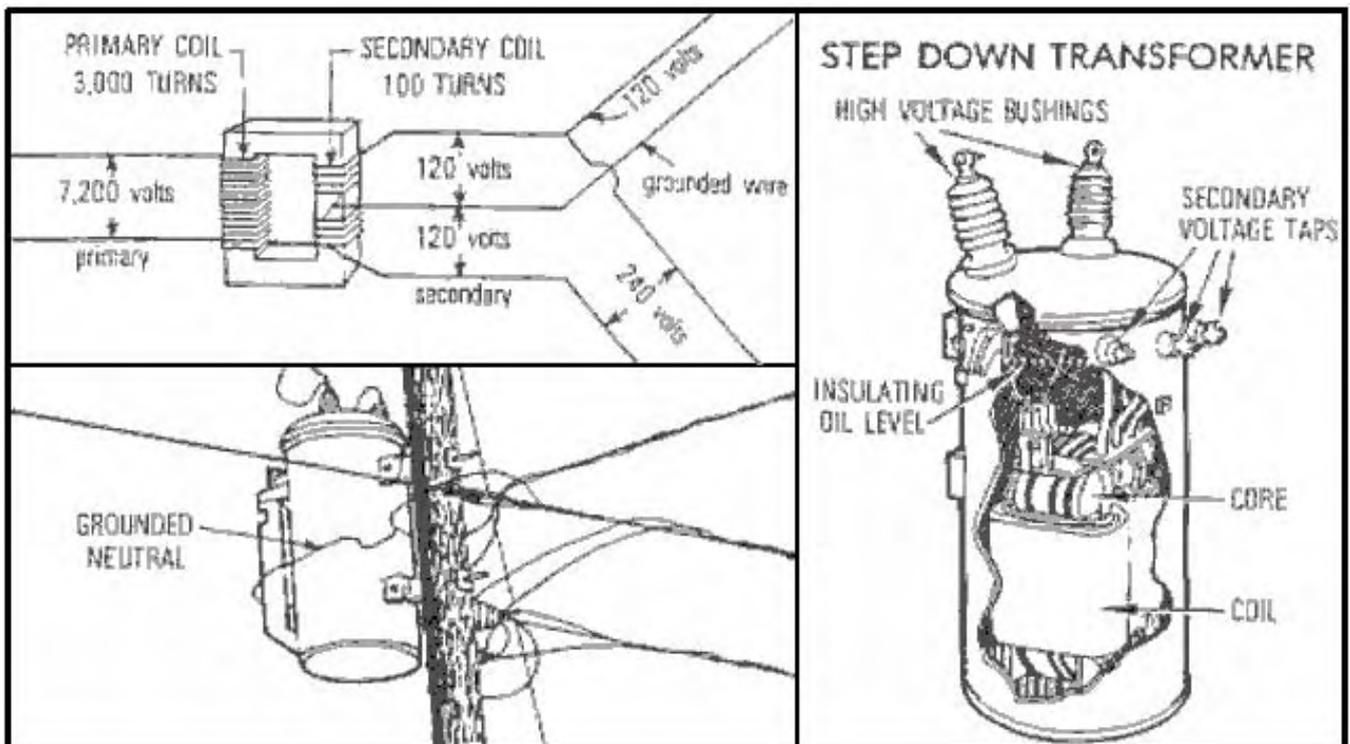
Single Phase - The most common type of electrical service or power available to consumers. One transformer is used between the distribution line and the meter. Usually three wires, two "hot" and one neutral, are installed to provide 120V and 240V single-phase service. Single-phase service may also be supplied with a three-phase service.

Three-Phase - This type of service is designed especially for large electrical loads. It is a more expensive installation due to three wires and three transformers being required. The important advantage of three-phase power is that the total electrical load is divided among the three phases, consequently, the wire and transformers can be smaller. Other advantages exist in the design of three-phase motors.

Short Circuit - A direct connection (before current flows through an appliance) between two "hot" wires, between a "hot" and neutral wire, or between a "hot" wire and ground.

Voltage Drop - A reduction of current between the power supply and the load. Due to resistance, there will be a loss of voltage any time electricity flows through a conductor (wire). Factors that influence voltage drop are size of wire, length of wire, and the number of amps flowing. A drop in voltage may cause a loss of heat, light, or the full power output of a motor. It could cause motor burn-out unless the motor is properly protected (time-delay fuse).

Fuse - A device used to protect circuits from an overload of current.

Circuit Breaker - A device used to protect circuits from an overload of current. May be manually reset.

Time-Delay Fuse - A fuse with the ability to carry an overload of current for a short duration without disengaging the contacts or melting the fuse link.

Horsepower (hp) - A unit of mechanical power equal to 746 watts of electrical power (assuming 74.6% electric motor efficiency). Motors of one horsepower and above are rated at 1000 watts per hp while motors below one horsepower are rated at 1,200 watts per hp.

Conductor - The wire used to carry electricity (typically, copper or aluminum). Copper and aluminum should not be spliced together due to their incompatibility resulting in deterioration and oxidation.

Insulator - A material which will not conduct electricity and is usually made of glass, Bakelite, porcelain, rubber, or thermo-plastic.

"Hot" Wire - A current-carrying conductor under electrical pressure and connected to a fuse or circuit breaker at the distribution panel. (Color Code: usually black or red)

Neutral Wire - A current-carrying conductor not under electrical pressure and connected to the neutral bar at the distribution panel. (Color Code: usually white)

Grounding - The connection of the neutral part of the electrical system to the earth to reduce the possibility of damage from lightning and the connection of electrical equipment housings to the earth to minimize the danger from electrical shock. (Color Code: Can be green or bare wire).

Underwriters' Laboratory (U.L.) - An American national organization which tests all types of wiring materials and electrical devices to insure that they meet minimum standards for safety and quality.

National Electric Code (N.E.C.) - Regulations approved by the National Board of Fire Underwriters primarily for safety in electrical wiring installations. All wiring should meet the requirements of the national as well as the local code.

4. Computing Electrical Energy Use and Cost

If an estimate of cost for electricity used is desired, the name plate data on appliances and equipment and an estimate of operating time may be used. The following formulas should be used for determining watts, amps, volts, watt-hours, kilowatt-hours, and cost.

Watts = Volts x Amperes

Amperes = Watts / Volts

Volts = Watts / Amperes

Watt-Hours = Watts x Hours of operation

Kilowatt-Hours = Watt-Hours / 1000

Cost = Kilowatt-Hours x Local Rate per Kilowatt-Hour (or per "Unit")

Example:

    Local electricity rate per Kilowatt-Hour: 8 cents
    Equipment plate data: 120 Volts 5 Amps
    Monthly hours of operation: 10

    1. Watts = Volts x Amperes, so Watts = 120 x 5 = 600 watts

    2. Watt-Hours = 600 x 10 = 6,000 watt-hours

    3. Kilowatt-Hours = 5,000 / 1,000 = 6 kilowatt-hours (or 6 Units)

    4. Cost = 6 x 8 = 48 cents

5. Electrical Circuits

An Electrical Circuit is a completed path through which electricity flows. Insulated conductors (wires) provide the path for the flow of electricity. A water system and an electrical circuit are similar in many respects. Water flows through pipes and is measured in gallons per minute, and electricity flows through conductors and is measured in amperes. A simple circuit is shown here:
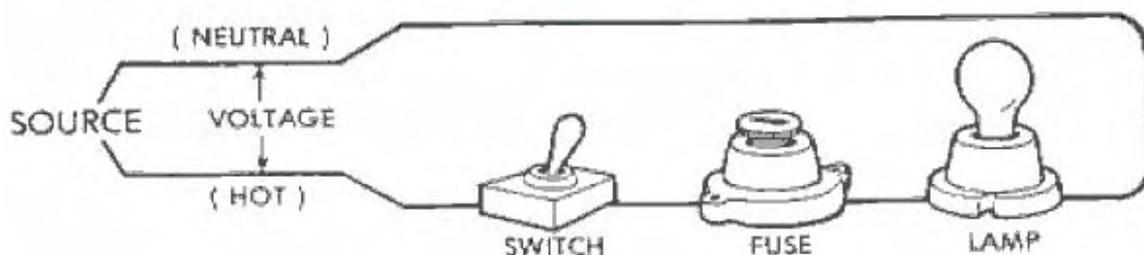
A circuit includes a "hot" wire (red or black) carrying current from the source through a switch, circuit protector (fuse or circuit-breaker), and an appliance. The neutral wire (white) conducts the current from the appliance to the source (ground).

There are two methods for connecting devices in a circuit - "in series" or "in parallel". In a series circuit, all of the current must flow through each device in the circuit. Removing any one of the devices in a series circuit will stop the flow of current. In parallel circuits, the load (lights or appliances) are connected between the two wires of the circuit providing an independent path for the flow of current, and removing a lamp has no effect on the other lamps in the circuit.

Switches, fuses, and circuit breakers are always connected in series. In most cases, except for some Christmas tree lights, appliances and lights are connected in parallel.

SERIES CIRCUIT   PARALLEL CIRCUIT

VOLTAGE   VOLTAGE
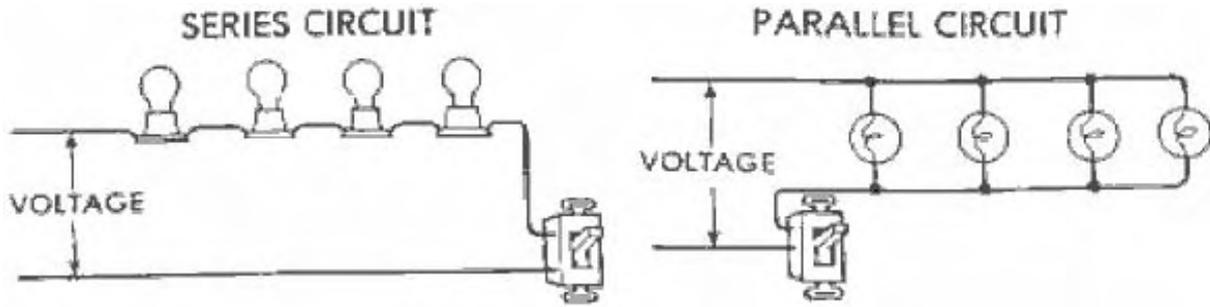
6. 120 Volt and 240 Volt Circuits

The 120V circuit has one "hot" and one neutral wire, with the switch and circuit protector in the hot line. The neutral wire from the appliance is connected to the neutral bar in the fuse or breaker box. For safety, the neutral wire should never be broken or interrupted with a switch or fuse.

120 VOLT CIRCUIT

120 v.

hot wire

neutral wire

FUSE BOX
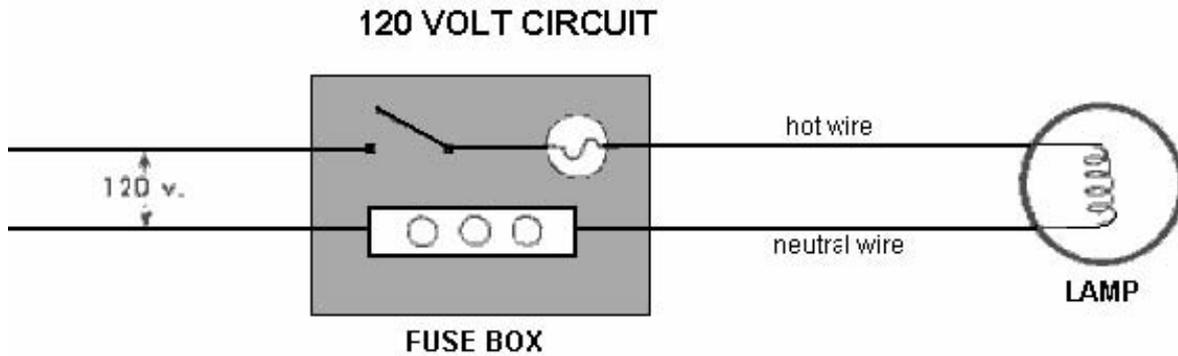
LAMP

The voltage in a 120V circuit is measured with a voltmeter with one lead on the hot terminal and the other lead on the neutral bar. The number of amperes flowing may be measured with a clamp-on ammeter by encircling the hot or neutral wire with the jaws of the ammeter.

AMMETER   VOLTMETER   WATTMETER
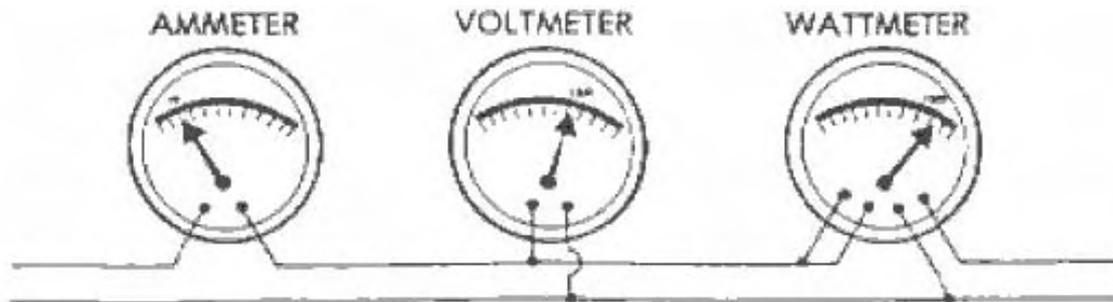
The 240V circuit has two hot wires and one safety-ground wire. Switches and fuses are installed in the hot lines. The two hot wires arc necessary for the operation of 240V welders and motors. The safety-ground wire, connected to the metal frame of the equipment or motor and to the neutral bar, does not carry current unless a "short" develops in the motor or welder. If a short should occur, one of the circuit protectors will burn-out or open, thus opening the circuit.

240 VOLT CIRCUIT
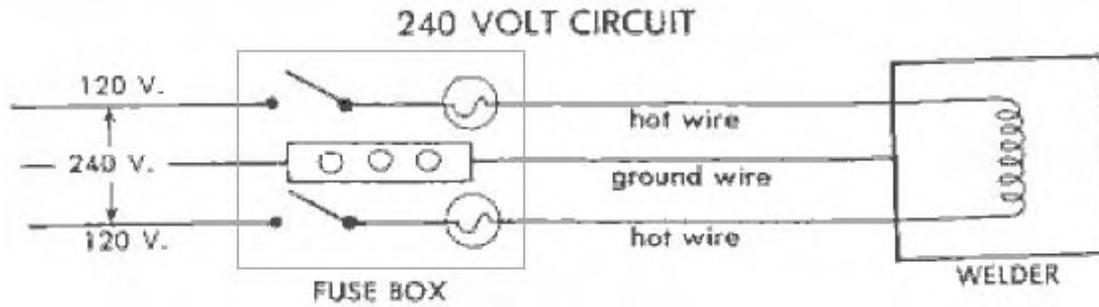
The voltage on a 240V circuit is measured by fastening a lead on the voltmeter to each of the hot wires. Voltage between either hot terminal and the neutral bar will be one-half of the voltage between the two hot wires. The number of amperes flowing can be measured by clamping an ammeter around either of the hot wires.

7. Safety Grounding of Electrical Equipment

Refer back, to the 240V circuit and note the ground wire from the metal frame to the neutral bar. The following illustration shows proper safety grounding when operating a drill in a 120V circuit. The safety-ground wire may be bare, but a three-wire cable is recommended. Safety-ground wire in three-wire cable is usually green in color. A current-carrying neutral wire should never be used for a safety-ground. Likewise, a safety-ground wire should never be used as a current-carrying hot or neutral wire.

SAFE-3-WIRE-GROUNDED

If short occurs, fuse will blow and open the circuit.
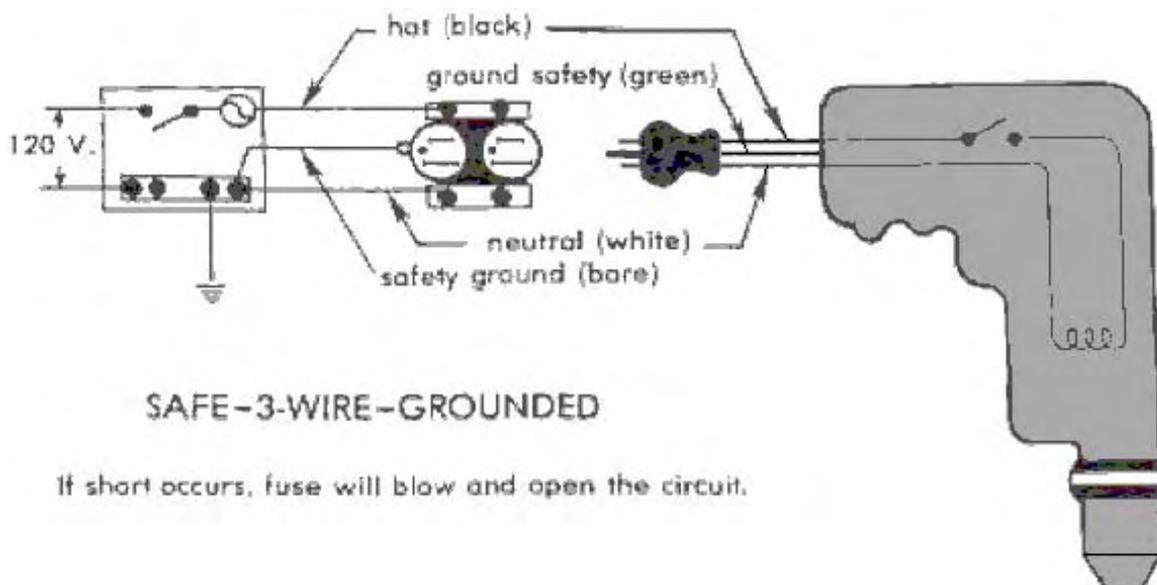
Using grounded receptacles and a safety-ground on all circuits will allow the safety-grounding of appliances when they are plugged into the outlet. An adapter must be used to properly ground appliances connected to receptacles which are not safety-grounded. If an adapter is used, the green pigtail wire must be connected to a known ground to give protection from electrical shock should a short-circuit occur.

GROUND PLUG AND ADAPTER
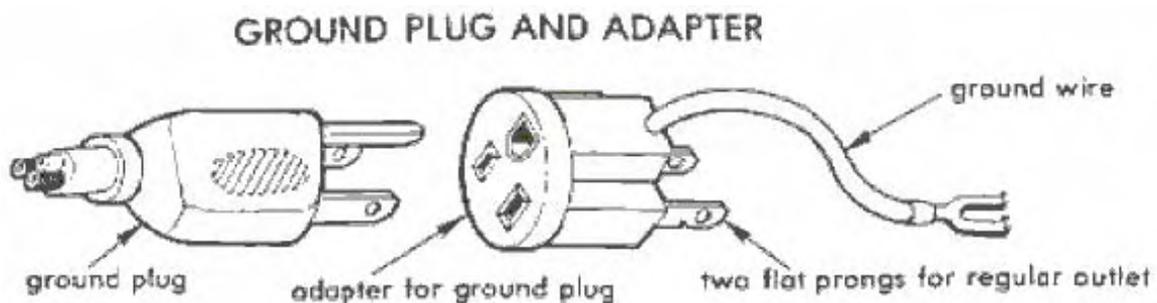
A test lamp can be used to check a circuit completed between a "hot" wire and a neutral wire. Use the test lamp to check appliances for shorts. With the appliance plugged into an outlet, touch the appliance frame with one lead of the test lamp while the other lead of the test lamp is grounded to a water or gas pipe. If the test light does not burn, reverse the appliance plug and check with the test lamp again. If the light burns, a short exists (the hot wire is touching the frame of the appliance). Unplug the appliance and repair or discard it.

8. Electrical Circuit Protection

Electrical circuits should be protected from an overload of amperes. Too many amperes flowing through an unprotected circuit will generate heat, which will deteriorate or melt the insulation and possibly cause a fire. The number of amperes that a given conductor can safely carry, depends upon the kind and size of wire, type of insulation, length of run in feet, and the type of installation. Charts are available in reference texts giving allowable current-carrying capabilities of various conductors.

The four types of circuit protection are: common fuses, fusetrons (time-delay), fustats (two- part time-delay), and circuit-breakers. Fuses are of two basic types: plug, and cartridge.

Common fuses contain a link made from a low-temperature melting alloy which is designed to carry current up to the rating of the fuse. Current higher than the amperage rating causes the link to heat above it's melting point. When the fuse "blows", the link melts and opens the circuit.

PLUG TYPE FUSE   CARTRIDGE TYPE FUSE

0-30 amperes

31-60 amperes

61-100 amperes

101-200 amperes
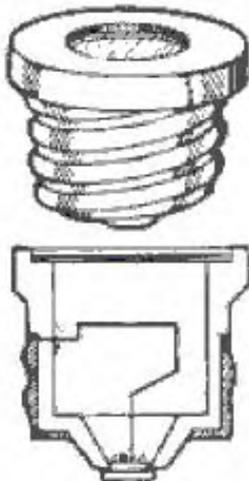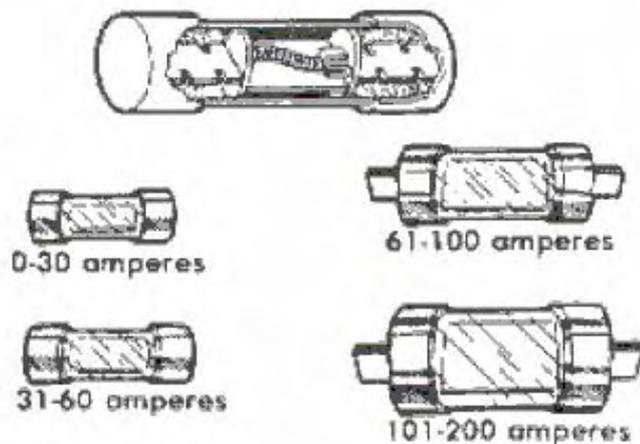
Fusetrons (time-delay fuses) are made to carry a temporary overload, such as the overload caused by the starting of an electric motor. The fuse, however, still provides protection for the circuit, and a short-circuit will melt the fuse link. If a common fuse is used, the fuse link will melt every time an electric motor starts. The use of a larger ampere common fuse will prevent the "blow" resulting from the temporary overload, but will not provide protection for the motor or the circuit.

OPERATING PRINCIPLE OF
DELAYED ACTION FUSE

TIME DELAY	CONTINUED OVERLOAD	SHORT-CIRCUIT
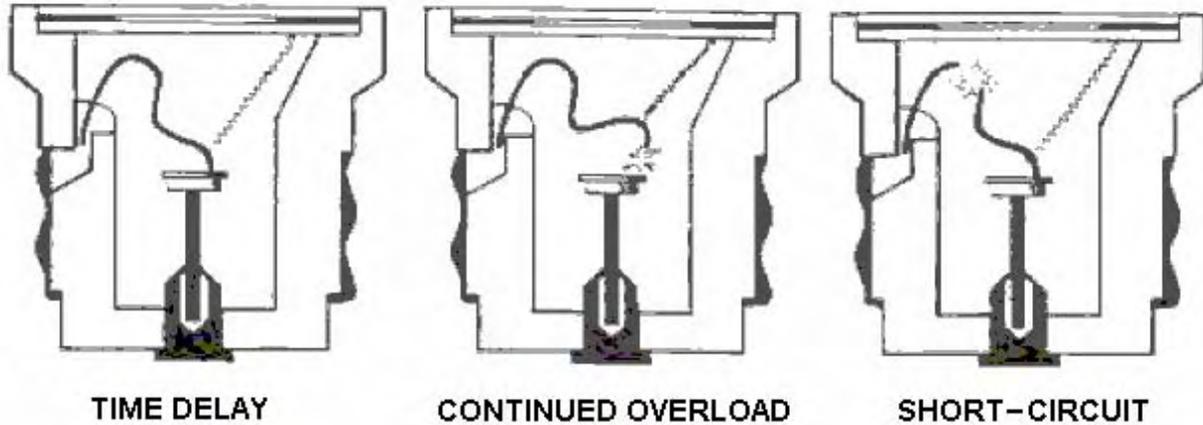
Fustats, non-tamperable fuses of the time-delay type, have a different size base and require a special adapter which is screwed into the standard fuse socket. After the adapter is installed, it cannot be removed. For example, the installation of a 15-ampere adapter allows only the use of 15-ampere or smaller fuse.

FUSTATS
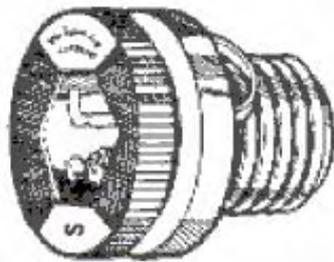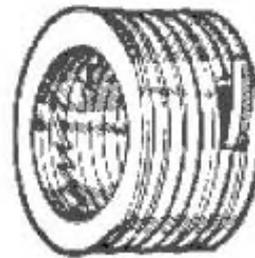
FUSE   ADAPTER

Circuit breakers eliminate the replacement of fuses and are commonly used even though a circuit breaker box costs more than a fuse box. Circuit breakers are of two types, thermal and magnetic. The thermal breaker has two contacts held together by a bi-metal latch. A current overload causes the bi-metallic strip to become heated, the latch releases, and the points spring open. After the bi-metallic strip cools, the switch is reset and service is restored.

CIRCUIT BREAKER OPERATION
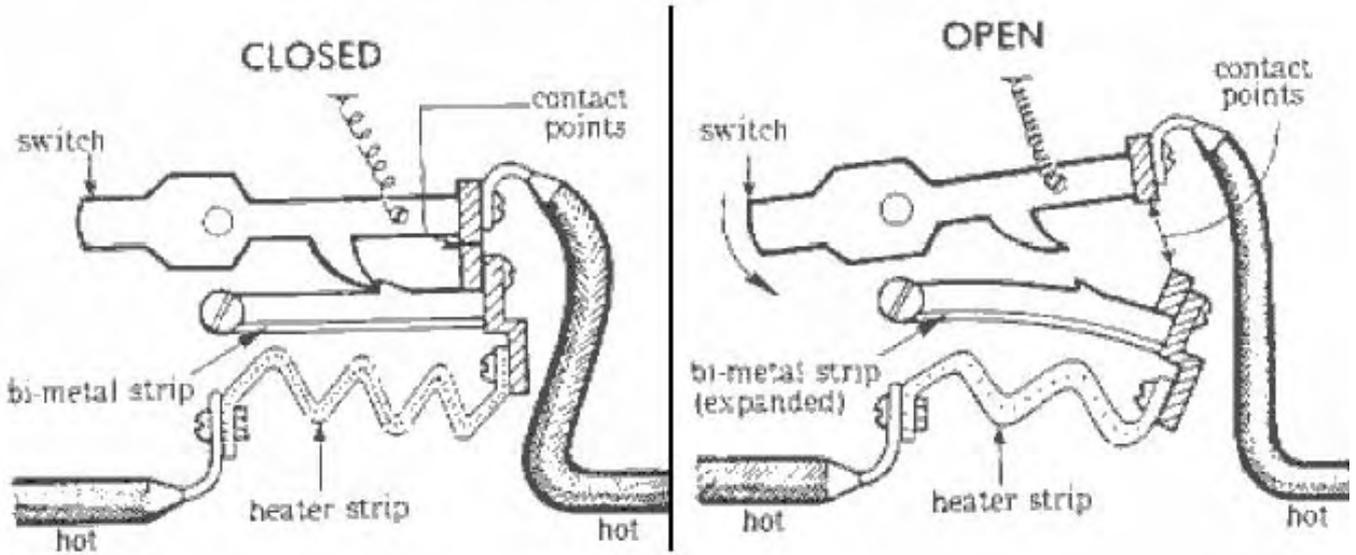
The magnetic breaker has contacts that are held together by a latch which is released by the action of an electromagnet. The amount of current flowing through the circuit will determine the size of the electromagnet. This type of circuit-breaker is reset by moving the toggle switch to the "on" position.

The following diagram shows the parts of a circuit breaker.
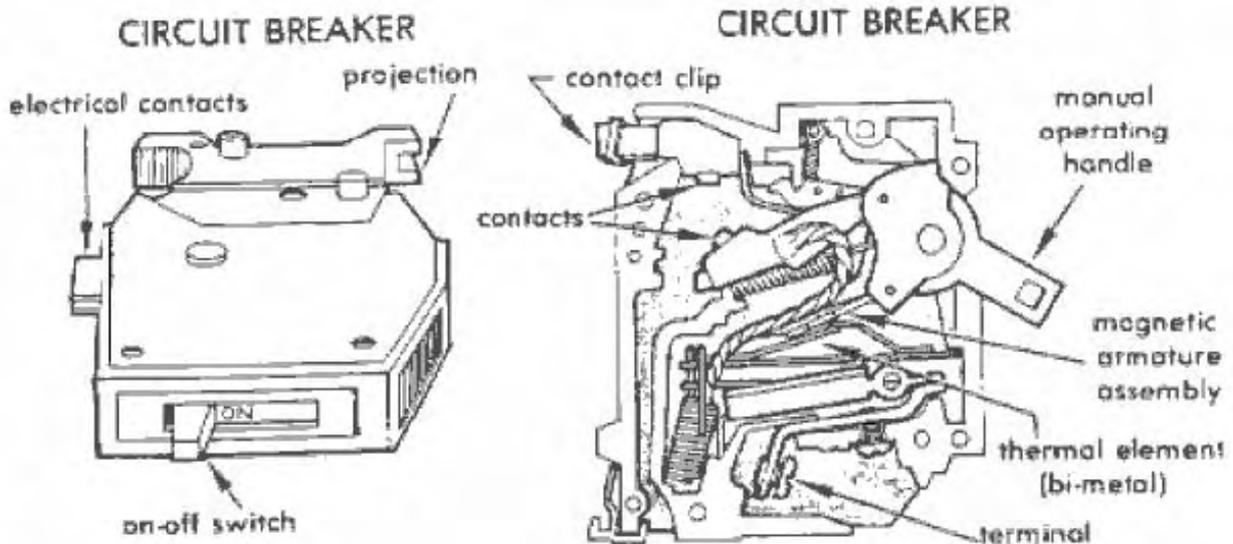
9. No Fault Grounding

Fuses and circuit-breakers are safety devices which limit current (amperage) in a circuit. Their main function is to protect equipment and wiring from overload. Ground fault circuit interrupters (GFI) are designed to protect humans, equipment, and/or electrical systems from injury or damage if electricity flows in an unintended path (a short-circuit).

A GFI is a very sensitive device that functions by comparing the current moving in the "hot" wire with that in the neutral wire. If these two currents are not equal, a fault exists, and current is "leaking" out of the circuit. If the difference in current between the two wires is 5/1000 of an ampere or greater, the GFI will open the circuit, shutting off the power and eliminating any shock hazard.

The National Electrical Code requires GFI's for all 120V, single phase, 15 and 20 amp receptacles installed outdoors, in bathrooms, and in garages for residential buildings. A GFI is required at construction sites and some other applications. After correcting a circuit fault, the GFI may be reset for further use.

A variety of GFI equipment is made for 120 and 240 volt circuits:

GFI RECEPTACLE FOR CONVENTIONAL OUTLET

reset and test buttons

PORTABLE GFI TO PLUG INTO OUTLET

GFI TO INSTALL IN BRANCH CIRCUIT

GFI TO REPLACE CIRCUIT BREAKER

test button
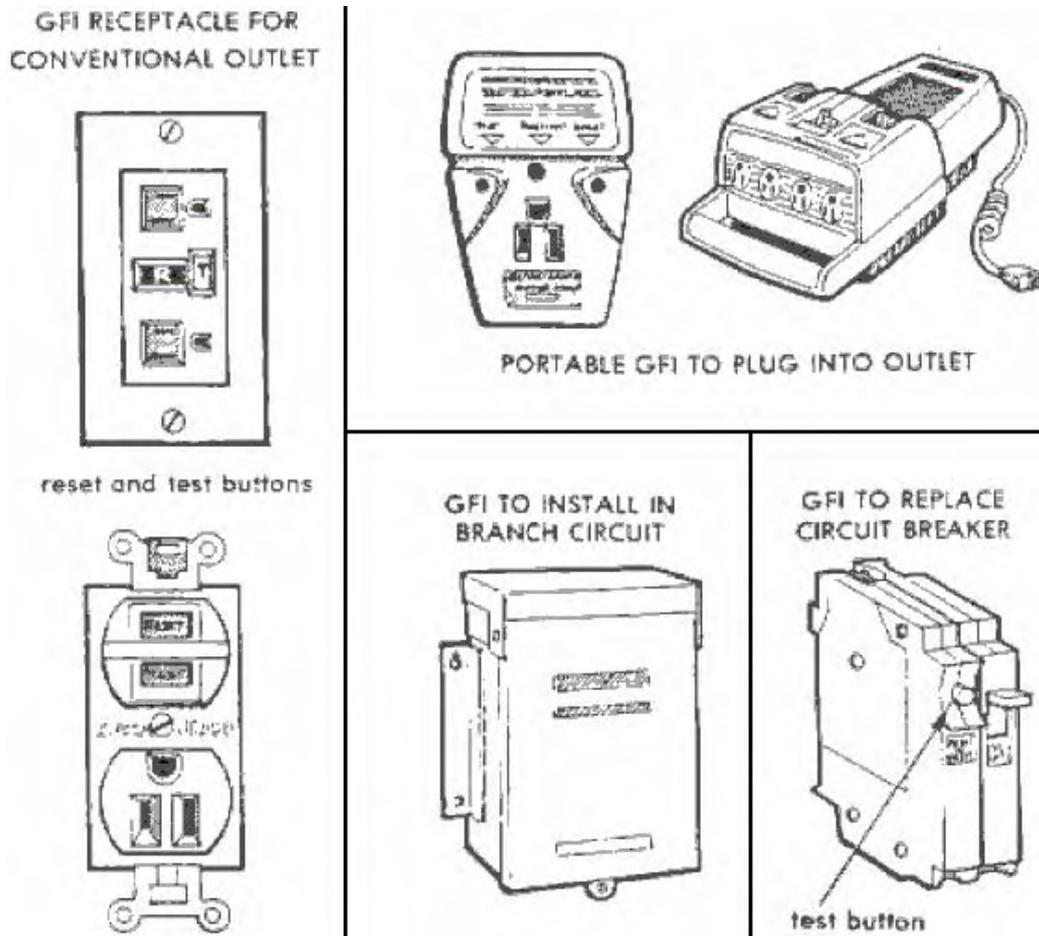
REFERENCES:
COOPER, ELMER L., *AGRICULTURAL MECHANICS: FUNDAMENTALS AND APPLICATIONS*. DELMAR PUBLISHERS INC., ALBANY, NEW YORK

ELECTRICAL WIRING - RESIDENTIAL, UTILITY BUILDINGS, SERVICE AREAS, AAVIM, ATHENS, GEORGIA.

Note: This electrical information does not apply directly to areas outside America and local regulations for electrical supply should be checked.

Variations
Some people have experimented with Don Smith's basic ideas and found some interesting things. One of these people is Ukrainian: I. M. Solovey. The translation for his application for a PhD is shown below and thanks is due to Howerd Halay for making this translation:

ELECTRIC POWER GENERATION SYSTEM HIGH FREQUENCY

I. M. Solovey, Candidate Ph.D.

NUBiP of Ukraine "Berezhany Agrotechnical Institute" LS Chervinsky, PhD National University of Life and Environmental Sciences of Ukraine NP Semenov, engineer NUBiP of Ukraine "Berezhany Agrotechnical Institute"

Considered:
Existing scientific views do not have a convincing theoretical basis for the phenomenon of excess energy output. Power supply, Inductance, power, high-frequency measuring range, filter, energy.

Currently, there is a great deal of information about devices, after which "Activation" in whatever working field; in the process of "relaxation" output energy is in excess of input energy used.

For example, in the "production" of thermal energy observed in the oxygen-hydrogen electrolysers for normal and heavy water (Filimonenko V., 1957, S. Jones, 1989), the electric discharger (Chernetskyy A., 1971), vortex heat generators (Potapov Y., 1992).

In the late 1980s Stanley Meyer patents "Water Fuel Cell" (WFC) that allows the conversion of ordinary tap water into hydrogen and oxygen with far less expenditure of energy than would be required by conventional electrolysis, and in much greater quantity than expected with simple electrolysis. His explanation of the results is based on the resonant electric field effects on water molecules [2].

Later Don Smith built a number of devices based on Tesla's experiments, mostly with high output power. In his articles, he notes that he repeated each of the experiments found in the Tesla books, and this gave him an understanding of "ambient background energy "[3].

Objective. Repeat one of the above methods of obtaining energy. To test whether these devices really work. For this we implemented the circuit of the Don Smith device from his patent of 1994, where the generator can achieve an output of 15 kW (Fig. 1).

I.M. Solovey, LS Chervinsky, N. Semenov, 2011
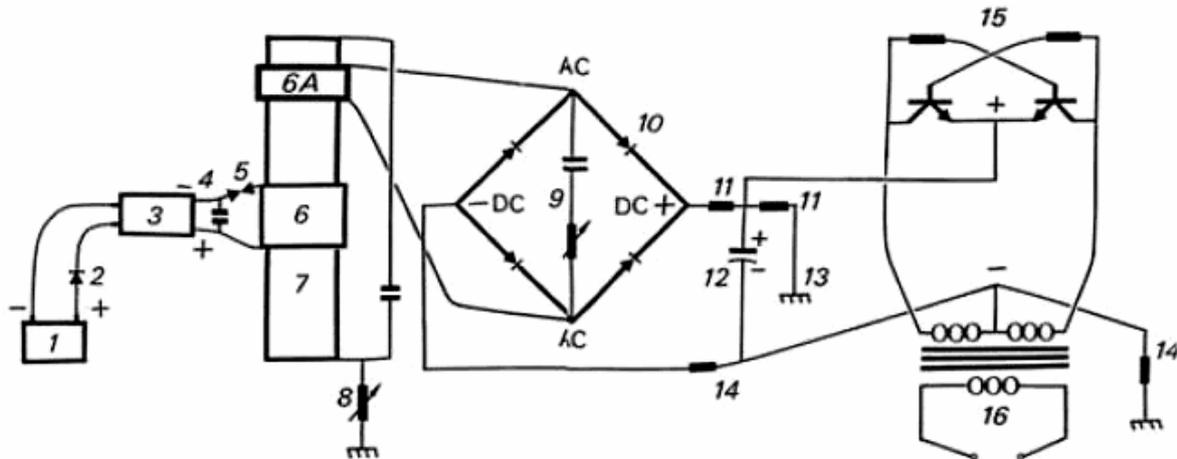
Fig 1. Schematic of electricity generator of Don Smith (according to his patent from 1994)

Basic materials and methods of research.

The main element in the schematic of Fig. 1 is an air-core transformer with the windings numbered 6 (primary), 6A (optional), 7 (secondary).

For the study we prepared Primary L1, secondary L2 and an additional L3 coil according to specifications given in the following table:

Coil Specifications

Specification	Primary $L1$	Secondary $L2$	Additional $L3$
Coil length, cm	5,5	32	6
Number of turns	8	463	10
Diameter CM	5,5	5,1	5,6
Active resistance, ohms	0,1	4,2	0,1
Copper wire length per winding, M	1,4	69,1	1,8
Wire diameter, mm	2	0,65	1,2

To calculate the electromagnetic parameters of the secondary coil L2 we used a program named "Flyback Tesla calculator".

Calculation results: L2
Coil inductance - 1559.9 uH;
self capacity - 4.61 pF;
Wire Length 73.2 m;
number of turns - 457;
quality factor - 8492;
resonance frequency AC - 1.875 MHz; and ¼ resonance frequency – 1.024 MHz
(Actual Experiment - 1.1 MHz).

The study was conducted according to the schematic in Fig. 2.

Placing of coil windings - as a Tesla transformer: primary on the base of the secondary.
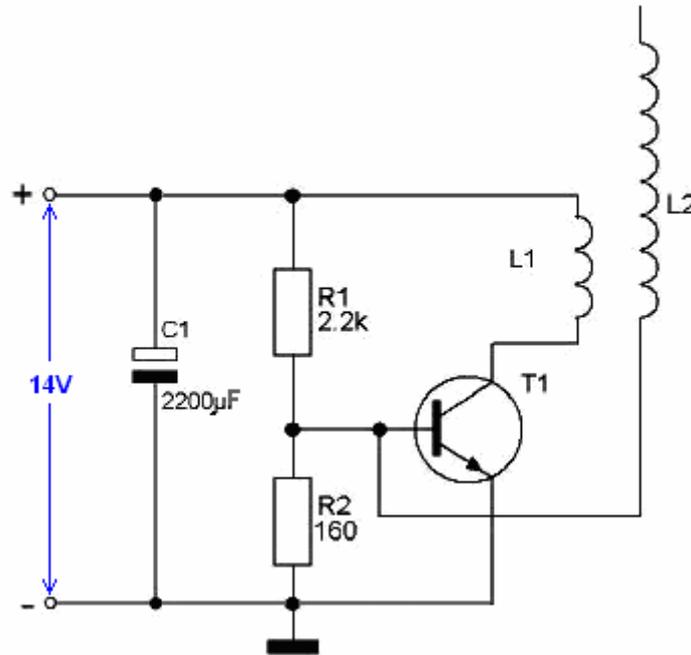
Fig. 2. Schematic of windings L1 and L2

Measurement of current was carried out by a DC ammeter on the PSU. Current consumption in the above schematic is 0.3 A. The value of voltage U2 at the output ends of the winding L2 is calculated by the formula: $U2 = Um/N1.N2 = 14/8.463 = 810.25$ V
where
Um is the voltage, 14 V;
N1 is the number of primary turns and
N2 is the number of secondary turns (see. Table).

Note. The formula does not take into account the resistance of the transistor's base-emitter pn junction nor that of the connecting conductors.

Experimentally determined values of voltage - largest breakdown in the air gap between the initial winding ends at L2 point of discharge. The magnitude of the voltage was 500-700 Volts. Frequency: 1.1 MHz measured experimentally by the use of a frequency generator.

When connecting the circuit (see. Fig. 2) to the constant power supply, power consumption was 0.3 x 14 = 4.2 W and this power can be called a complete network power consumption of 4.7VA. On output of the L2 winding we obtain (at the base of the coil) current of about 0.3 A and a voltage between the two ends of the coil of 700 V which calculates to 0.3 x 700 = 210 VAR. The study of high-energy parameters of the generator power circuit was conducted in Figs. 3 - 6 where a bulb was used as an active load. The magnitude/intensity of lamp brightness determined the output power measurement. Lamps used were various capacities from 0.3 watts to 21 watts.

Under the schematic of Fig. 3 switching in various incandescent lamps, for example 0.3 W, did not lead to lighting, although consumption of the circuit energy was 14 x 0.3 = 4.2 watts.
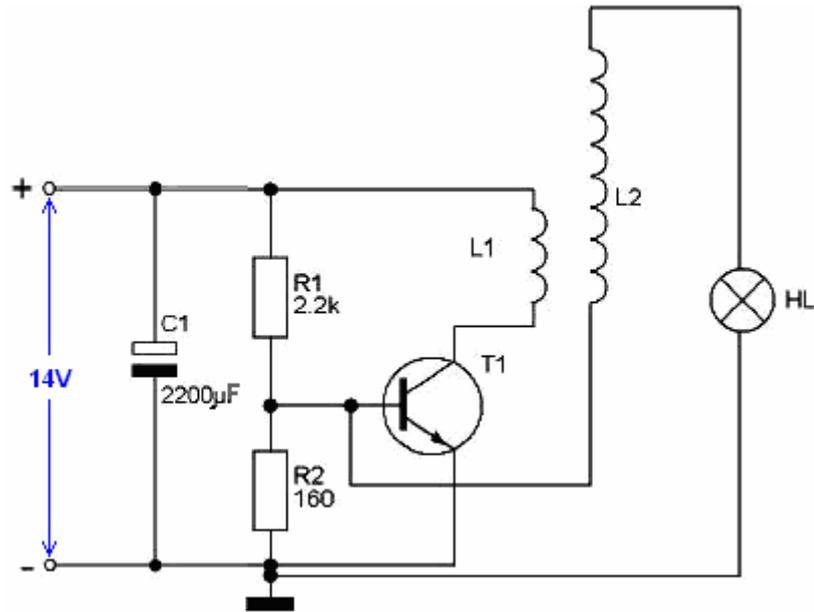
Fig. 3. Circuit of the experiment to determine the active power output of the L2 coil

We placed an extra coil L3, as in Smith's schematic (Fig. 4). Coil L3 was placed in the upper third of the L2 coil. A 6 volt, 3 watt lamp was connected to the additional coil L3 (see Table) and it showed a subtle glow.
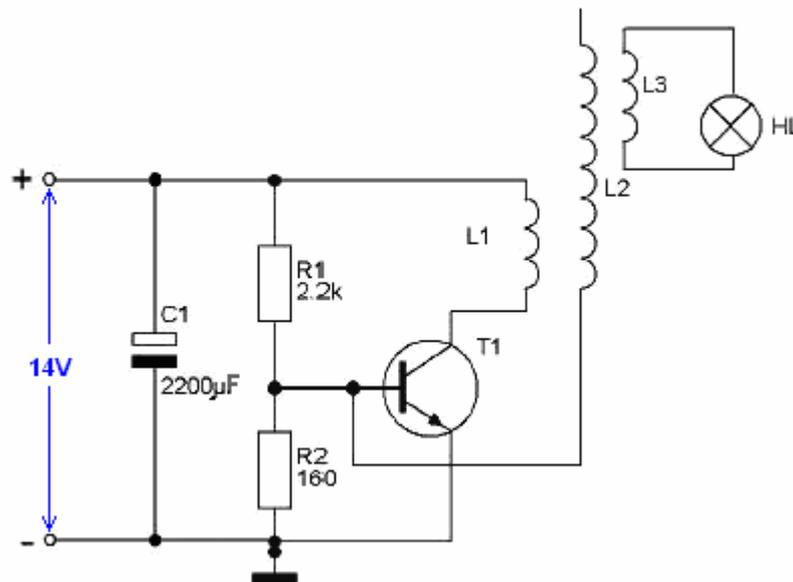
Fig. 4. Inserting various incandescent bulbs through additional winding L3.

When we inserted a capacitor C2 in series with the winding L2 (Fig. 5) We inserted a 12 volt 21 watt lamp to the L3 coil output. The lamp became brightly lit and in 4 to 5 seconds it burned out. The current consumption was a net 1.2 amps.
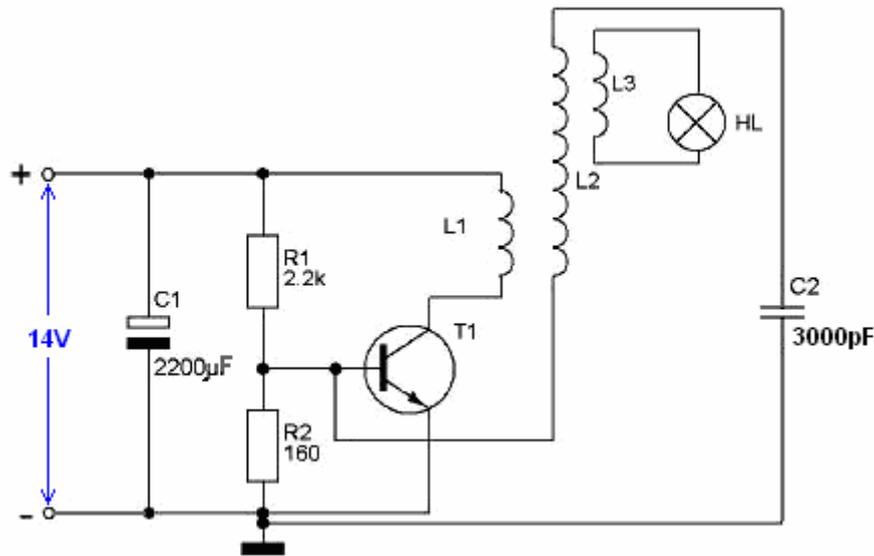
Fig. 5. Switching incandescent bulb(s) through the additional winding L3 when creating L2-C2 path.

An analogous result was obtained when we switched in a tungsten lamp using the schematic in Fig. 6 in a series circuit L2 / C2. A 12 volt 21 watt lamp also burns out in 4 to 5 seconds. The current in the lamp in this configuration was 1.8 - 2.3 Amps.
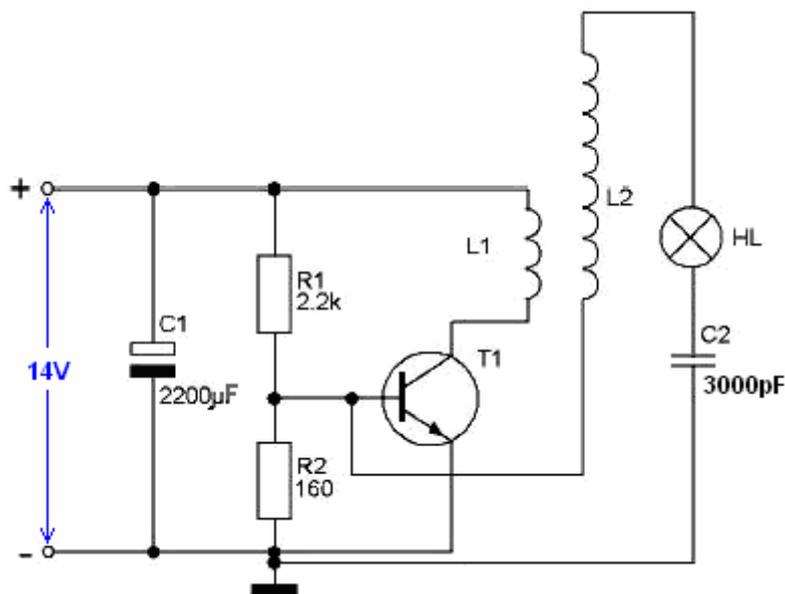
Fig. 6. Schematic: inserting an incandescent lamp in series through L2 and C2.

Conclusions
The results of exploratory studies confirm the existing scientific thought that the processes of input and output routing/transmission of electricity using high-voltage high-frequency electromagnetic field (radiation) phenomena require further deep theoretical and experimental studies.

References

1. Kanarev FM Beginning Phys chemistry microcosm / Kanarev FM [8th ed.].
   Krasnodar, 2007. - 750 s.

2. Fominsky LP Rotary generators of free heat. DIY
   Fominsky LP - Cherkasy: "OKO-Plus". 2003. - 342 s.

3. US Patent No. 08/100074 .

The phenomena of appearance of excess energy effects have not found a convincing theoretical explanation from the standpoint of existing scientific views.

The interesting thing about this paper from Solovey is that the input voltage is so low at a mere 14 volts, although, of course, the output voltage is much higher and is at 1.1 Megahertz. Solovey's final diagram Fig.6 is interesting in that his 21 watt 12 volt bulb was destroyed in just a few seconds.
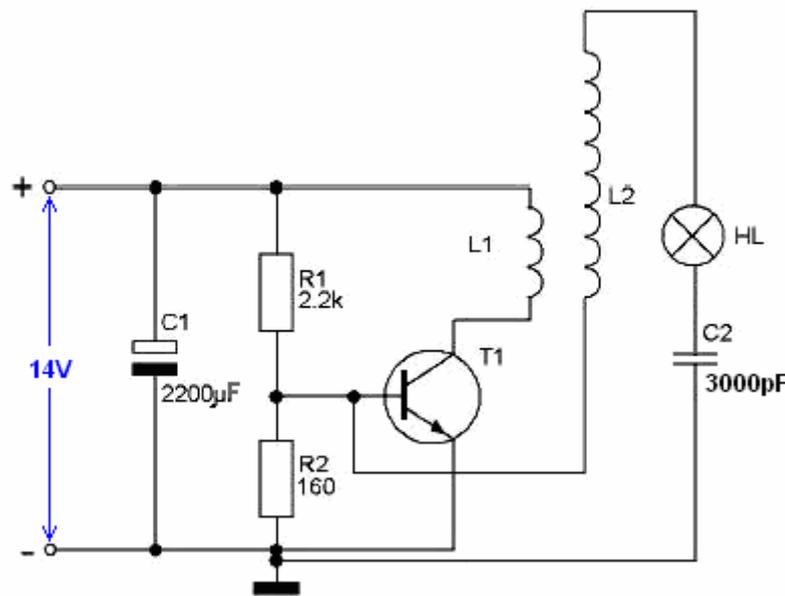
The measurement of current through the bulb was 2.1 amps while the bulb's design current is 1.75 amps. That difference is not enough to have destroyed the bulb so rapidly, so the problem will have been that the bulb wattage was exceeded severely. Earlier, the voltage across the coil "L2" was measured at 700 volts, so there may have been as much as that applied to the twelve volt bulb. If 700 volts were applied to the bulb and a current of 2.1 amps flowed through the bulb, then the dissipated power in the bulb would have been as much as 700 x 2.1 = 1470 watts which is 70 times the rating for the bulb and more than a kilowatt! Please don't be misled by the 14 volt input voltage, this circuit steps up the voltage and it could easily kill you. It is said that the high frequency of 1.1 MHz makes the output harmless to humans. I have not tested this and you really need to be careful around any high voltage circuit.

A point which Solovey seems to have missed is the fact that the positioning of the L1 primary coil along the length of the L2 secondary coil has a major effect on the output amperage, so, positioning the L1 coil in the middle of the L2 coil should increase the output power considerably.

The lamp used as the load is essentially a resistive load. I don't know enough about the subject, but putting a step-down air-core transformer in place of the bulb should lower the output voltage and increase the available output current considerably. However, a transformer is an inductive load and whether or not that change would completely alter the functioning of the circuit remains to be seen.

It might be worth testing the following simple circuit if we were to assume that the output voltage is indeed the 700 volts measured by Solovey and that a resistive load is needed. Three 220-volt 100-watt filament bulbs connected in series would appear to be a satisfactory test load:
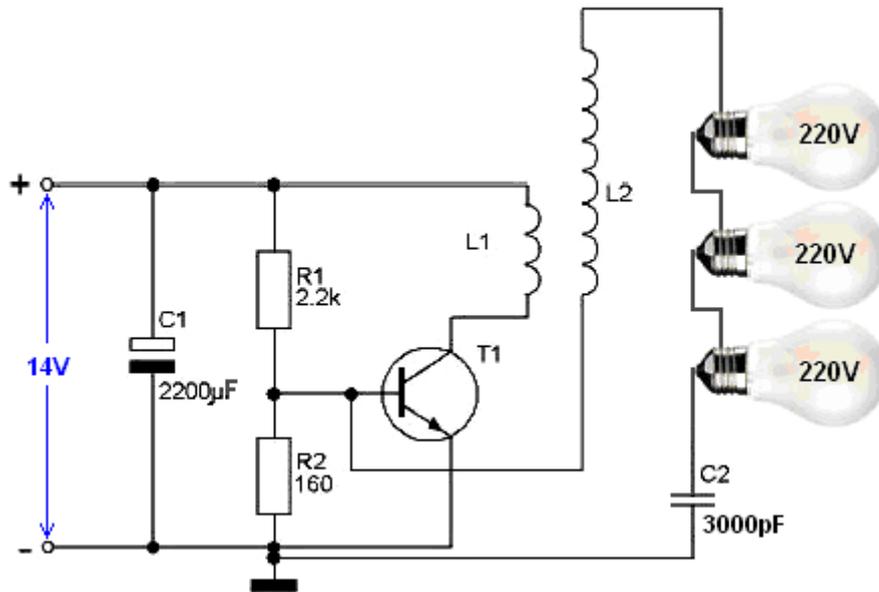
Another possibility would be to take an ordinary cheap halogen heater and re-wire it so that the three 400-watt lamps are in series rather than in parallel:


A standard, low-cost halogen heater consists of three separate 400-watt sections with a switching arrangement which allows one, two or three sections to be powered up:

1200-watt halogen heater
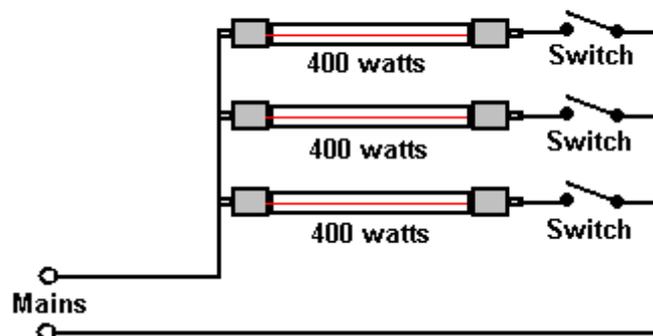
You can change the wiring inside the heater, so that all three halogen lamps are connected in a chain. As the wires connecting the lamps have push-on 'spade' connectors to allow for both simple manufacturing and easy replacement of a halogen lamp, this can often be done without any soldering. The new arrangement is like this:

230 watt halogen heater
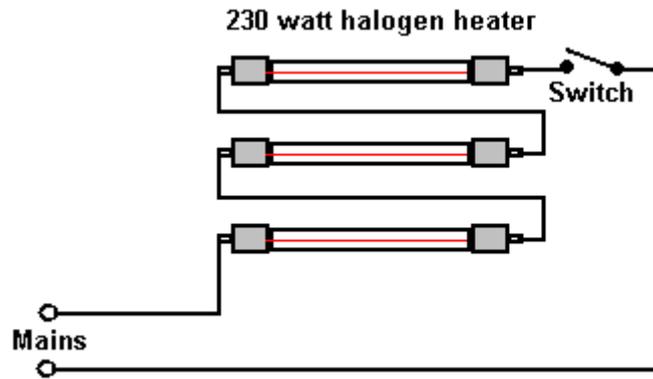
This arrangement 'under-runs' the lamps as each lamp only gets one third of the voltage which it was designed for. If the halogen heater is now connected across 700 volts and the three lamps are similar to each other, then about one third of the 700 volts will be across each bulb. This is only an untested 700 volt suggestion although a heater of this type works well at low power on 220 volts. However, should give a high voltage resistive load as a starting point for experimentation.

Making a Solid-State Tesla Coil.
As some readers may feel that there is some "black magic" about the neon-driver circuit used by Don to drive the Tesla Coil section of his circuitry and that if a suitable unit could not be purchased then the circuit could not be reproduced or tested, it seems reasonable to show how it operates and how it can be constructed from scratch:

The circuit itself is made up of an oscillator to convert the 12-volt DC supply into a pulsating current which is then stepped up to a high voltage by a transformer. Here is a circuit which has been used for this:
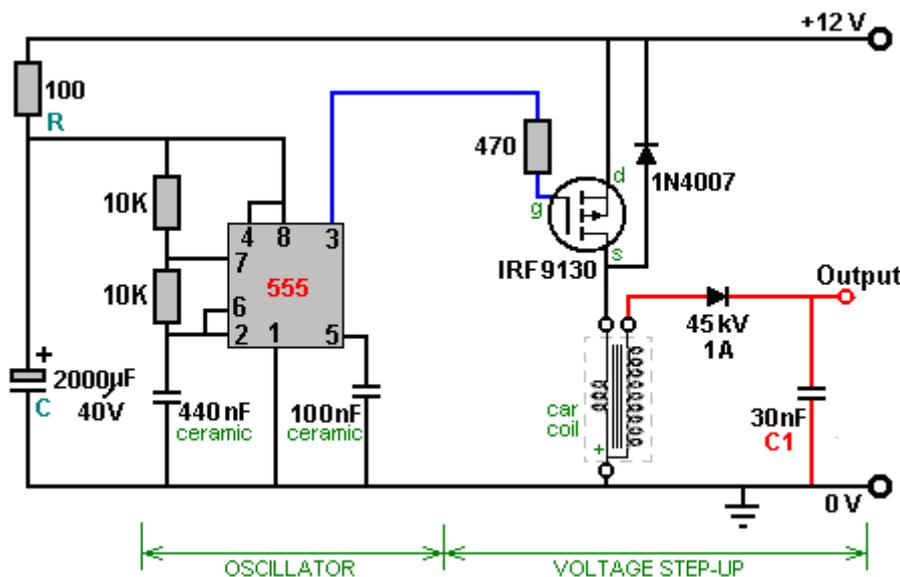
The supply for the 555 timer chip is protected against spikes and dips by the resistor "R" and the capacitor "C". The 555 timer chip acts as an oscillator or "clock" whose speed is governed by the two 10K resistors feeding the 440 nF capacitor. The step-up transformer is an ordinary car coil and the drive power to it is boosted by the IRF9130 FET transistor which is driven by the 555 chip output coming from it's pin 3.

The output from the (Ford Model T) car coil is rectified by the diode, which needs to have a very high voltage rating as the voltage at this point is now very high. The rectified voltage pulses are stored in a

very high-voltage capacitor before being used to drive a Tesla Coil. As a powerful output is wanted, two car coils are used and their outputs combined as shown here:
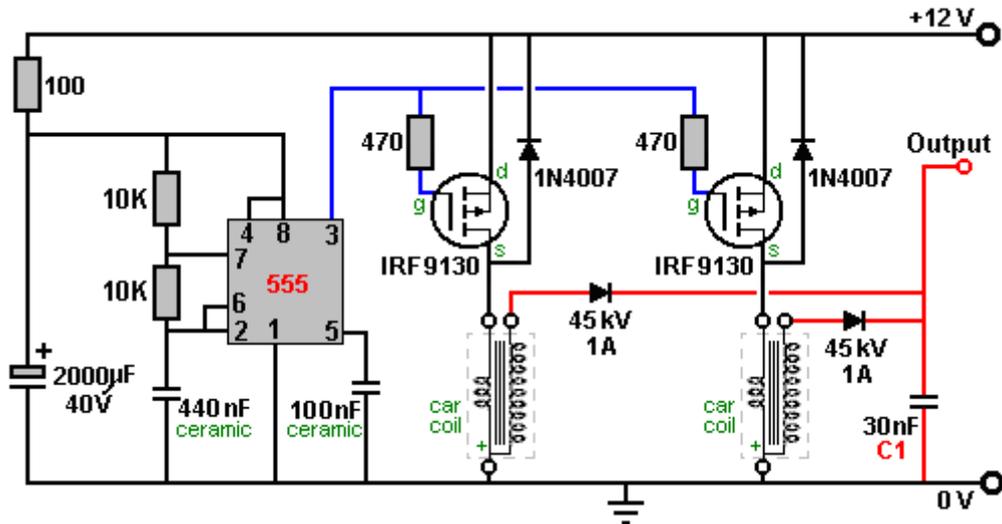

You will notice that the car coil has only three terminals and the terminal marked "+" is the one with the connection common to both of the coils inside the housing. The coil may look like this:
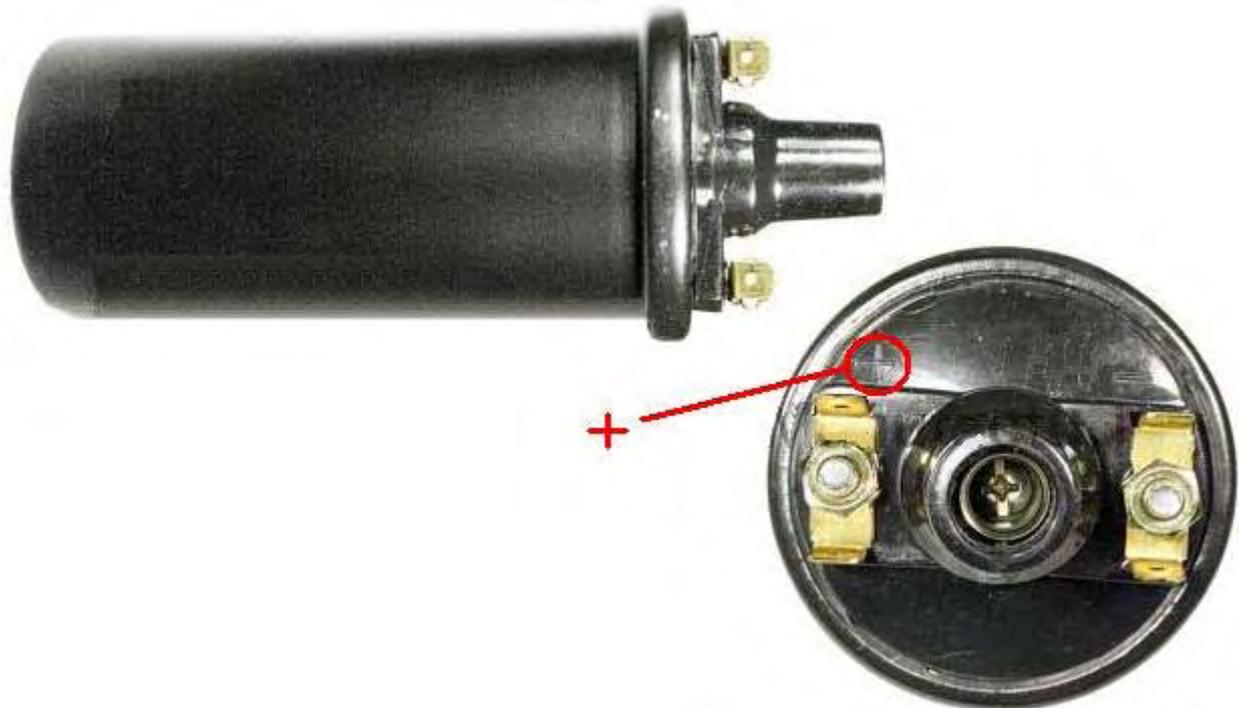

and the "+" is generally marked on the top beside the terminal with the two internal connections running to it. The circuit described so far is very close to that provided by a neon-tube driver circuit and it is certainly capable of driving a Tesla Coil.

There are several different way of constructing a Tesla Coil. It is not unusual to have several spark gaps connected in a chain. This arrangement is called a "series spark gap" because the spark gaps are connected "in series" which is just a technical way of saying "connected in a row". In the chapter on aerial systems, you will see that Hermann Plauson uses that style of spark gap with the very high voltages which he gets from his powerful aerial systems. These multiple spark gaps are much quieter in operation than a single spark gap would be. One of the possible Tesla Coil designs uses a pancake coil as the "L1" coil as that gives even higher gain. The circuit is as shown here:
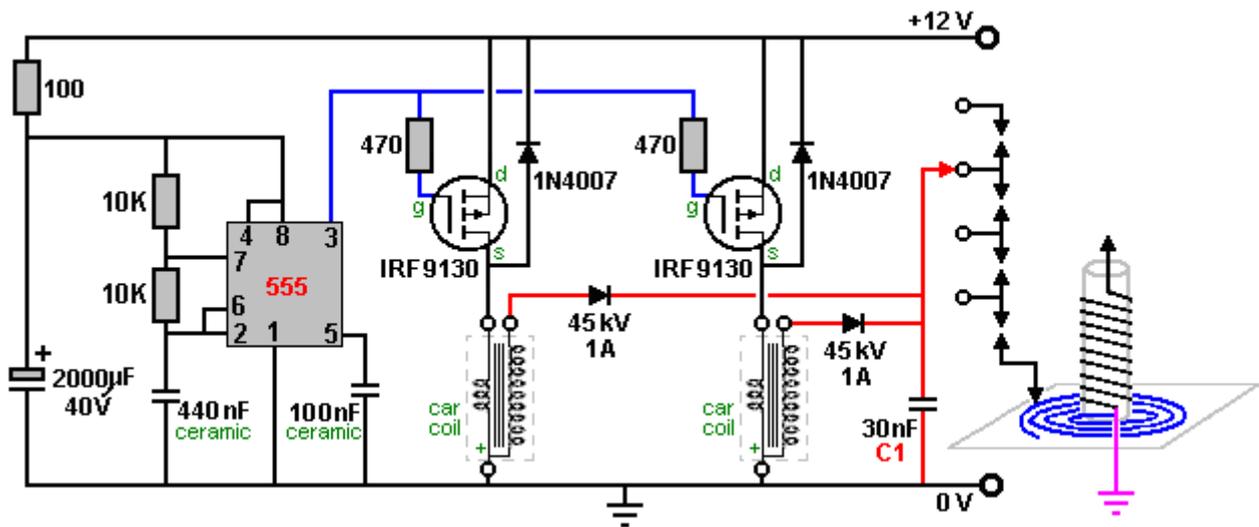
The connection to the pancake coil is by a moveable clamp and the two coils are tuned to resonance by careful and gradual adjustment of that connection, 10 mm at a time (**after** powering down and discharging the "C1" capacitor).

It has been found recently, that connecting two of these (non-ballast resistor) car coils back to back with the plus and minus connections switched over, that the performance is very much improved. It has been suggested that the small self-capacitance of each coil when connected across the other coil, causes a very much higher frequency of operation, giving much sharper voltage spikes which is a very desirable situation in a circuit of this type. This arrangement might be connected like this:
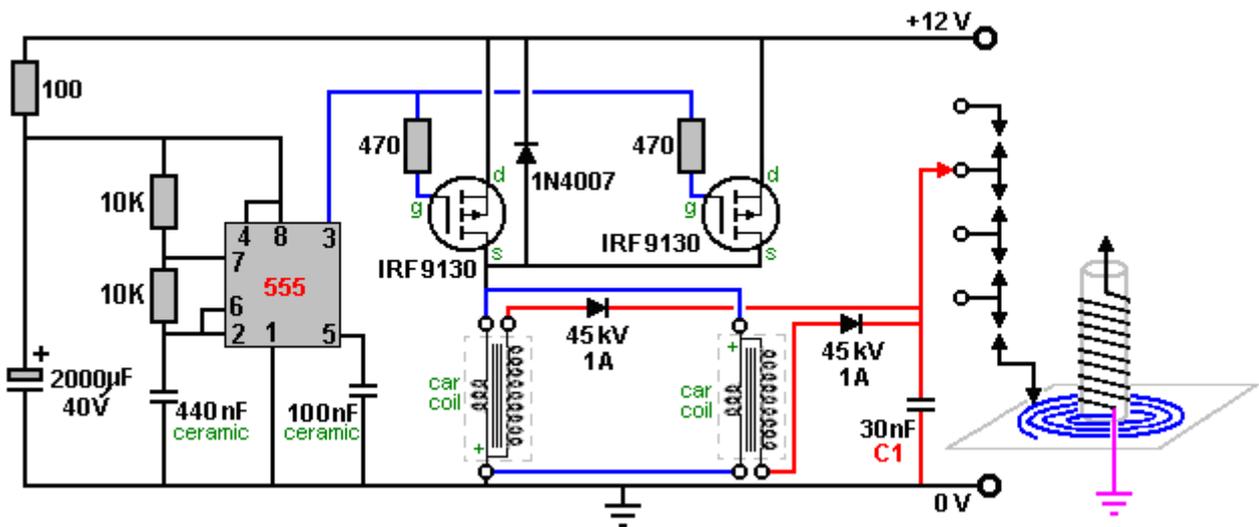
The series spark gap can be constructed in various ways, including using car spark plugs, gas-discharge tubes or neon lamps. The one shown here uses nuts and bolts projecting through two strips of a stiff, non-conducting material, as that is much easier to adjust than the gaps of several spark plugs:
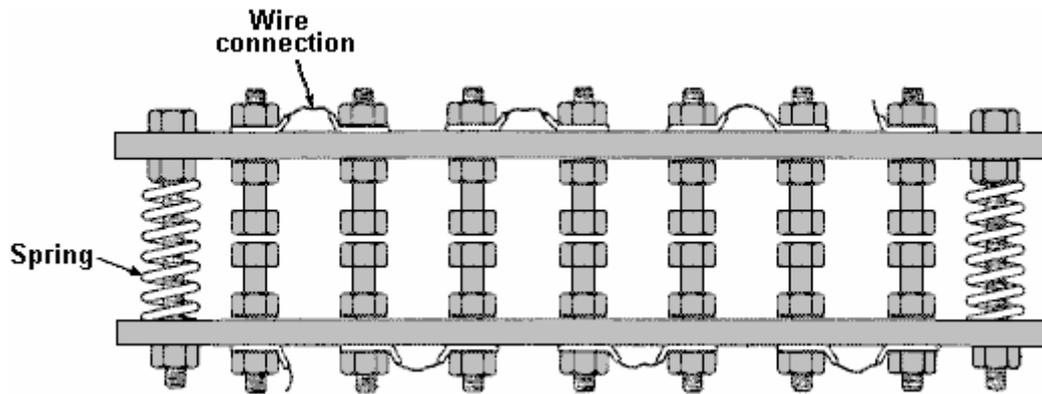
Tightening the bolts which compress the springs moves the bolt heads closer together and reduces all of the spark gaps. The electrical connections can be made to the end tags or to any of the intermediate wire connection straps if fewer spark gaps are required in the chain.

Let me remind you again that this is not a toy and very high voltages will be produced. Also, let me stress again that if you decide to construct anything, then you do so entire on your own responsibility. This document is only provided for information purposes and must not be seen as an encouragement to build any such device nor is any guarantee given that any of the devices described in this ebook will work as described should you decide to attempt to construct a replication prototype of your own. Generally, it takes skill and patience to achieve success with any free-energy device and Don Smith's devices are some of the most difficult, especially since he admits quite freely that he does not disclose all of the details.

The output capacitor marked "C1" in the circuit diagram above has to be able to handle very high voltages. There are various ways of dealing with this. Don dealt with it by getting very expensive capacitors manufactured by a specialist company. Some home-based constructors have had success using glass beer bottles filled with a salt solution. The outside of the bottles are wrapped in aluminium foil to form one of the contacts of the capacitor and bare wires are looped from deep inside each bottle on to the next one, looping from the inside of one bottle to the inside of the next one, and eventually forming the other contact of the capacitor. While that appears to work well, it is not a very convenient thing to carry around. An alternative is just to stand the bare bottles in a container which is lined with foil which forms the second contact of the capacitor.

One method which has been popular in the past is to use two complete rolls of aluminium foil, sometimes called "baking foil", laying them one flat, covering it with one or more layers of plastic cling film and laying the second roll of foil on top of the plastic. The three layers are then rolled up to form the capacitor. Obviously, several of these can be connected together in parallel in order to increase the capacitance of the set. The thicker the plastic, the lower the capacitance but the higher the voltage which can be handled.

The November 1999 issue of Popular Electronics suggests using 33 sheets of the thin aluminium used as a flashing material by house builders. At that time it was supplied in rolls which were ten inches (250 mm) wide, so their design uses 14" (355 mm) lengths of the aluminium. The plastic chosen to separate the plates was polythene sheet 0.062 inch (1.6 mm) thick which is also available from a builders merchants outlet. The plastic is cut to 11 inch (280 mm) by 13 inch (330 mm) and assembly is as follows:

Aluminium sheet | Plastic sheet

SIDE VIEW | TOP VIEW
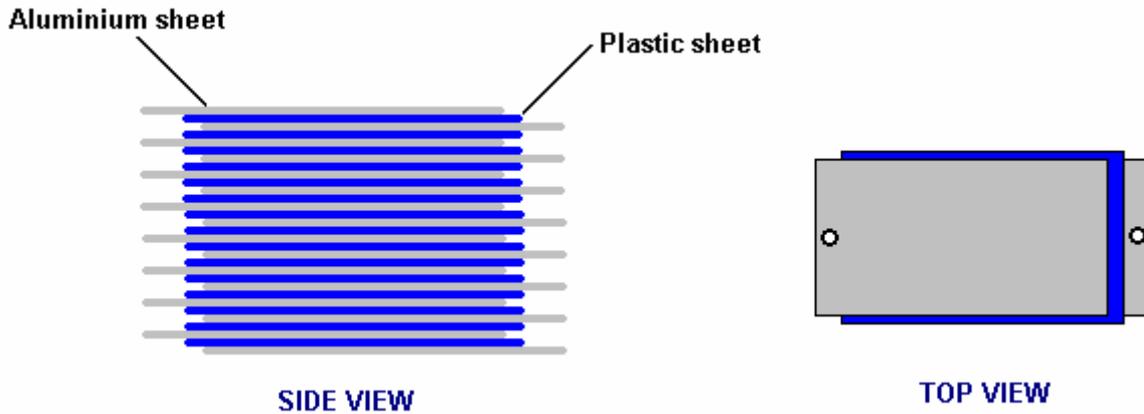
The sandwich stack of sheets is then clamped together between two rigid timber sheets. The tighter that they are clamped, the closer the plates are to each other and the higher the capacitance. The electrical connections are made by running a bolt through the projecting ends of the plates. With two thicknesses of plastic sheet and one of aluminium, there should be room for a washer between each pair of plates at each end and that would improve the clamping and the electrical connection. An alternative is to cut a corner off each plate and position them alternatively so that almost no plate area is ineffective.

As Don Smith has demonstrated in one of his video presentations, Nikola Tesla was perfectly correct when he stated that directing the discharge from a Tesla Coil on to a metal plate (or in Don's case, one of the two metal plates of a two-plate capacitor where a plastic sheet separates the plates just as shown above), produces a very powerful current flow onwards through a good earth connection. Obviously, if an electrical load is positioned between the plates and the earth connection, then the load can be powered to a high level of current, giving a very considerable power gain.

Constructing High-Quality Coils.
The Barker & Williamson coils used by Don in his constructions are expensive to purchase. Some years ago, in an article in a 1997 issue of the "QST" amateur radio publication, Robert H. Johns shows how similar coils can be constructed without any great difficulty. The Electrodyne Corporation research staff have stated that off-the-shelf solid tinned copper wire produces three times the magnetic field that un-tinned copper does, so perhaps that should be borne in mind when choosing the wire for constructing these coils.

Epoxy

Stripboard
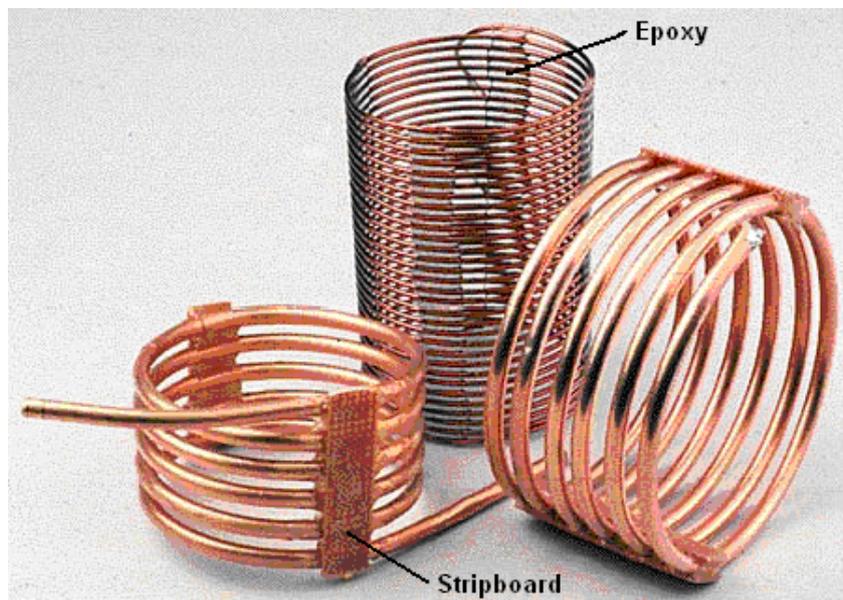
These home-made coils have excellent "Q" Quality factors, some even better than the tinned copper wire coils of Barker & Williamson because the majority of electrical flow is at the surface of the wire and copper is a better conductor of electricity than the silver tinning material.

The inductance of a coil increases if the turns are close together. The capacitance of a coil decreases if the turns are spread out. A good compromise is to space the turns so that there is a gap between the turns of one wire thickness. A common construction method with Tesla Coil builders is to use nylon fishing line or plastic strimmer cord between the turns to create the gap. The method used by Mr Johns allows for even spacing without using any additional material. The key feature is to use a collapsible former and wind the coil on the former, space the turns out evenly and then clamp them in position with strips of epoxy resin, removing the former when the resin has set and cured.

Mr Johns has difficulty with his epoxy being difficult to keep in place, but when mixed with the West System micro fibres, epoxy can be made any consistency and it can be applied as a stiff paste without any loss of it's properties. The epoxy is kept from sticking to the former by placing a strip of electrical tape on each side of the former.
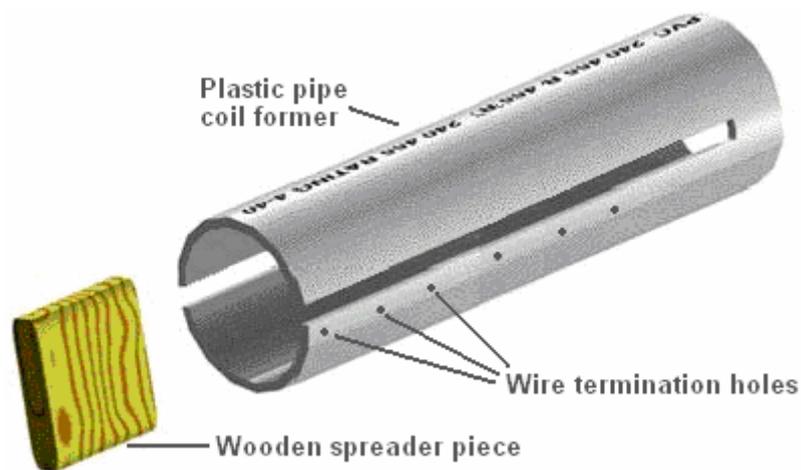
I suggest that the plastic pipe used as the coil former is twice the length of the coil to be wound as that allows a good degree of flexing in the former when the coil is being removed. Before the two slots are cut in the plastic pipe, a wooden spreader piece is cut and it's ends rounded so that it is a push-fit in the pipe. This spreader piece is used to hold the sides of the cut end exactly in position when the wire is being wrapped tightly around the pipe.

Two or more small holes are drilled in the pipe beside where the slots are to be cut. These holes are used to anchor the ends of the wire by passing them through the hole and bending them. Those ends have to be cut off before the finished coil is slid off the former, but they are very useful while the epoxy is being applied and hardening. The pipe slots are cut to a generous width, typically 10 mm or more.

The technique is then to wedge the wooden spreader piece in the slotted end of the pipe. Then anchor the end of the solid copper wire using the first of the drilled holes. The wire, which can be bare or insulated, is then wrapped tightly around the former for the required number of turns, and the other end of the wire secured in one of the other drilled holes. It is common practice to make the turns by rotating the former. When the winding is completed, the turns can be spaced out more evenly if necessary, and then a strip of epoxy paste applied all along one side of the coil. When that has hardened, (or immediately if the epoxy paste is stiff enough), the pipe is turned over and a second epoxy strip applied to the opposite side of the coil. A strip of paxolin board or strip-board can be made part of the epoxy strip. Alternatively, an L-shaped plastic mounting bracket or a plastic mounting bolt can be embedded in the epoxy ready for the coil installation later on.

When the epoxy has hardened, typically 24 hours later, the coil ends are snipped off, the spreader piece is tapped out with a dowel and the sides of the pipe pressed inwards to make it easy to slide the finished coil off the former. Larger diameter coils can be wound with small-diameter copper pipe.

The coil inductance can be calculated from:

Inductance in micro henrys L = d^2n^2 / (18d + 40l)

Where:
d is the coil diameter in inches measured from wire centre to wire centre
n is the number of turns in the coil
l is coil length in inches (1 inch = 25.4 mm)

Using this equation for working out the number of turns for a given inductance in micro henrys:

$$n = \frac{\sqrt{L(18d + 40l)}}{d}$$

Chinese Developer Ming Cao.
a free-energy developer in mainland China, comments on the designs of Don Smith, and Tariel Kapanadze. He says:

None of these things originate from me, they come from Tesla and God.

1. The most important issue, is resonance. Don Smith said that we should make the wire length of the primary coil to be one quarter of the wire length of the secondary coil in order that they will resonate together. My experiments show that this is not true. In a Tesla Coil, the primary coil and it's capacitor form a tank circuit which is an L/C circuit, which oscillate at it's own resonant frequency, and when it does that, it generates a longitudinal wave at that exact frequency. The frequency of this longitudinal wave is determined by the inductance of the primary coil combined with the capacitance of it's tank circuit capacitor, and not the wire length of the primary coil alone. The secondary coil with it's sphere at the top, together form an antenna, which transmits this longitudinal wave. The secondary coil and it's top sphere together form a quarter-wave resonant antenna for this longitudinal wave. They do not form an L/C circuit and that is why very few people have managed to replicate Don Smith's devices.

2. In the devices of Don Smith and Tariel Kapanadze, there is no sphere. We see a single coil as the secondary. This is no longer a quarter-wave antenna, but a half-wave antenna. The highest voltage shows up at the very centre of this coil, and zero voltage shows up at the two ends of the coil winding. These are where the energising coil and the pick up coil should be positioned.

3. The longitudinal wave which passes through the secondary coil is not a current at all, it is a signal running through it, so if we let the secondary to charge a capacitor, we will get nowhere. All we will get is hot electricity caused by the loose induction coupling. The arc at the top of a typical Tesla coil is lightning voltage, and no capacitor on earth can handle that voltage, so even a very high voltage capacitor will be over stressed and the arc will shock through it.

4. The speed of this wave is well defined. It depends on the total capacitance of the coil, and the sphere if there is one. In a typical Tesla coil, the bigger the sphere, the bigger the capacitance, and the lower the resonant frequency of the secondary coil. People are trying to explain it by L/C circuit theory, but this is not necessarily true. Increased capacitance will slow the wave down. If there is no sphere, as in the devices of Don Smith and Tariel Kapanadze, the total capacitance is quite small, and so, the speed of the wave should approach the value (π/2) x C, where C is the speed of light. This speed of the longitudinal wave is claimed by Tesla himself. I kind of verified this by experiment. I said "kind of", because in my experiment, I got a speed of (π/2) x C x (8/9). The wave is slowed down by the copper losses and the capacitance of the coil, mostly the capacitance, but it's definitely faster than the speed of light.

5. So, to tune the secondary, we should not use the speed of light at all, Don was playing a game with us here. Take Don's device as an example. If we position the primary coil at the centre of the secondary coil, then that

middle point of the secondary should either be grounded or connected to a large metal sphere, and each half of the secondary coil should act as a half-wave antenna. Also, the pick-up coils should be located at the two far end terminals. The speed of the longitudinal wave along the secondary coil is unpredictable and so we can only predict a general speed range, we cannot tell whether it is already resonating by performing calculations.   Like Nick Giannopoulo's arrangement (see below) and Tesla's patent diagram, there are two quarter wave coils, whose inner terminals are connected together and open to the air. Here 'open to the air' means that it is different from the other turns of the coil. The longitudinal wave is climbing the turns rather than passing along the wire. But at the end of each quarter wave coil, there is no other turn to climb any more, only a long wire for it to travel along. This straight long wire is open to the air and provides a capacitance for the whole device, and this additional capacitance will slow down the longitudinal wave which is passing through it, so that the resonant frequency for the combination of these two secondary coils will be lower. But if we eliminate the straight wire, and make it a single half-wave secondary coil, the longitudinal wave can keep climbing the turns, and there's no additional capacitance, so that the speed of the longitudinal wave will be very close to $(\pi/2)$ x C, and the resonant frequency will be higher. We can use the same wire length and same diameter coil former to build different devices, which will work at completely different frequencies. So the resonant frequency is unpredictable and we need to find the exact frequency by equipment measurement, or it won't work. The only correct way of tuning the secondary is shown by Eric Dollard in his video of the 1980s, entitled "Eric Dollard Transverse and Longitudinal Wave" which at the present time can be found on YouTube at http://www.youtube.com/watch?v=6BnCUBKgnnc.

6. A pick-up coil is always necessary, and it should be positioned near the zero node of a standing wave. This is one of the only two ways of harness the longitudinal wave. This method is the dynamic way, the other way is the static method, which I believe was used by Ed Gray.

7. In Dr. Peter Lindemann's book and video, he says that Tesla is using unidirectional current. I have to disagree with this. When we charge a capacitor and discharge it through a spark gap, the discharge current "bounces" between the two plates of the capacitor, until the energy is all lost at the spark gap. This process repeats itself endlessly in a typical Tesla Coil. We can see this primary waveform with an oscilloscope and it is alternating current. Thousands of Tesla Coils work in this way and generate lightning. I am confident that this is how it operates.

8. It is not like Don Smith said, that doubling the voltage quadruples the output. It does look like that, but it is actually the current flowing through the primary doing the job. Of course we increase the current by increasing the breakdown voltage of the spark gap by widening the gap. But fundamentally, it is the current which is doing the job. Ed Gray's tube uses a short straight copper bar as the energising 'coil', but it's not a coil, it has little inductance to generate voltage, it only has high current passing through it to energise the longitudinal wave. Of course I haven't actually seen this process, it is a conclusion which is not fully based on experiment.

9. The larger the number of turns in the pick-up coil, the higher the output voltage will be. I still cannot understand how the pick-up process works, but it does pick up more energy.

I get all these by low voltage from a signal generator, as I haven't finished building a high voltage device yet, although I'm already working on it. But I think it's safe for me to believe that these results are solid and good enough to share.

Here is a image from Tesla's patent 593,138 Electrical Transformer.
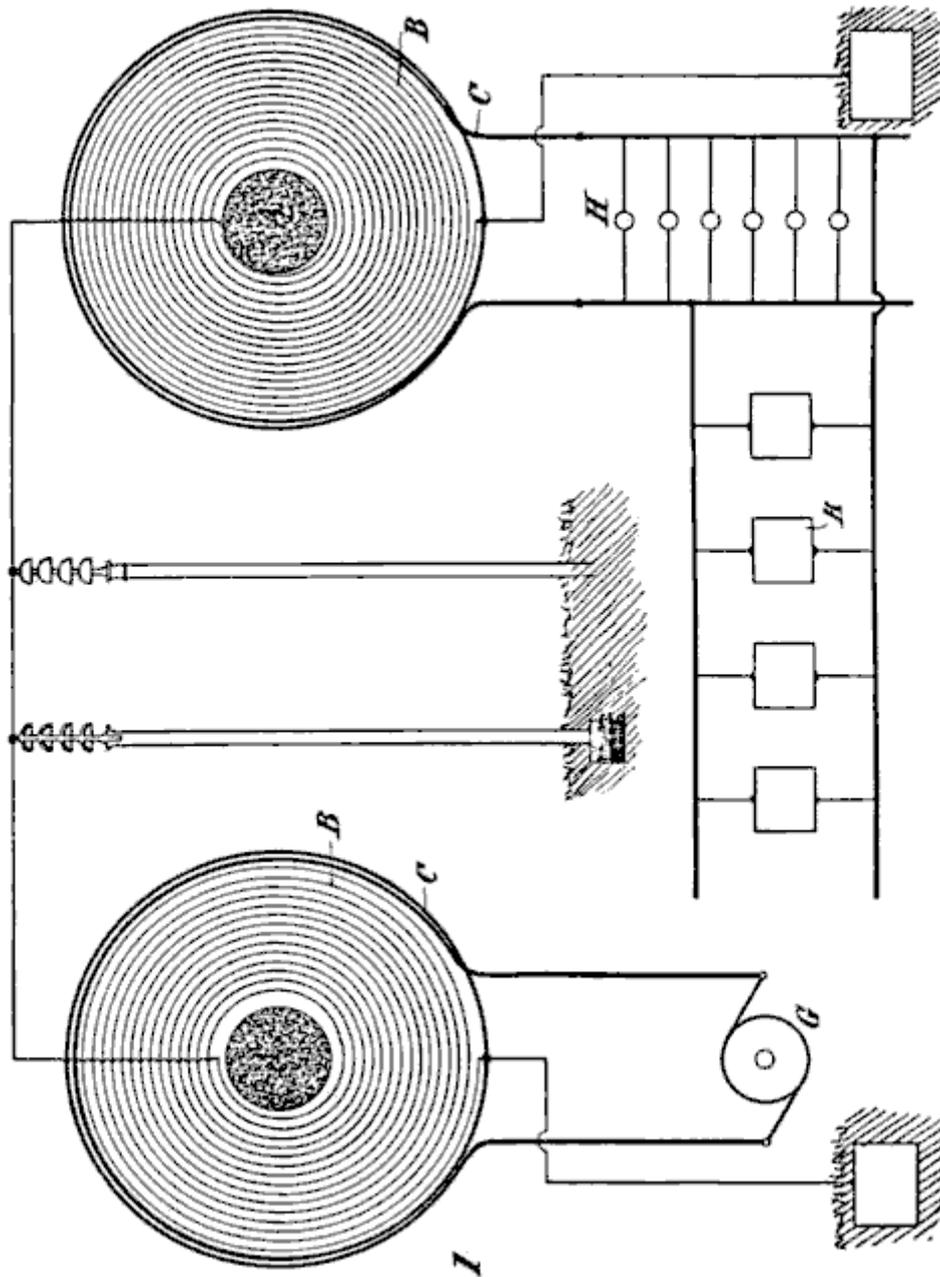
We can see it's exactly the same as Nick Giannopoulos' setup, except that Tesla is using a generator in this diagram, I believe for simplicity. As long as the generator is generating the exact frequency of current, it will work fine. The secondary at the energising side is a quarter-wave coil, and at the pick-up side is another quarter-wave coil. The highest voltage is at the far end of these two secondary coils and their connecting wire, and zero voltage is at the very outside turn of each of the coils. Now if we change the spiral form coil to helical, it becomes Nick's set-up. And let's take this further, we can shorten the connecting wire until the two solenoid secondary coils actually become one big coil, then, when combined it is a half-wave coil, and the highest voltage is at the middle point of it. Now it becomes Don Smith's and Tariel Kapanadze's device, like this:
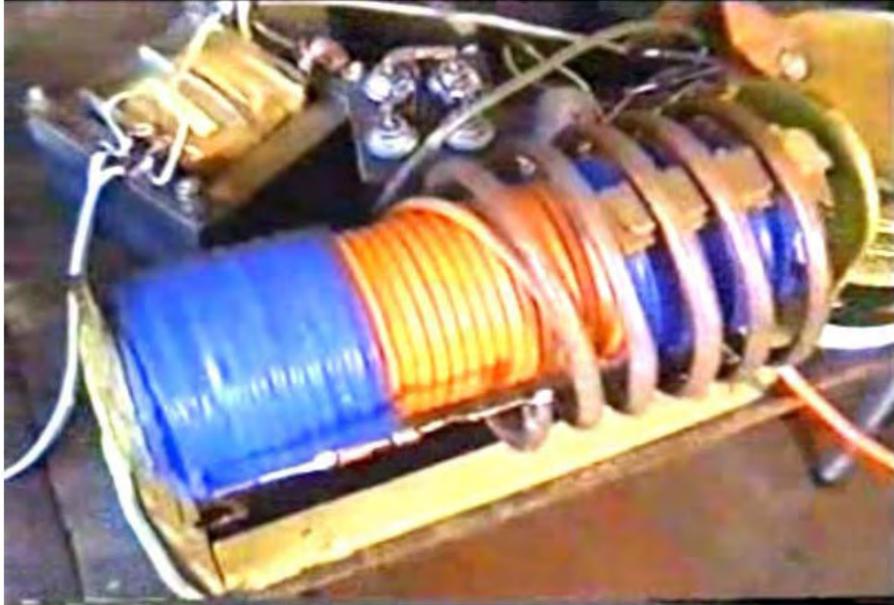
Because the energy is also coming back from the energising side, Kapanadze adds another pick-up coil right underneath the primary energising coil. This arrangement, I think, is very hard to replicate, because it is so very hard to tune, for several reasons:

1. The Secondary wire length is rather short, and the wave speed is very very close to (π/2) x C, so the frequency should be very high, at least 5-7MHz I would guess, or perhaps even higher.

2. The pick-up coil and the energising primary coil is too close to the centre point of the half wave secondary coil. Because the centre point is the point of highest voltage, if the input is a little high, there would be arc shock between the secondary to the energising coil and the pick-up coil, at lightning voltage levels, and so even the best isolation is useless. Also, the centre point is very very sensitive, any conductor close to it will add to the total capacitance of the coil and of course that will alter the half-wave resonant frequency. This adds more difficulty to the tuning adjustment. Besides, after all, people don't even know it's a half-wave coil if he doesn't tell us.

3. The coupling coefficient **K** is a little high, this will increase the hot transformer effect by inductive coupling, and that will not help at all.

Don Smith did indeed say something useful. He said that we can make the secondary coil a fixed size, and then slide the primary coil inside it. Well based on experimental results, this sliding process is altering the actual effective length of the secondary coil. In general, we should assess coil size by counting the turns from the turn right underneath the primary energising coil, to the turn right underneath the pick-up coil, this section is the actual secondary, and this section should be a half-wave resonate coil, the rest of the coil just sits there doing nothing.

But it's not that simple, the terminals of the secondary coil should connect to the earth or to a large sphere, or a typical Tesla Coil secondary with the same quarter-wave resonant frequency. Otherwise the signal will bounce backwards and forwards in the coil producing a mess, or generating an arc, and this is bad for performance, and this is why a solid ground connection is desirable. And this is the true meaning when Don says "slide the primary coil to do the fine tuning".

So, returning to the Kapanadze device, the energising coil covers a large area of the secondary coil, making the effective length of the secondary coil very much shorter, again, boosting the working frequency of the device even higher. For such a device, it is impossible to tune it without a 20Mhz signal generator, an oscilloscope and complete understanding of how a longitudinal wave behaves. For a start, I don't even know where to connect the oscilloscope probe or which terminal should connect to the ground, I'm so lucky to be able to watch Eric Dollard's old video, and I recommend everybody to watch that video, watch it over and over again, also many other educational videos from Eric. A lot of fundamental stuff about how a longitudinal wave behaves are explained there, it's like a treasure map covered in dust in a quiet corner of an open library.

Ming's video http://www.youtube.com/watch?v=1p41KLfOM2E&feature=youtu.be demonstrates what he is saying here. For the video he uses an input coil, a monitoring coil and a secondary coil, each end of which is earthed using separate earth connections:
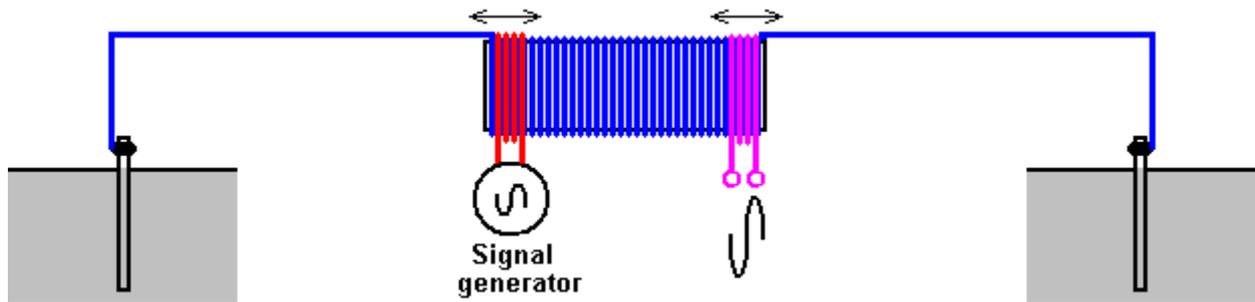
Ming also remarks:

For the set-up in the video, the secondary coil is wound using 1mm diameter enamelled copper wire, 365 turns around a 160mm diameter PVC pipe. The total coil length is 39.5cm. The total wire length of the secondary is approximately 182m. The white material is several layers of insulating glue to prevent arcing between adjacent turns when working with high voltage. The primary coil and the pick-up coil are wound with audio cable which is more than 4 square millimetres in cross section. The primary coil has 2 strands, 2 turns. The pick-up coil has 4 strands and only one turn. I use this thick wire, because I am going to use these coils for my high voltage project.

For a low voltage experiment like shown in the video, it would be quite adequate to use ordinary copper wire of 1 square millimetre cross section (swg 18 or AWG 17). If the secondary wire length is reduced, then the resonant frequency will be higher, but the principle is the same.

If only low voltage is going to be used - perhaps just to study the nature of longitudinal waves, then the secondary coil can be made using very thin wire of 0.3 to 0.4mm diameter (swg 30 to swg 27) enamelled copper wire, which will cost much less. I made my coils with thick wire because I intend to continue using high voltages.

It's been a long time, but I've got some more understanding about harnessing radiant energy. I have made two additional videos: http://www.youtube.com/watch?v=WJUfj53geBo and http://www.youtube.com/watch?v=BdBjKVyKBZA In these two videos, I explain the method of converting Tesla's 'cold' electricity to normal 'hot' electricity by storing it in a capacitor. I strongly believe that, the method shown in the second video is exactly what Don is doing with his famous device, which has no pick-up coil, just a two-part secondary.

In the first video, I replace the pick-up coil with an uncoated sheet of copper, to show people that, this is not a transformer, and so, is not based on electromagnetic induction. The pick-up coil is fundamentally, a piece of metal which can be electrified by a longitudinal wave. I can remove the diode and the capacitor, and just let the copper sheet discharge to ground through a spark gap and two ordinary 200-watt incandescent light bulbs connected in series, the light bulbs are pretty bright although not fully lit, but pretty bright in spite of this being a non-resonant situation. They look like this:

The copper sheet is electrified, and it's charge is flowing to ground, and it is this very process which forms the current. So if we consider it as a transformer, and consider the pick-up coil as a inductor, and add a load to this "inductor" to form a closed loop, then we are going in the wrong direction.

Then I re-read about Nick Giannopoulos' device, and I noticed that he said that the light coming from his bulb is blue and white. Following his circuit diagram, I believe that it is like this:

I get this kind of light when I attach the light bulb directly to the sheet copper without an earth connection or any other additional wire. Here at this stage, we have no 'hot' electricity. The blue-white light is caused by the high voltage of the metal, to which the bulb is attached. The high voltage is not caused by induction, it is purely static charge on the metal surface, caused by longitudinal wave electrification. If we use Tesla's specially made bulbs as shown in his lectures, we have his single-wire lighting system, and we will have a very bright light suitable for general-purpose lighting instead of this kind of blue-white light. Generally speaking, my bare copper sheet is the equivalent of Nick's pick-up coil plus his step-down transformer, which, of course, is not a transformer at all.

Note: As will be seen in the videos, Ming uses two separate earth connections. One is the earthing wire of his mains electricity and the other is a connection to his cold water pipes.

A Russian Developer
A Russian developer has lit a large light bulb with a self-powered Kapandze-style circuit:

ENERGY AMPLIFICATION WITH HIGH VOLTAGE SPARK GAP

22Kv HTV INPUT

HV DIODE · C3 · SPARK GAP · 3T

80T · 80T · 500nF 750V · OUTPUT

GOST-armored trains

2KW

μ=80.000
Nanoperm stripes 2 см

Counter bifilar

80 · 80 · 320 · 320

17,5 · 2см · 1мм · 3см · 5см

aluminium

1см 3,5

100nF 10kV · ТДКС на ТЛ494

5μF 1kV

Бронепоезд БТГ

S1 · Tr

L4 · L1 120μH · L2 120μH · L3 · 2-2.5 кВт

100n · C2 1....10μ

Авиационный алюминий

Навивач

12V · G · T1 · VD4

Очень точная настройка частоты

12V 0.8Ah · ТДКС на 494

заземление

100nF 10 kV · индуктор

80 витков 120uH · резонатор

1...10uF 1kV

start/stop

2kW

1000мкф.

как синяя катушка в "аквариума 2012г"!

синяя обмотка L2
желтая обмотка L3
намотанные как бифиляр!

синяя обмотка L2
желтая обмотка L3

80 витков
алюминиева разрезанная труба или одна витка от алюминия

C3
L1
индуктор

резонатор – необходимо сообразить в какой сторону намотан он!

ТВС

C2
0.5uF

L4

S1
T1
L5

V1
12V

R1
Q2 NPN

R2
Q1 NPN

T2

заземление

C1
1000мкф.

синяя обмотка L2
желтая обмотка L3

ТВС

80 витков
алюминиева разрезанная труба или одна витка от алюминия

C3
индуктор

100-150 µH
d=2.5 mm

12V
0.8Ah

IRFP 260N

470 5W

10K
2 W

15V
2W

680nF
1200V

5-6w
d=2.5mm

56nF
400V

10K
2 W

15V
2W

470 5W

DSEI60-10A

DSEI60-10A
IRFP 260N

0.5мкФ
750В

резонатор
L4

S1
T1
L5

заземление

C1
1000мкф.

Video at http://www.youtube.com/watch?v=5nxKqfkkndw&feature=youtu.be shows self-powered bulb (needs an earth connection):
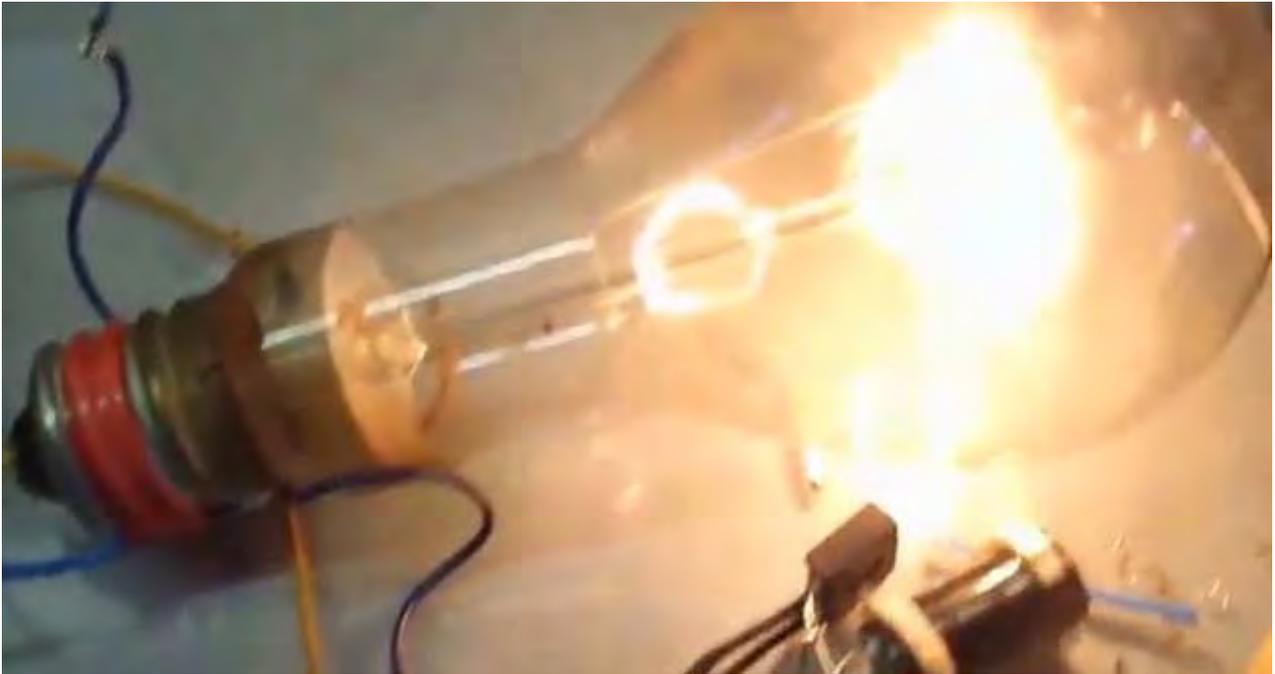
'Salty Citrus' Chinese Developer.
A Chinese developer whose forum ID is 'Salty Citrus', has replicated Don Smith's main device very successfully. Using an input of 12V at 1A to 2A (24 watts) he is lighting ten 100-watt light bulbs to a high level of brightness. The Chinese language video relating to this can be seen at:
http://www.energysea.net/forum.php?mod=viewthread&tid=1350&extra=&page=1

Here are some of the frames from that video:
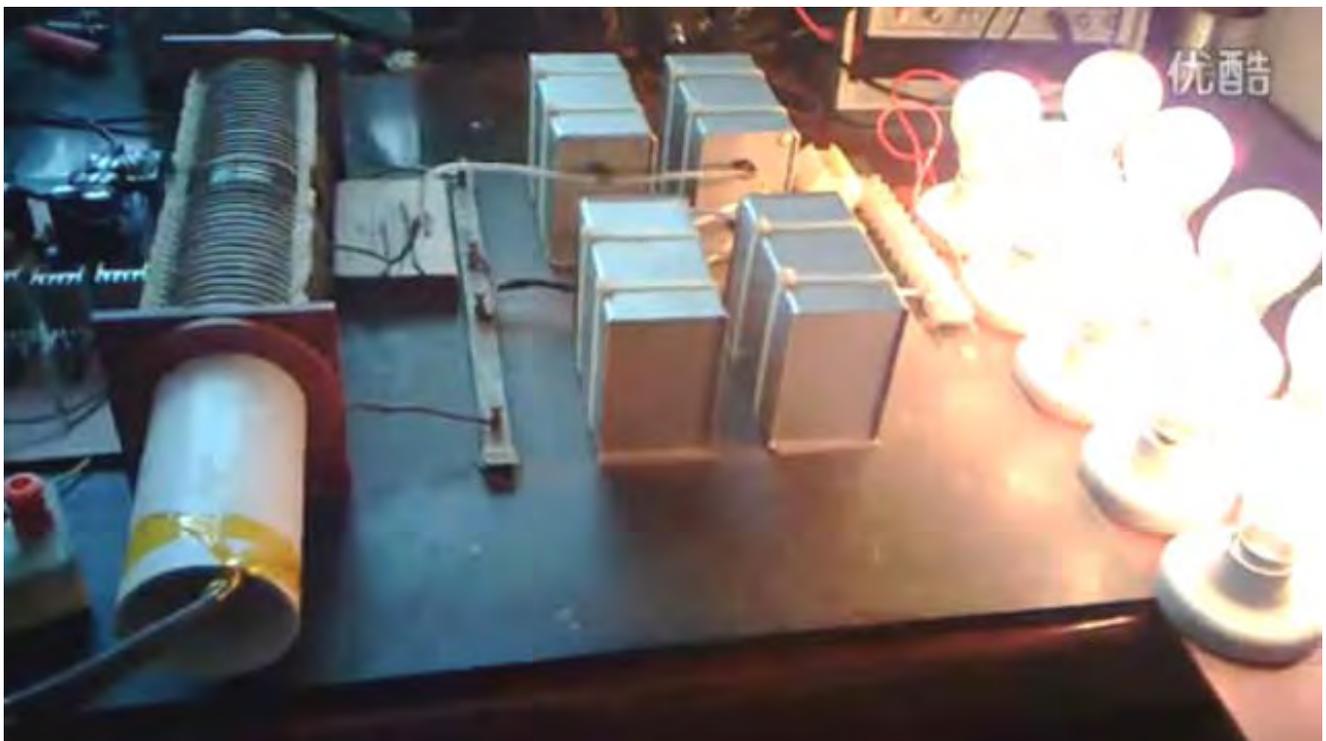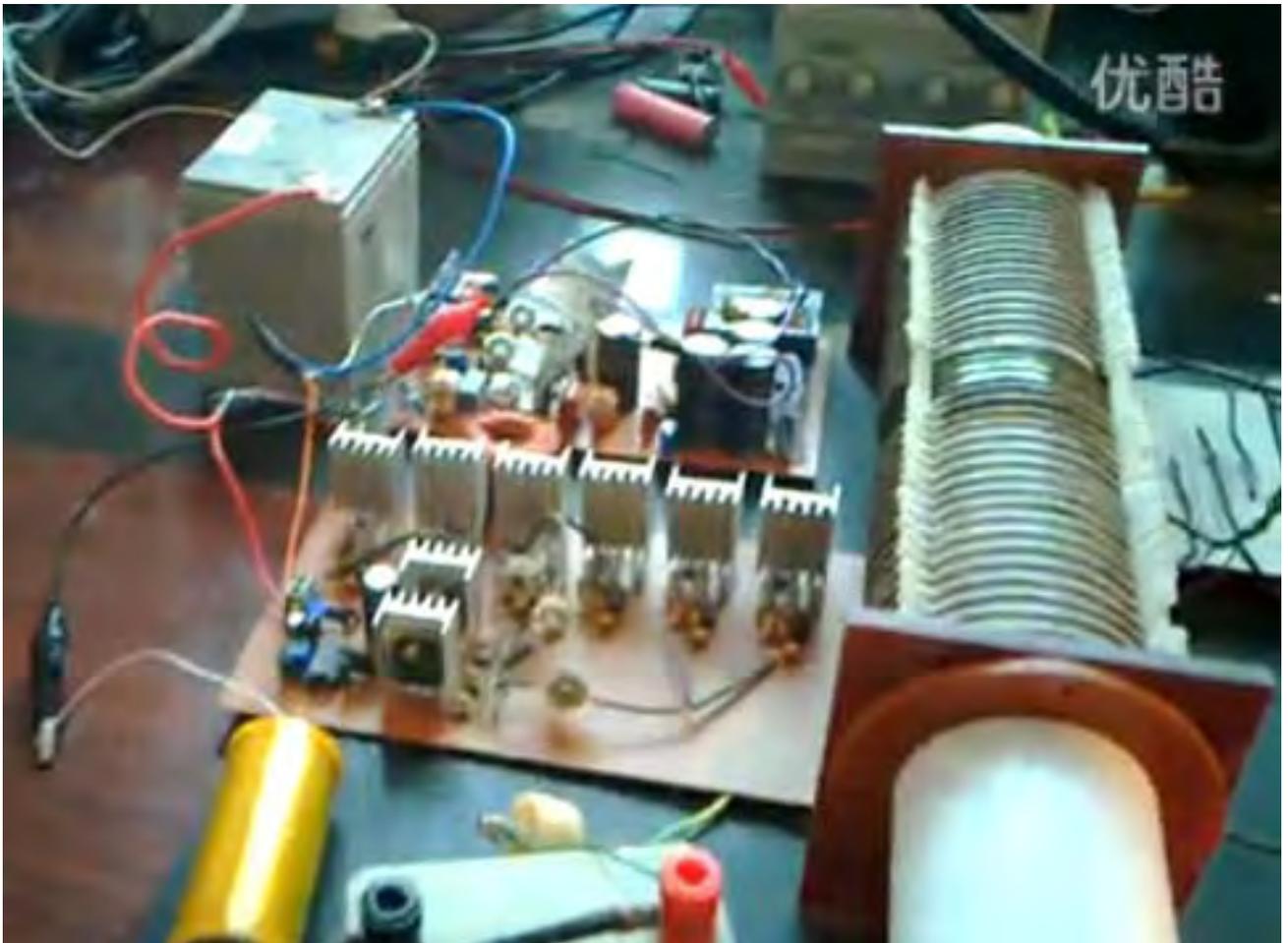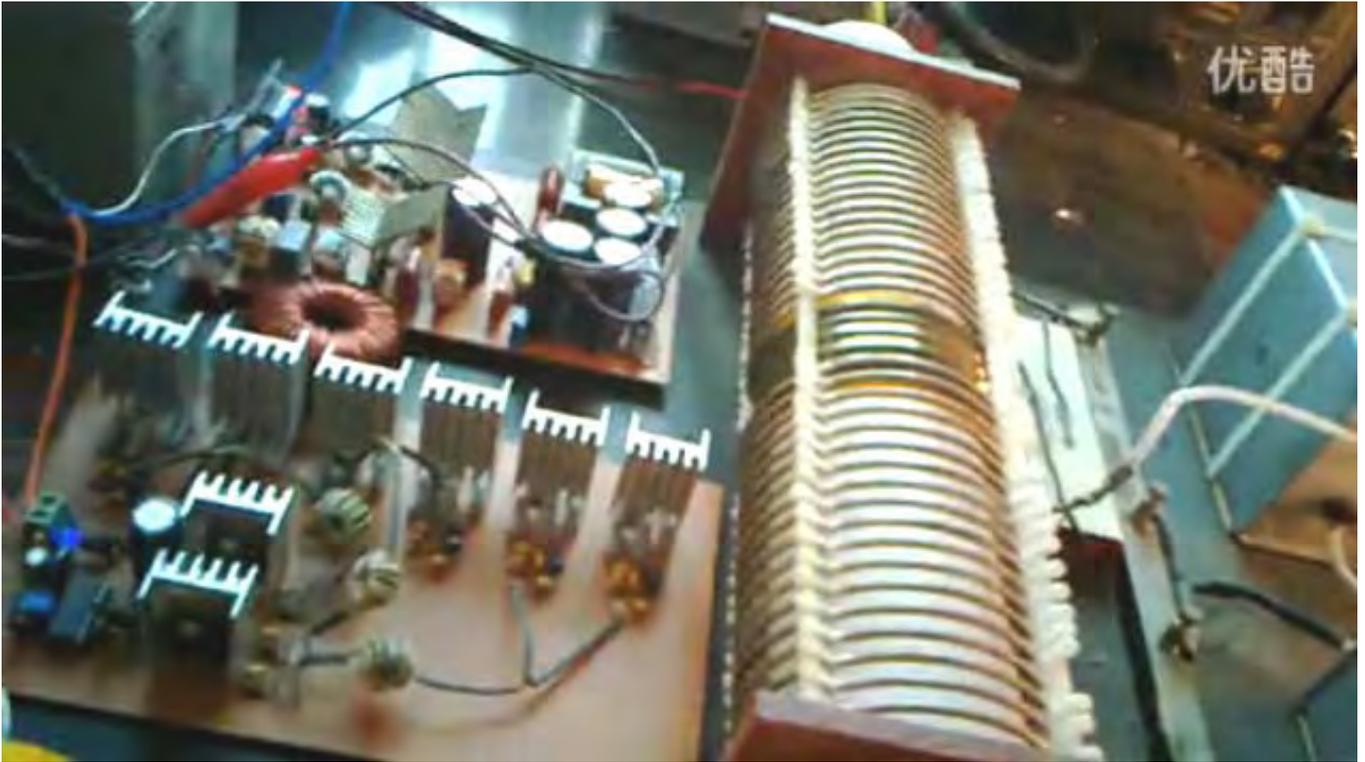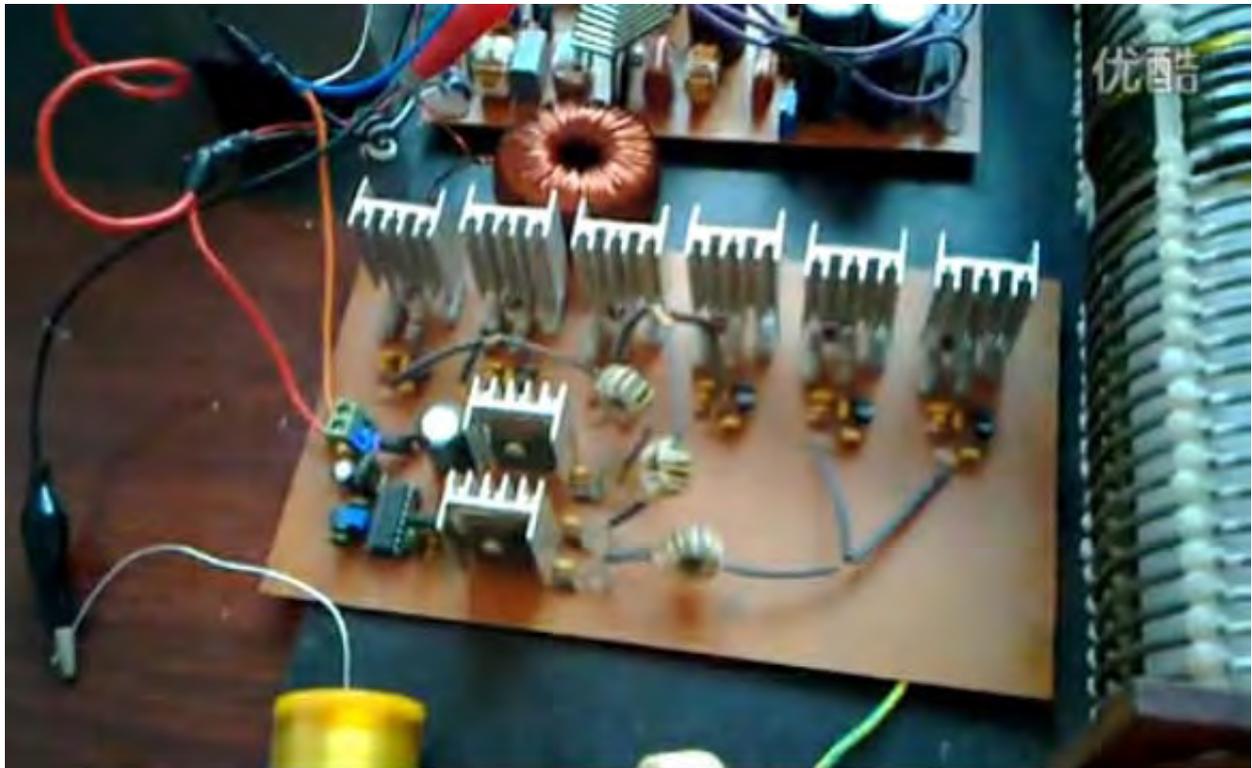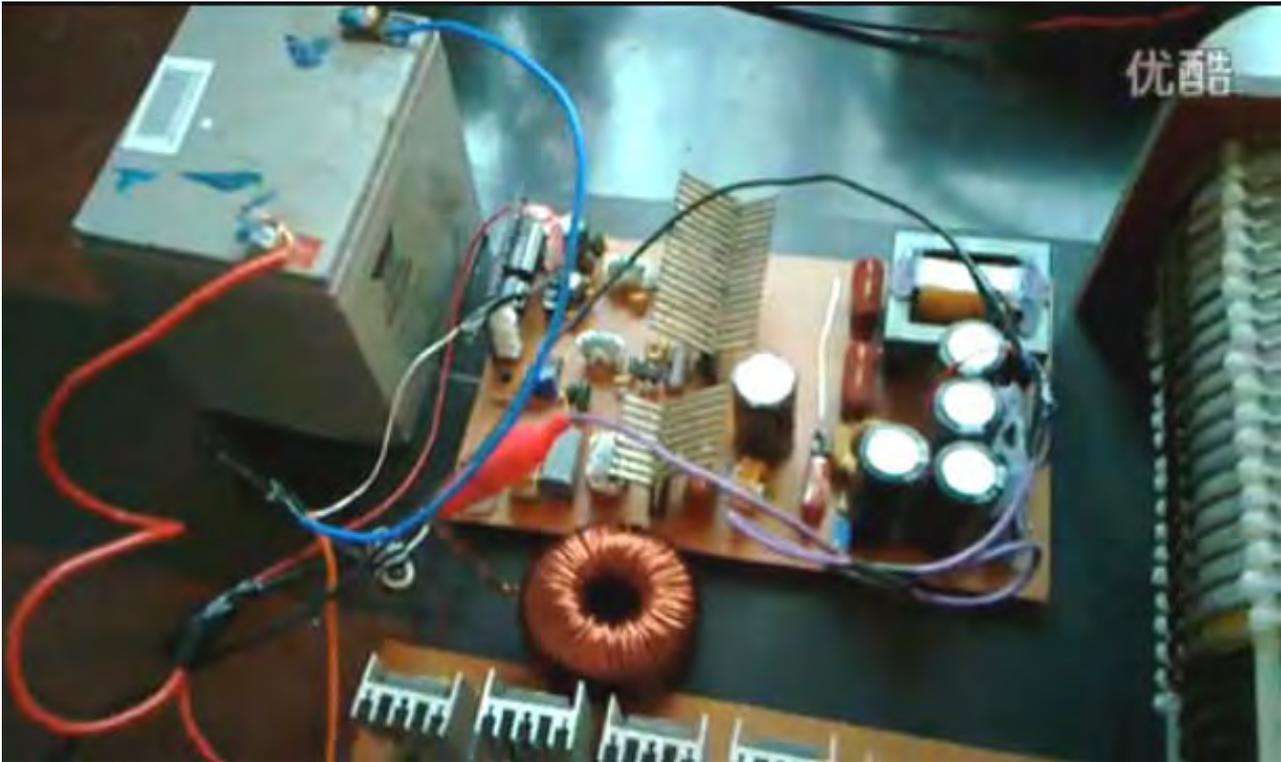
The circuitry used is shown here:
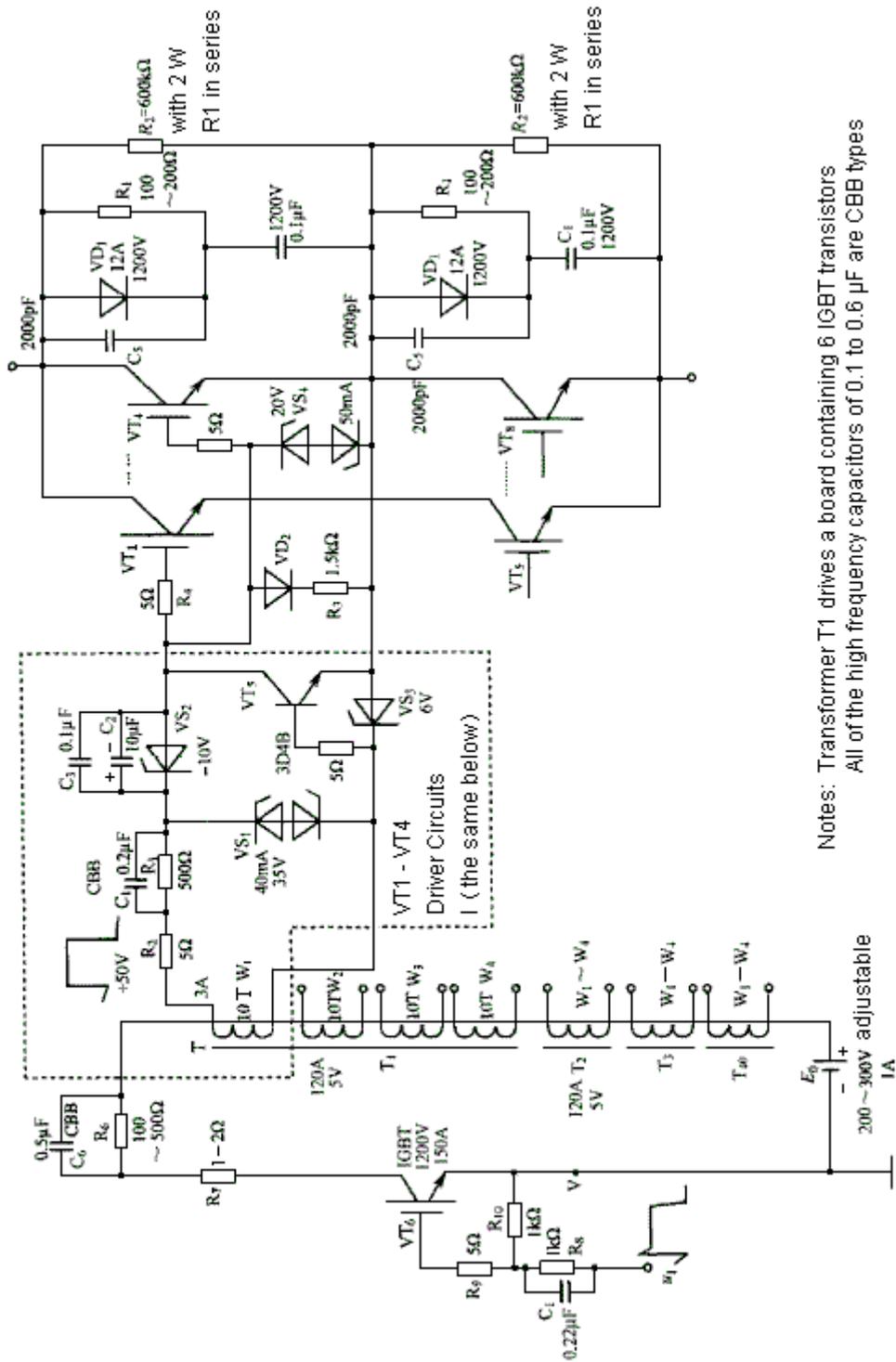
Notes: Transformer T1 drives a board containing 6 IGBT transistors
All of the high frequency capacitors of 0.1 to 0.6 μF are CBB types
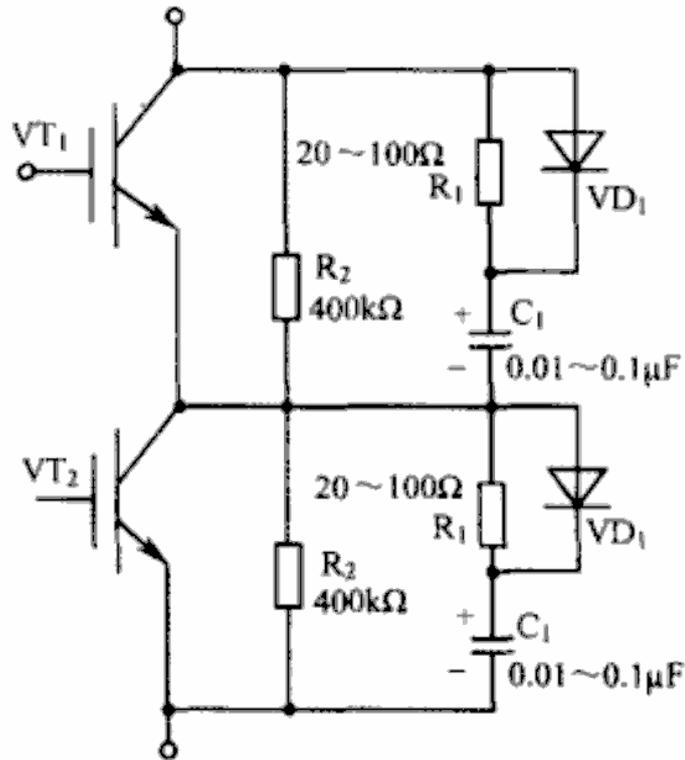
Subsequently, a forum post by a Mexican man says:

Hello 'Salty Citrus',

I love your video!!!! I can really appreciate the amount of work you and your group have spent to develop and perfect the Don Smith / Tesla free-energy device. Thank you for pursuing such a noble cause.

I am intrigued by your switching network using the CREE CMF20120.   How did you wire the MOSFET's?
You used a UCC3825A Pulse-Width Modulator to clock the signal --> MOSFETS --> Gate Drive Transformers (x3) --> push-pull transistors --> CMF20120?   Did you run the CMF20120 in series?   Sorry about so many questions, but I am totally impressed by your ingenuity, and completely agree that your solid-state solution has undoubted benefits over Tesla's conventional spark gap.

I would be honoured if you could take the time to answer my questions. I would love to replicate your circuits.

I wish you the best of luck with your endeavours.

Sincerely,

'Lost_bro' (half a world away)

Re: 'Lost_bro'

Thanks for the compliment. The success does credit to my team. Thanks to my team. Yes, the CMF20120 run in series in this solution. The voltage balancing between each MOSFET is critical as is the balancing between RC and DC voltage created by R.

Welcome to our forum for the exchange of information. China is an hospitable country. If you have any information or ideas, please don't hesitate to share them with us. 'Half a world away' is not a great distance.

All the best,

Sincerely

'Salty Citrus'

An earlier entry on the Chinese forum translates as:

Here is an earlier build. It is simple and has no step-down section and so cannot be self-powered:

10.000 V capacitor
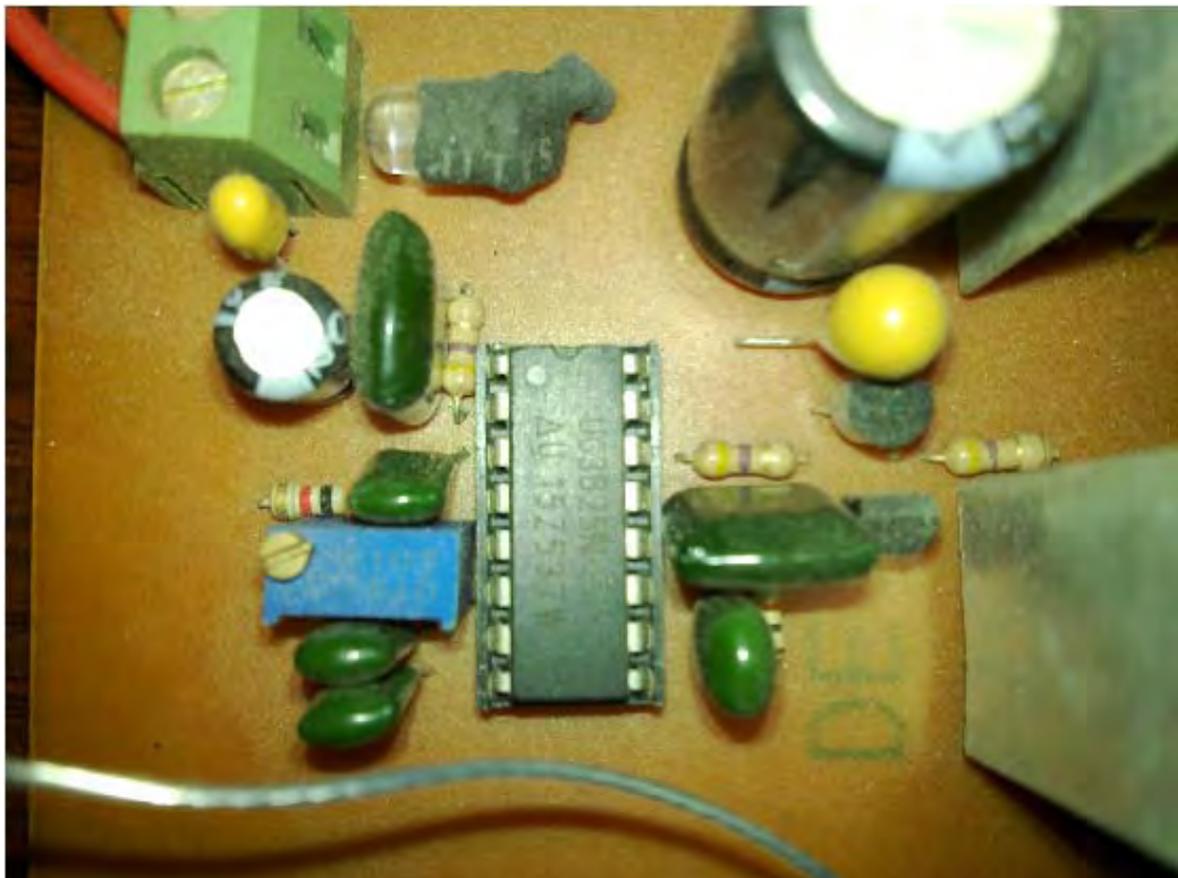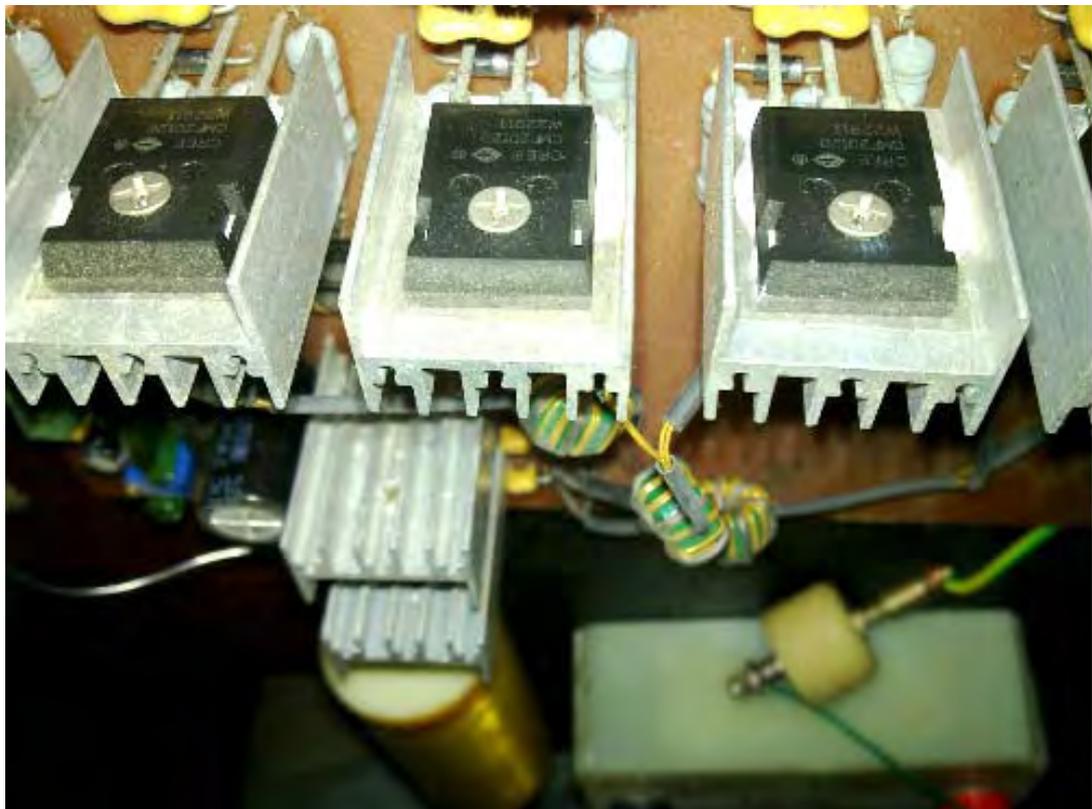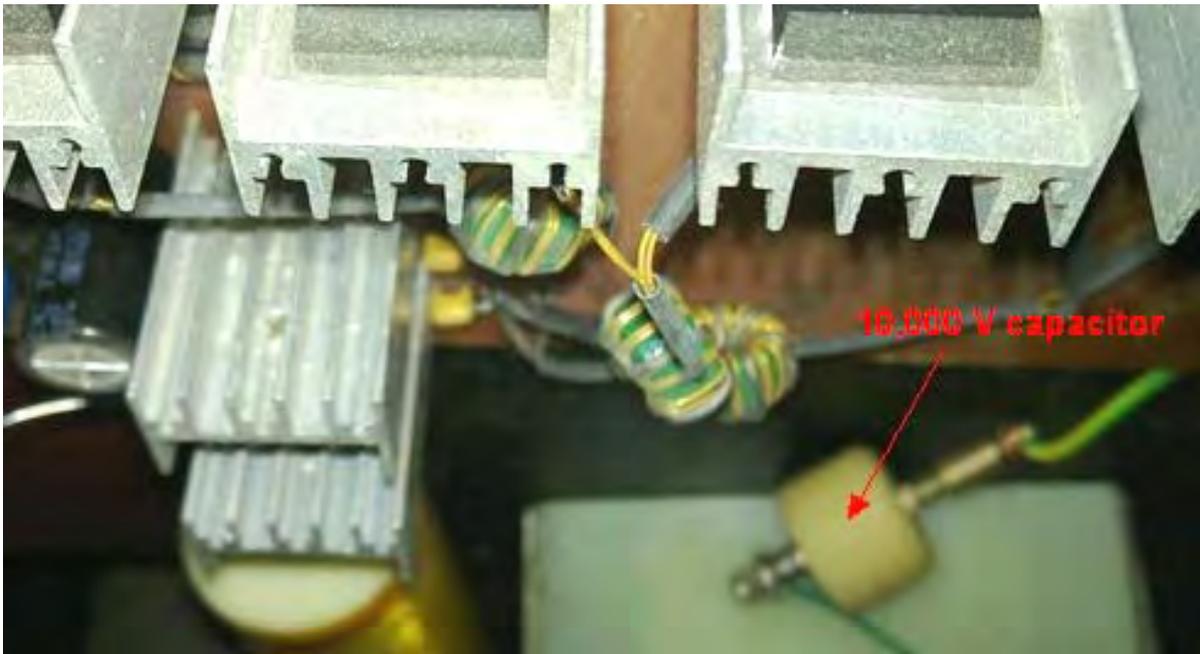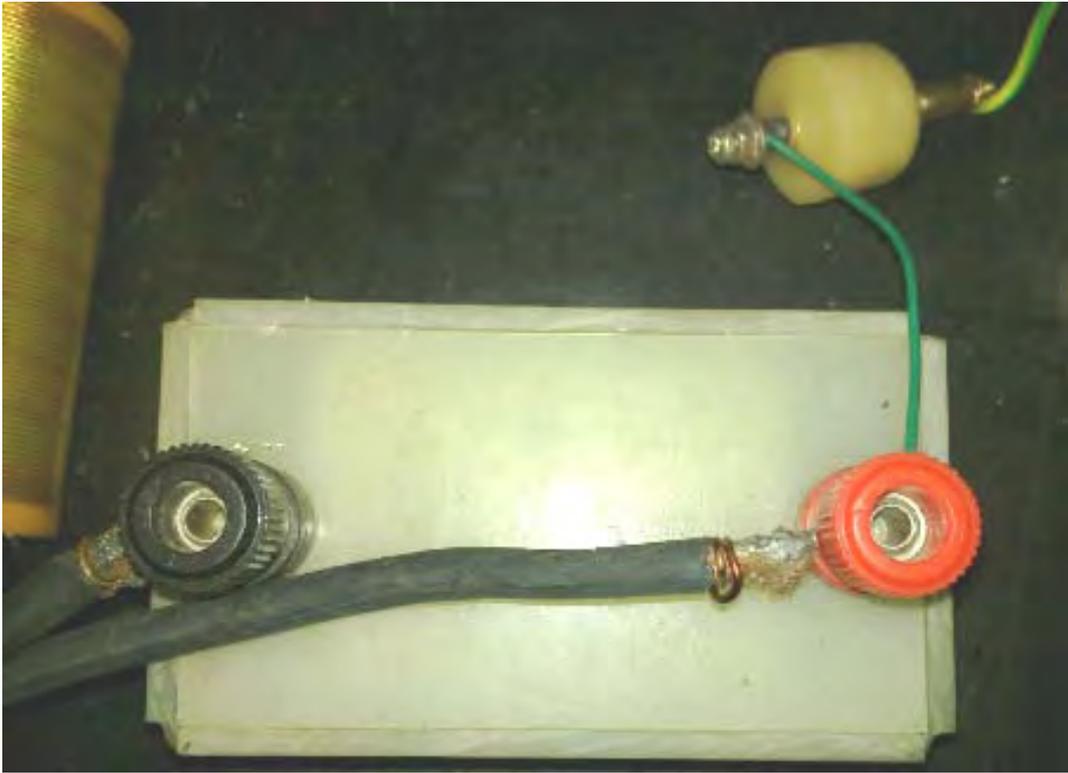
Each bulb is 100 watts. The first board has a 12-volt input and an adjustable output which can be varied from 500V to 1600V (any higher voltage would damage the four 450V 20 microfarad capacitors). In the video, the variable resistor is used to set the voltage level of the FBT after boost as the voltage step-up circuit can go up as high as 3,000 volts.

The L2 coil is wound in a single direction and has just one tap at the centre. The idea is from Tesla's Colorado Springs Notes, in which Tesla disclosed the best method for a resonant driver. The frequency used in this circuit is about 230 kHz.

Question: There is nothing to do with quarter-wavelength, but is there anything with the length of the L1 and L2 coils on quarter-wavelength?
Answer: I think that the phase is more important.

Question: Do you need a Phase-Locked Loop circuit with a certain phase difference?
Answer: Basically, I use a fixed frequency, I have tried a Phase-Locked Loop and the effect is the same.

Question: Do you use direct drive with the spark gap only being used to limit voltage?
Answer: You can use a vacuum tube to drive it.

Question: If you drive it directly, then the loading will be very big and the current will increase, whereas if you use a spark gap, then the spark will become smaller and the current will be steady.
Answer: If the load affects the input, then you cannot drive it even with a spark gap. If you trigger with a spark gap, then the load will not increase the input. The spark gap is just a switch.

Question: Is there any direct Lenz relationship between the load and the primary?
Answer: Once the phase has been adjusted, the primary has no adverse effect on the secondary.

Commenting on his circuitry, 'Salty Citrus' states:

The diode symbols with a tick indicate a Zener diode (or bidirectional TVS-Transient Voltage Suppressor or "varistor"). For example, in this circuit, they are used to suppress the Grid voltage of the MOSFET, to maintain the gate voltage within the range of +20V to -20V. The above circuit is just a description of the structure of the MOS series method. Specific components will be needed for your own requirements considering the MOSFETs being used in your construction.

The voltage E0 can be adjusted. The source can be made using a TL494 IC operating at 12V, or alternatively, an adjustable, voltage-stabilised inverter can be used. The voltage setting depends on the numbers of MOSFETs which are being used in series and the parameters of Grid voltage and the turns ratio of the isolation transformer. The circuit is arranged so that each MOSFET has its own separate isolation transformer, and all of the primary windings of those transformers are connected in series to form a single current path. The number of turns in the primary of each isolation transformer is exactly the same. To drive an IGBT(or MOSFET), VT6 provides a high-frequency pulse current to drive the Gates of the MOSFETs, so as to achieve consistent switching.

In my circuit, the frequency used is 220 kHz, for this frequency, I use six MOSFETs type CMF2012 (1200V, 37A, Resistance Drain-to-Source of just 80 milliohms). This MOSFET from CREE has excellent performance, but you have to design the drive circuit carefully, 2V to 22V for the Gate voltage will be best. I particularly stress that it is very important that MOSFETs operated in series, require voltage balancing and an accurate drive. Especially important is having synchronized drive signals and the rise and fall time of the drive signal should be as short as possible, so that the switching time difference between the MOSFETs will be short, and that improves the high frequency operation.

Tesla Coils Back-to-Back

I have been told of one man who used his common sense and produced an impressive result. He used a Tesla Coil as the driving force, and then used a second Tesla Coil back-to-back with the first one, to step the high voltage back down again. Doing that, he was able to light a series of powerful light bulbs from the "L1" output coils. He also confirmed that doubling the voltage, quadrupled the power output, verifying what Don said. He also found that adding additional coils with bulbs to the output Tesla Coil, did not increase the input power at all, did not cause any of the existing light bulbs to shine any less brightly, and yet lit the additional bulbs. That would appear to be confirmation of Don's statement that any number of magnetic copies of the original oscillating magnetic field of the first Tesla Coil, can provide a full-power electrical output without requiring any additional input power. I'm no expert, but my understanding of the arrangement is:
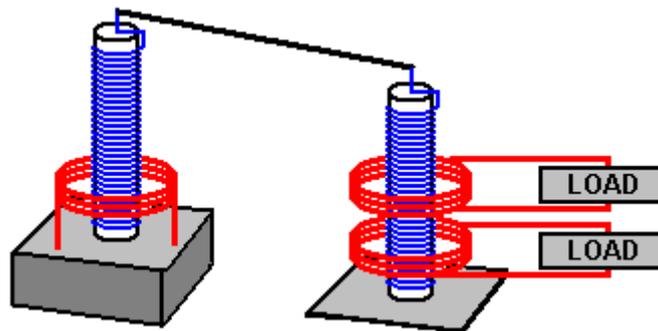
As the large diameter coil is exactly one quarter the length of the smaller diameter coil, there is an automatic resonance of both when the applied frequency is just right. As the first narrow coil is identical to the second narrow coil, they are also automatically resonant together. Again, as the large coils which feed the loads are exactly one quarter the wire length of the narrow coils, they also resonate at the common frequency and at that frequency, the input power is at its minimum while the output power is at its maximum. The spike at the top of each of the narrow coils is connected with a wire to channel the generated power from the first Tesla Coil to the second one.

This arrangement may seem too simple to be effective, but with Tesla technology "too simple" just does not apply. This can be seen clearly from the work of **Nikanor "Nick" Giannopoulos**. Before he ever learned anything about electronics, Nick read and understood Nikola Tesla's "Colorado Spring Notes" (http://www.free-energy-info.tuks.nl/TeslaCSN.pdf 60Mb) and this helped with his present level of understanding. Interestingly, and perhaps not surprisingly, Nick had difficulty with conventional electronics after becoming familiar with Tesla's technology.

Nick used a square wave signal generator adjustable from 50 kHz downwards and with a fully adjustable Mark/Space ratio. This was used to drive an oil-filled car ignition coil, which, as he points out is not a Tesla Coil in spite of the frequently held view that it is. Ignition coils only operate at low frequency due to the limitations of their core material. However, John Stone points out that certain coil designs, such as those for the Fiat 'Punto' car, are built in such a way that replacing the core with ferrite should be possible, and that would allow high frequency operation.

Anyway, Nick uses a standard car ignition coil at lower frequency and uses it to feed a spark gap like this which is constructed from two chipboard screws:

His circuit is:
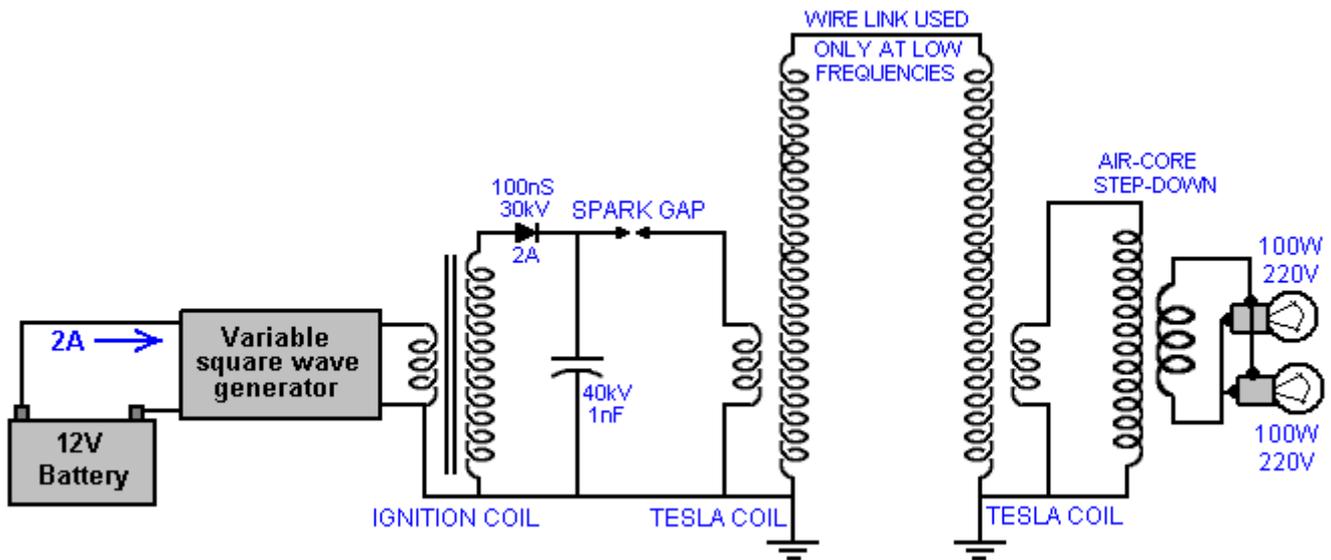
Nick has had very impressive results from his circuit, although it is still very much a work in progress with more development and testing still to be done. The 24 watt input of 12V at 2A is producing two very brightly lit 220V light bulbs. This does not tell us very much about the actual output power as bulbs are notorious for lighting brightly at low power levels, especially if the frequency is high. But, a very important point is the quality of the light which is an unusual, blue-white colour, quite unlike the colour produced when connected to the 220V mains supply. This is generally a sign of the power being 'cold' electricity. While he has not yet had the opportunity to test it, Nick believes that the circuit as it stands now is quite capable of powering much higher loads, and considering the colour of the light, I would be inclined to agree with him, although anything like that has to be tested and proven before any solid conclusions can be drawn from what is already known about the performance. The circuit performance is much improved if two separate physical earth ground connections are made.

Please don't fall into the trap of thinking that because the sparks are occurring at less than 5 kHz, that the Tesla coils also operate at that frequency. If you strike a bell which vibrates at 400 Hz, does that mean that you have to hit it 400 times every second in order to hear it? Actually, no, you don't, and the same thing applies here where the resonant frequency of the Tesla coils is approximately 650 kHz. The primaries are wound on 100 mm diameter PVC pipe sections and 19 turns of 1.02 mm diameter enamelled copper wire is used for them (19 swg or #18 AWG). The secondary coils are wound on 70 mm diameter PVC pipe using 0.41 mm diameter enamelled copper wire (27 swg or #26 AWG) with a total length of four time the primary winding wire length. As you will see later on in this chapter, resonance in a coil involves a standing wave inside the wire. That standing wave is created by the signal bouncing off the end of the wire and being reflected back. At frequencies other than the resonant frequency, this results in a constantly changing set of many different waves travelling in both directions and at different intensities (what could reasonably be described as a total mess). When the resonant frequency is fed to the coil, then all of that mess disappears and just one waveform remains, and at any point along the wire, that waveform appears to be stationary although, of course, it is not actually stationary, just the effect of the peaks always occurring at exactly the same spot and the troughs occurring at exactly the same spot, making successive waves look exactly the same as the previous one.

This feature has one very practical aspect, namely that if you run the same wire away from the coil turns to connect to whatever the next circuit component happens to be, then the wave inside the wire will not bounce back at the end of the coil turns but will continue on to the end of the wire before bouncing back. So, the connecting wire length has to be included when reckoning the wire length in the turns of the coil. On the other hand, if the wire in the coil turns is terminated at the ends of the coil and wire of a very different diameter is used for connecting to the next component in the circuit, then the signal inside the wire will bounce back from the sudden change in wire diameter and so the connecting wire length will not be part of the wire length in the turns of the coil. This is an important feature if you are aiming for an exact 4:1 wire length ratio (and 4:1 wire weight) between the Tesla Coil windings in order to impose an automatic resonance between the two windings.

It should be noted that PVC (especially non-white PVC) has a very restrictive effect on high frequency coils. At low frequencies, PVC is ok, but it drags down the coil performance as the frequency rises, lowering the "Q" (for "Quality") factor of the coil. Using acrylic instead of PVC overcomes this. Alternatively, coating the PVC with a high-voltage insulating material such as shellac or one of the proprietary coating agents, will improve matters considerably. The ideal, of course, is to have no former at all and have the coil standing unaided because of it's own strength.

The 'Gegene' Magnetic Arrangement.

As we have seen from what Don Smith has said, a very effective method of gaining additional power is to make a high frequency magnetic transmitter as that allows several outputs to be taken from the transmitter without increasing the input power in any way. Recently, a clever idea for a simplified version of this has been shared on the web. As far as I am aware, this device was first presented by the Lithuanian 'FreeEnergyLT' whose website is at http://freeenergylt.narod2.ru/dynatron/


and the information then replicated and documented by J L Naudin on his website http://jnaudin.free.fr/gegene/indexen.htm and named 'Gegene' being short for 'Great Efficiency Generator'. The clever idea is to use a commercial induction hot-plate as the transmitter. These have recently become available at low cost, this one:

Sold in the UK by Maplin, has power levels adjustable from 300 watts to 2000 watts, and at time of writing, costs only £30 delivered to your address. These devices operate by generating a powerful high frequency oscillating magnetic field which induces eddy currents in any magnetic material placed on the surface of the cooker. That is, cookware which is made of cast iron or steel (not stainless steel which is supposedly non-magnetic). The heating is very rapid and completely uniform across the item of cookware which is very helpful when cooking. The hot plate is controlled by sophisticated electronics which will not switch on unless there is an iron object on the plate and which varies the frequency and current in a way chosen by the designer.

The circuitry produces the magnetic field by pulsing current through a large, flat coil in the centre of the case as can be seen in this photograph of a typical induction plate with the case opened:
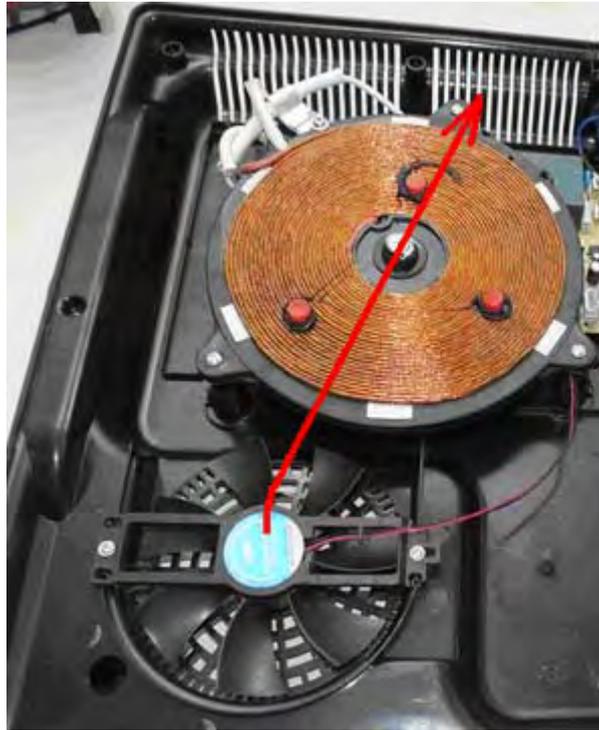
The brown coil gets hot, and so there are spacers on it to prevent the cool outer casing form picking up the heat of the coil. There is also a fan which draws air in from underneath the case and blows it across the coil in order to keep the heat down.

In order to use this magnetic transmitter, we need to place a suitable output coil on the plate, and power a load from the energy collected by that coil. This is a fairly recent idea and so there is still a good deal of experimentation going on, testing different coils, and various loads. It is generally agreed that the best load is a non-inductive load with halogen lamps and ordinary filament light bulbs being recommended. Halogen lamps are used in some low-cost commercial heaters, and they are very effective method of radiant heating. In his video at http://www.youtube.com/watch?v=LbAhUwHvJCE, Laurent powers seven separate 400-watt halogen lamps using a small 800-watt maximum plate which has a small 120 mm diameter transmitter coil:

No particular power output is claimed by Laurent, but as you can see, the 2800 watts of halogen lamps are brightly lit while a wattmeter on the input to the plate reads just 758 watts. It seems to be fairly clear that there is a significant power gain with this arrangement. Then, Laurent places an additional coil on top of the first one and shows it lighting a 100-watt filament light bulb very brightly:

It is actually quite difficult to see the brightness of lamps shown in a video as the video camera automatically turns down the brightness of the recording. The important point here is that there is significant power output from a second coil, without there being any increase in the power input to the transmitter coil in the induction plate.

There are many different designs of electronics in commercial induction plates. Most will not start operating until a magnetic object is placed on top of the plate. If that is done, then the object needs to be removed very promptly as it heats up very rapidly. Fortunately, most plate designs keep operating as soon as the induction process is started and so there in no problem with removing the metal cookware (or whatever is used to start the process). Laurent's very small induction plate does not have that protection circuitry and so starts up as soon as it is switched on.

Jean-Louis Naudin uses a 2000-watt induction plate turned down to its 1000-watt setting. It has a 180 mm diameter pick-up coil. He says that for him, it is essential to have at least 1500-watts of load or else the induction plate will shut down with an error code indicating that no cookware is present.

The coils used are Tesla bi-filar pancake types, typically, attached to a thin sheet of MDF or plywood, say 2 mm thick, with superglue. Laurent's 120 mm coil has ten turns and Jean-Louis' 160 mm coil has sixteen turns, needing about 5 metres of twin-core wire, and Laurent's about 2.5 metres of wire. I suggest that the wire should be rated for mains voltage and have, perhaps 1 sq. mm cross-sectional area of copper wire in each conductor. A Tesla pancake coil is wound like this:
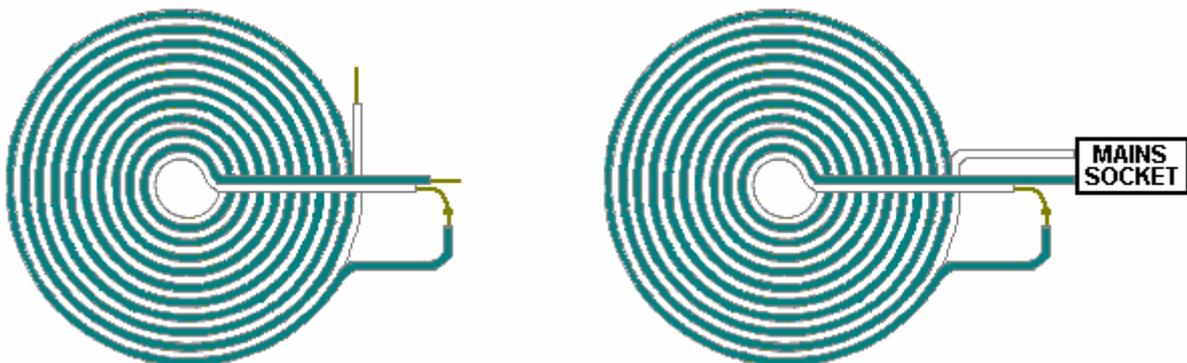
Please remember that this arrangement involves high voltages and so is not suitable for newcomers to electronics. This presentation is strictly for information purposes only and it is not a recommendation that you attempt to implement anything shown here, and if you choose to do so, then the responsibility is yours and yours alone.

An interesting video is here: http://www.youtube.com/watch?v=SJ1MG1Qt7LQ&feature=em-uploademail.

Tariel Kapanadze's Self-Powered Generators
Tariel Kapanadze, like Don Smith, appears to have based his work on that of Nikola Tesla. There has been a video on the web, of one of his devices in operation, but it appears that the video has been removed. However, part of it can be seen here: http://www.youtube.com/watch?v=l3akywcvb9g The video commentary was not in English and so the information gathered from it is not as complete as it might be. However, in spite of that, a number of useful things can be learned from it. Unfortunately, Tariel refuses to share the details of his designs.

The video shows a demonstration being staged in a back garden, I believe, in Turkey. Strong sunshine was casting dense shadows which made video detail less than perfect. Essentially, Tariel demonstrated one of his builds of a Tesla-style free-energy device, powering both itself and a row of five light bulbs.

One of the most encouraging things about this video is that the construction and operation was of the most basic kind, with not the slightest suggestion of expensive laboratory work or anything high-precision. This is most definitely a backyard construction within the scope of any knowledgeable person.

Electrical connections were made by twisting bare wires together:

and where necessary, tightening the twist with a pair of pliers:

This shows clearly that a high-power and very useful free-energy device can be made with the most simple of construction methods - no expensive connectors here, just a zero-cost twisted connection.

The device being displayed is a Tesla Coil powered, earth-connected system of the type already described. You will notice that the thick primary winding is not placed at one end of the central secondary winding but is much closer to the centre of the coil. Remember that Don Smith states that if the primary coil is placed centrally, then the amount of current which the coil can deliver is very large, in spite of the fact that most people think that a Tesla Coil can only produce trivial currents. Notice also that this Tesla Coil appears to be mounted on a cheap kitchen-roll holder. I have seen it said that Tariel makes a new device for each demonstration and takes it apart afterwards, so if that is correct, then it is likely that there is no great effort or expense involved in making one of these systems.
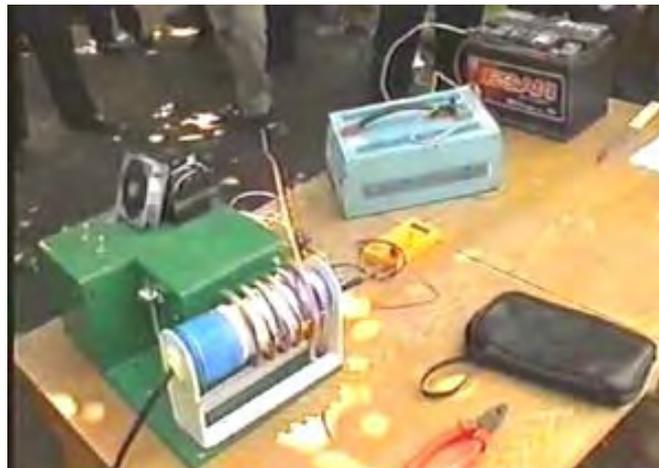
The main operational components are shown here, placed on one small table. There is a lead-acid battery (which is removed later in the demonstration), what appears to be an inverter to produce mains AC voltage from the battery, a high-voltage step-up system housed in a green box for safety reasons, a Tesla Coil, a spark gap mounted on the box and a fan-cooled component, probably a solid-state oscillator system driving the Tesla Coil. Not seen in this picture, is an item contained in a small box which might well be a high-voltage capacitor.

Two earth connections are organised. The first one is an old car radiator buried in the ground:

and the second is a bare wire wrapped around a garden tap's metal pipe and twisted tight as shown above. It is distinctly possible that the circuit is based on this circuit of Tesla's:
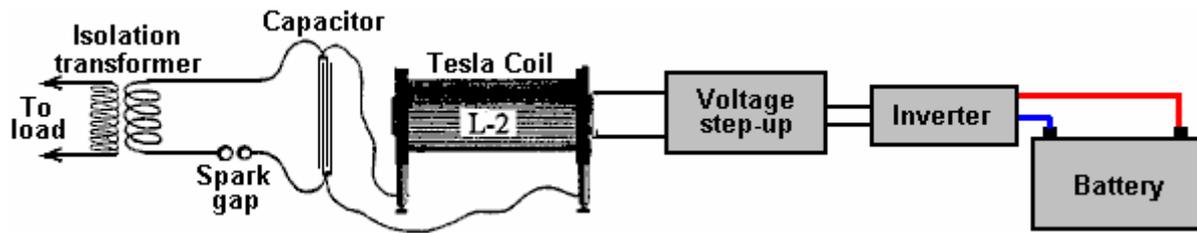
Perhaps, the battery powers the inverter which produces mains voltage, which is then stepped up to a high voltage level by the enclosed electronics. This then drives the Tesla Coil, producing both very high voltage and current with the capacitor storing the energy as a reservoir. The spark gap then pulses this energy, driving the primary winding of the isolation transformer which produces a lower voltage at substantial current (depending on the current-handling capacity of the transformer itself) powering the load, which in this case, is a row of light bulbs.

The load is a row of five light bulbs hung from a brush handle placed across the backs of two chairs:

As you can see, this is not exactly high-tech, high-cost construction here, with all of the materials being used for other things afterwards.

Initially, the battery is used to power the inverter and it is demonstrated that the current being drawn from the inverter is substantially less than the power entering the load. In conventional terms, this appears impossible, which is an indication that the conventional terms are out of date and need to be updated to include the observed facts from demonstrations such as this.

As the system is putting out a good deal more power than is required to drive it, might it not be possible to use part of the output power to provide the input power. This is often called "closing the loop" and it is demonstrated in this video as the next step.

First, the circuit is altered so that the input power connection to the inverter is taken from the output. Then the circuit is powered up using the battery as before. The battery is then disconnected and removed altogether, and the people helping with the demonstration pick up all of the active items and hold them up in the air so as to show that there are no hidden wires providing the extra power from some hidden source. The items on the table are not part of the circuit:

There is some additional information on Tariel including videos of some of his more powerful, newer designs at http://peswiki.com/index.php/Directory:Kapanadze_Free_Energy_Generator#Official_Website although it has to be said that there does not appear to be very much on him or his work available at this time.

In December 2009 an anonymous contributor e-mailed to say that Kapanadze returned to the ex-USSR republic of Georgia and that the video soundtrack is in the Georgian language and after the demonstration, the interview is in Russian. He has kindly translated the parts which relate to the device, as follows:

Question: What are you showing us today?
Answer: This is a device which draws energy from the environment. It draws 40 watts as it starts up, but then it can power itself and provide an output of 5 kilowatts. We don't know how much energy can be drawn from the environment, but in an earlier test, we drew 200 kilowatts of power.

Question: Is it possible to solve the energy problems of Georgia?
Answer: We consider that they have already been solved.

Question: Please tell us in simple terms, how your device works.
Answer: (1) Power is drawn from the battery to get the device running
(2) If we want, we can use part of the output power to drive a charger and charge the battery
(3) When the device is running, we can remove the battery and it then operates self-powered. This particular unit can deliver 5 kilowatts of power which is enough for a family. We can easily make a version which supplies 10 kilowatts. We don't know what the practical power limit is for a unit like this. With this particular device we have here, we do not draw more than 5 kilowatts as we don't want to burn out the components which we used in this build.

Question: Does your invention pick up current from mains wires?
Answer: The mains has nothing to do with this device. The energy produced comes directly from the environment.

Question: What do you call your device and do you dedicate it to anyone?
Answer: I would not dream of claiming this device to be my invention, I just found something which works. This is an invention of Nikola Tesla and all the credit is his. Tesla has done so much for mankind but today he is just forgotten. This device is his invention, his work.

Question: Why are you so sure that this is a design of Nikola Tesla's?
Answer: Because I worked from his invention - his design. I discovered how to get automatic resonance between the primary and secondary windings. The most important thing is to achieve resonance. Melnichenko came close to solving this problem. The government of Georgia refuses to take this invention seriously.

Question: You said that resonance must be maintained. Which parts resonate?

Answer: Here (pointing to the green box) and here (pointing to the Tesla Coil mounted on the top of the green box). The resonator is inside the green box and at present, it is secret until patented.

Question: How much would one of these units cost?
Answer: When mass produced, it would cost between 300 and 400 US dollars for a unit which has an output of 5 or 6 kilowatts.

Question: How much did it cost you to build this demonstration device?
Answer: About eight thousand (currency not specified). Parts had to be got in from twenty different places.

Question: Is this your house?
Answer: No, I rent this place because we have sold all that we have to make these devices. And, having done it, the government and many scientists say "We are not interested because a device like that is impossible and can't possibly exist!". I have not been allowed to make a presentation to them, but people who understand the Tesla Coil understand how this device works.

Kapanadze is an architect by profession and has not had any training in either physics or Electrical Engineering. The information on which this design was based was downloaded free from the internet.

One of the most important aspects of this video is the confirmation it gives for the work of Tesla and of Don Smith, in that it shows clearly, yet again, that large amounts of energy can be drawn from the local environment, without the need to burn a fuel. Another video: http://www.youtube.com/watch?v=gErefbcTz-U

People frequently ask for construction drawings or alternatively, outlets where they can buy one of his devices. Unfortunately, Tariel is not willing to share the details of his designs and so they will probably never be manufactured. Many people have tried to analyse and replicate his design.

The Cold Electricity Coil of 'UFOpolitics'

A man who uses the forum ID of 'UFOpolitics' has been sharing his insights and experiences on various different forums, such as the one dealing directly with the production and use of cold electricity in solid-state circuits: http://www.energeticforum.com/renewable-energy/10529-my-motors-got-me-tap-into-radiant-energy-1.html His insights are unusual and very important. His basic statement is that if a coil is pulsed, using a circuit like this:
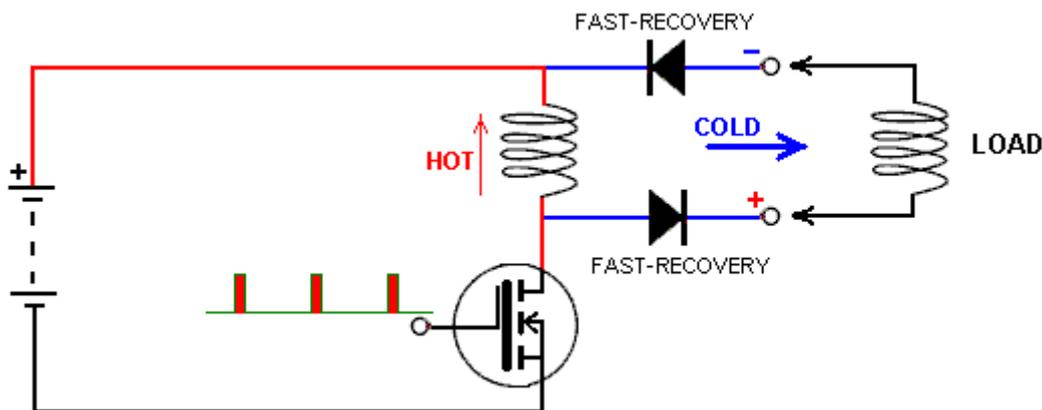

then conventional hot electricity pulses the coil when the transistor is switched ON, but if that current is switched OFF rapidly, then there is an inflow of cold electricity into the coil from the surrounding environment. That inflow of energy can be collected and diverted to power a load through the use of two high-speed diodes which can carry considerable current as the power inflow is substantial. The inflow of energy occurs when the transistor is switched OFF and so it is desirable to have the transistor switched off for most of the time, in other words, a low percentage Duty Cycle for the transistor. There **must** be a significant load on the cold electricity output. If there is not, then the cold electricity will flow back into the hot electricity section of the circuit and it may damage the transistors. Tom Bearden states that resistors boost cold electricity rather than hindering it's flow, so the load should be a coil, a DC motor with brushes or a fluorescent light bulb.

It has been observed that the incoming energy tends to flow inwards towards the centre of the coil, so an additional method of collecting this extra energy is to place a second coil inside the main coil, and wound in the same direction as it, like this:
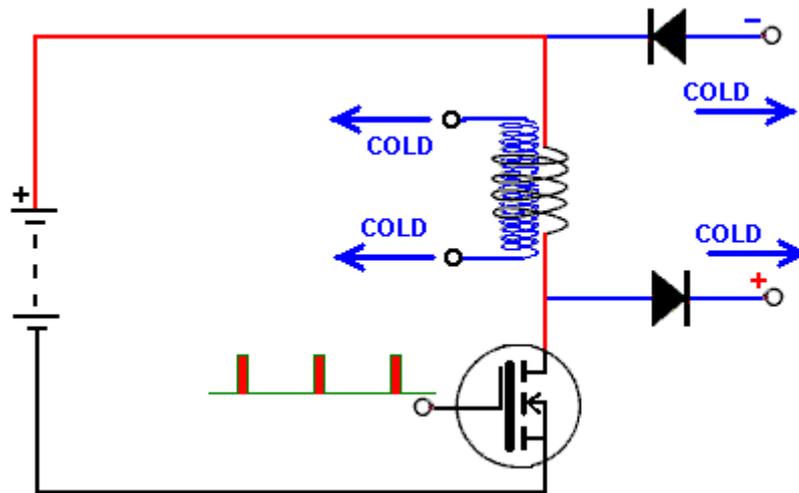
This provides two separate, independent cold electricity power outputs. Diodes are not needed for the inner 'secondary' coil. This inner coil is a pick-up coil and is not related in any way to the number of turns in the hot electricity pulsing coil. Instead, this coil collects inflowing cold electricity during the period when the pulsing coil is switched OFF. The hot electricity pulsing coil can be wound directly on top of the extra pick-up coil or the extra coil can be wound separately and placed inside the main coil spool.

Very surprisingly, it is recommended that the powerful high-speed diode used to channel the cold electricity out of the circuit, be followed by a small 1N4148 silicon epitaxial planar high-speed diode (75V 0.45A) as this is said to clean up the cold electricity output even more. It is important that the cold electricity has to encounter the more powerful silicon diodes before reaching the 1N4148 diodes, so the order of the diodes is very important, and should be as shown here:
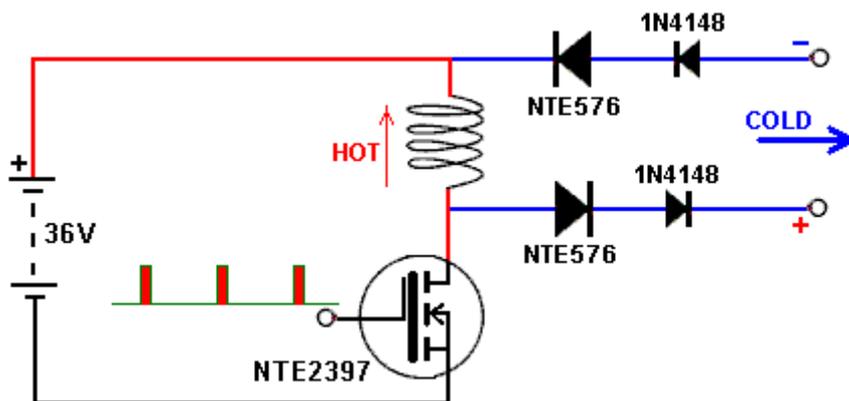
Alternative diodes for the NTE576 (6A, 35nS, 400V) are the NTE577 (5A, 70nS, 1000V) and the HFA16PB (16A, 19nS, 600V). The main requirement is high-speed operation, voltage rating of at least 400V and current rating of at least 5 amps..

There is one additional thing to be done with this circuit when a DC output is required and that is to apply filtering to the output. First, when the energy has passed through the NTE576 (or equivalent) power diodes, it encounters a high-frequency (low capacity) high quality film capacitor placed across the output in order to siphon off any high-frequency voltage ripple before it is passed through the small 1N4148 diodes and into a smoothing and storage electrolytic capacitor. Storing the cold electricity in the electrolytic capacitor converts it into conventional hot electricity.
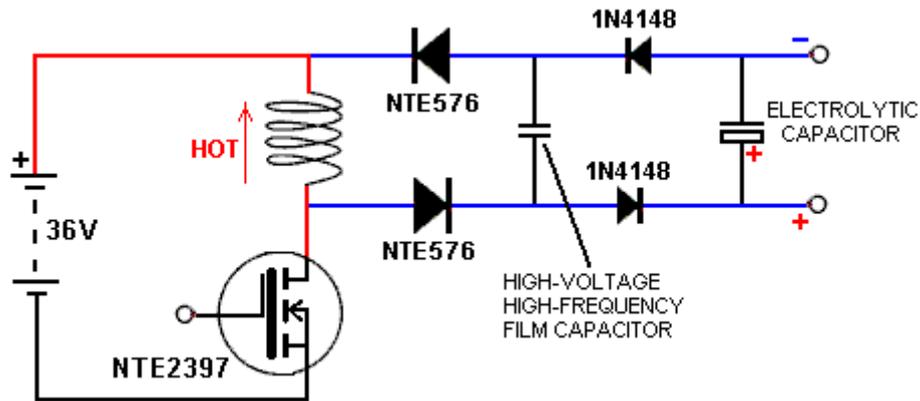
While this circuit looks like something which you just switch on and it works, that is not the case as there is an essential start-up procedure where the signal applied to the transistor is started at just a few cycles per second and 50% duty cycle and that input is then adjusted carefully and slowly while monitoring the voltages and currents produced by the circuit. This is a seriously powerful system with the capability of producing a major power output.
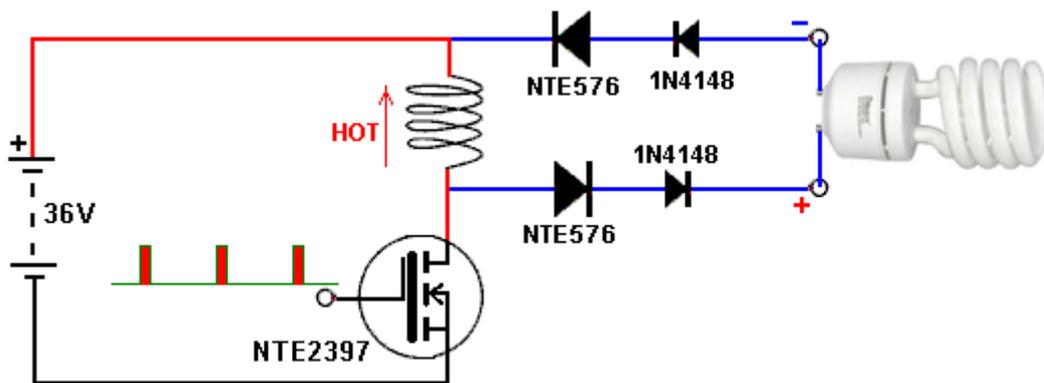
It is very important that the circuit is not powered up without a suitable load on the cold electricity output. A suitable load is a self-ballasted 230-volt fluorescent light. It must be understood that just flipping the power switch to it's ON position is not sufficient to get an inflow of cold electricity. Instead, it is necessary to progress the start-up sequence carefully, and a fluorescent light is particularly helpful for doing this although a neon bulb is also a popular choice of temporary load, because these devices allow the current flow in the load to be assessed visually.

Before switch-on, the input oscillator is set to 50% duty cycle and minimum frequency. Then the frequency is raised very slowly, causing the lamp to start flashing. As the frequency is raised, the current drawn from the battery needs to be monitored as it is the current flowing through the transistor, and the current is kept down by lowering the duty cycle progressively. This process is continued carefully and if successful, the colour of the light produced will initially be purple or green before reaching continuous bright white light. Videos showing the light produced and the fact that it is not dangerous to life or affected by water can be seen at http://www.youtube.com/watch?v=W1KALMgFscg&list=UUdmFG5BeS0YnD2b5zasXXng&index=1&feature=plcp .

The driving force is a series of powerful magnetic pulses, and implementing the physical circuit to achieve that requires careful construction. The battery driving the circuit is a 36 volt combination of cells. The coil is wound as an air-core construction on a 2-inch (50 mm) diameter spool and the DC resistance is arranged to be about 1.4 or 1.5 ohms. This, in turn, requires a substantial drive from the transistor and so it is normal to connect six powerful output transistors in parallel in order to spread the current flow between them as well as dissipating the heat generated across several transistors bolted to a common heat-sink of generous area.

How the coil is wound is something to consider. The objective is to have a coil of about 1.5 ohm resistance and which has the maximum magnetic effect for the current passed through it. Copper wire has become very expensive and so it would be very costly to wind the coil with vast lengths of thick wire, not to mention the very large size and great weight which would be produced by doing that. The copper wire options in Europe are typically to work with half-kilogram reels of wire. The details of some of these are as follows:

Gauge (swg)	Wire length	Total ohms	Amps/strand	Strands	Total amps
14	17.5 m	0.09	9.3	None	-
16	27 m	0.22	5.9	None	-
18	48 m	0.71	3.7	None	-
20	85 m	2.23	1.8	2	3.6
22	140 m	6.07	1.2	4	4.8
24	225 m	15.81	0.73	11	8.0
26	340 m	35.70	0.45	24	11.0
28	500 m	77.50	0.29	52	15.0

We can see from this that a 500 gram reel of 14 swg wire has a total resistance of just 0.09 ohms and so it would take sixteen reels (weighing 8 kilograms and costing a lot of money) to wind just a one-strand coil using that wire, producing a coil which could carry a current of 9.3 amps. As opposed to that, a single reel of 28 swg could provide 52 separate windings, which when connected in parallel, could carry 15 amps as well as costing and weighing far less. It would be tedious, but not impossible, to wind a 52-strand coil, so a more reasonable number of strands connected in parallel might be used. We are aiming at a DC resistance of about 1.45 ohms in any coil arrangement which we select.

The magnetic field produced by a single strand is generally less than the magnetic field produced by two strands carrying the same total current. So, if we were to pick 22 swg wire, then we could measure out four 133.5 metre lengths, join them at the start, and wind the four strands simultaneously, side-by-side to form a coil with a DC resistance of 1.45 ohms. It is important that the strands are exactly the same length so that they carry exactly the same current and no one strand gets overloaded with current due to it having a lower resistance than the other strands. It should be realised that as the maximum current which the wire can carry is 4.8 amps and the resistance is only 1.45 ohms, the maximum continuous DC voltage which can be sustained by the coil is only 7 volts, and so as a 36-volt battery is being used, we **must** adjust the frequency and duty cycle very carefully, especially since we are starting at very low frequencies. If the full battery voltage is applied continuously to the coil, then the coil will be destroyed.

Various members of the forum have suggested, built and tested different circuits for feeding a variable-frequency variable-duty-cycle drive signal to the output transistor. However, 'UFOpolitics' recommends a simple 555 timer circuit. If you are not familiar with electronic circuits, then read chapter 12 which explains them in some detail, including the 555 timer family of circuits. The point stressed by 'UFOpolitics' is that the output taken from pin 3 of the 555 chip passes first through a 100 ohm resistor and then, every transistor gets a separate feed via a two resistor voltage divider pair. The 47K Gate-to-Ground resistor is to ensure that the FET turns off properly. It may be possible to increase the value of these resistors but they should never be less than 47K.
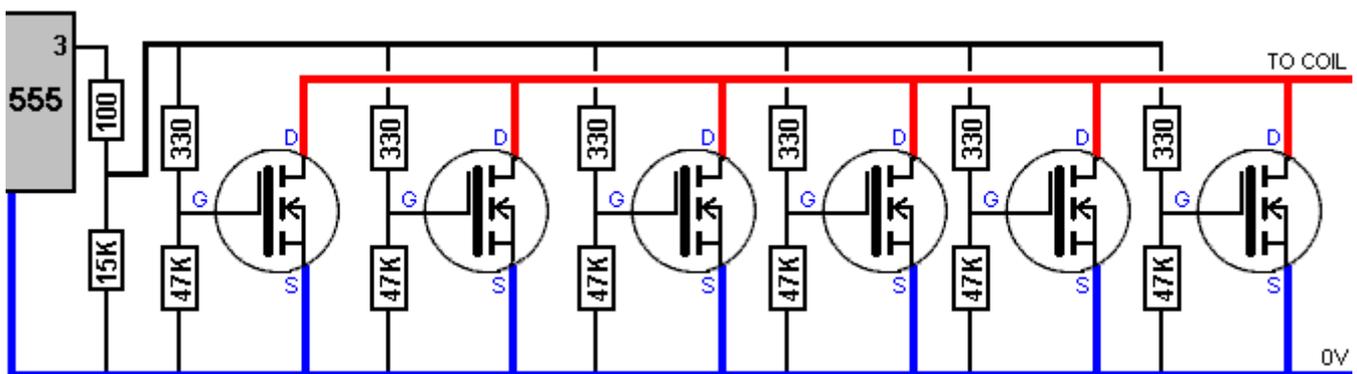

The thick lines in this diagram indicate heavy-duty wiring which can carry high currents without generating any real heat when doing so. It is also recommended that although the FET has an internal diode, an extra external high-speed diode (NTE576 or similar), be connected across each FET in order to boost the switching speed:
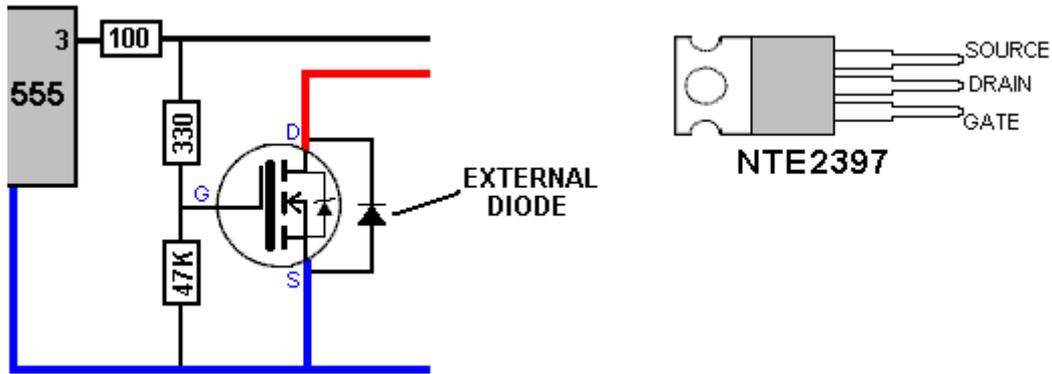
A FET has a gate capacitance of about 1 nF. The faster it can be charged / discharged the faster the FET will switch (and stay cool). What determines the speed of charge / discharge for the gate capacitance is the length of wire from driver to gate or gates is inductance (where one metre of wire produces 0.05µH). In addition to that, different lengths of Gate connection wire will create different switching delays and the different inductances can then initiate High Frequency oscillations with repetitive ON/OFF/ON/OFF switching actions. The result might be burned FETS and lack of cold electricity activities.

Another point made by 'UFOpolitics' is that the physical layout should have the connecting wires or tracks kept as short as possible and he suggests this layout:
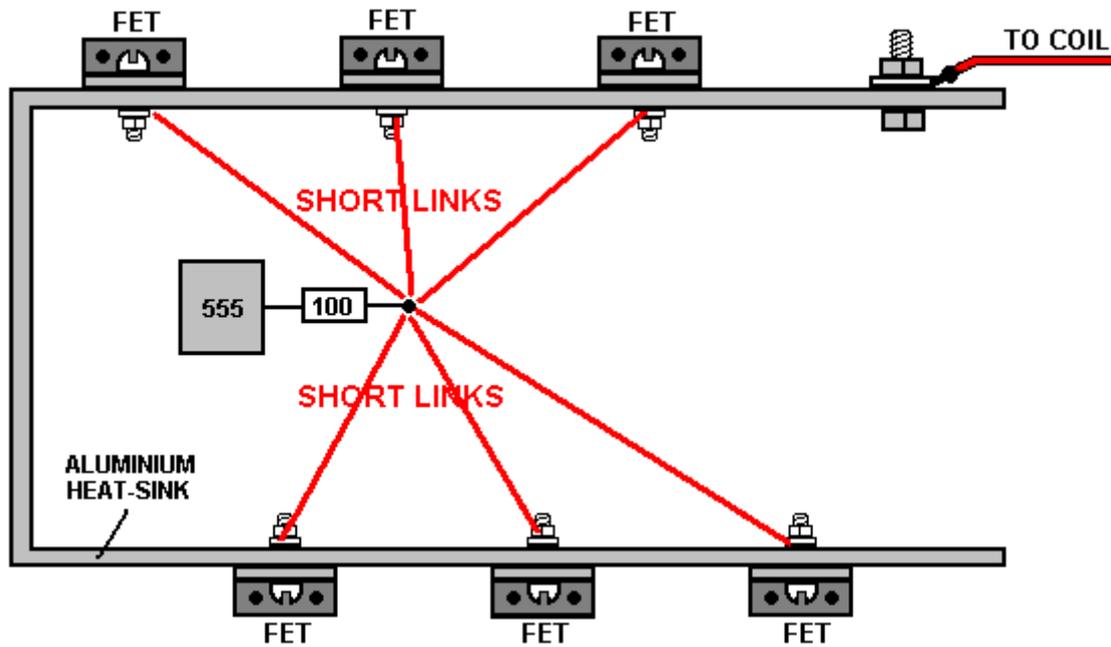
There are two things to note here. Firstly, the 100 ohm resistor coming from pin 3 of the 555 timer IC is positioned centrally between the six FET transistors mounted on the aluminium heat-sink, and that point is carried closer to each FET with a low-resistance conductor to give a good-quality link for the resistors feeding the Gate of each FET. Secondly, the heat-sink itself is also used to provide a low-resistance electrical connection to the coil which the FETs are driving. The connection to the heat-sink is via a nut and bolt clamping a solder tag firmly to a cleaned area of the heat-sink. Each FET is electrically connected to the heat sink through it's mounting tag which forms it's heat-sink connection as well as connecting to the Drain of the Transistor. However, if the aluminium heat sink is a black anodised type, then, apart from cleaning between each FET and the heat-sink contact area, it is worth running a thick wire also linking the central FET pins to the output wire connection point.

The transistors used in the prototype, and recommended for replications are the NTE2397. This is not a very common transistor in Europe at this time and so the popular IRF740 might perhaps be used as it appears to have all of the main characteristics of the NTE2397 transistor. 'UFOpolitics' suggests the 2SK2837 (500V, 20A, 80A pulsed), or the IRFP460 (500V, 0.27 Ohm, 20A and 80A pulsed).

As the 555 timer has a maximum supply voltage of 15 volts, an LM317N voltage-stabiliser chip is used to create a 12-volt supply from the 36-volt battery (a 24V battery could be used):
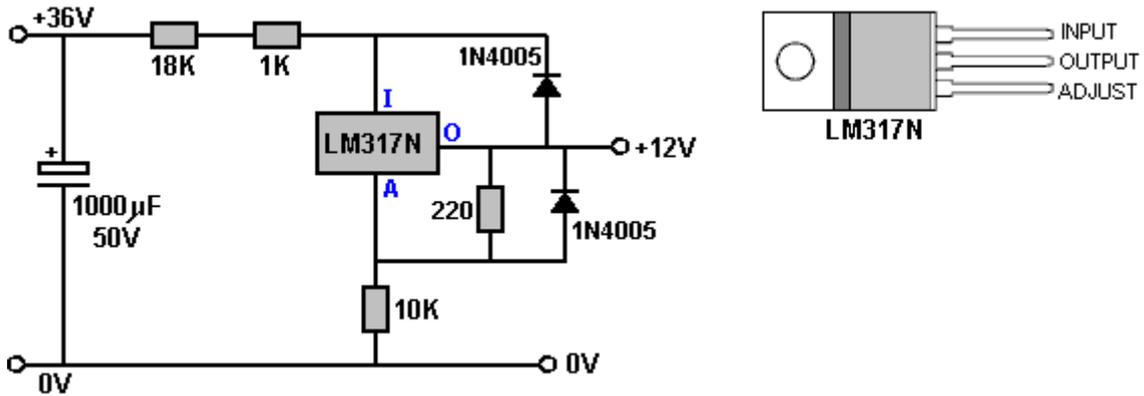
The LM317N integrated circuit should be attached to a good heat sink as it is dropping off 24 of the 36 volts powering the circuit, and so, has to dissipate twice the power that the NE555 chip uses:
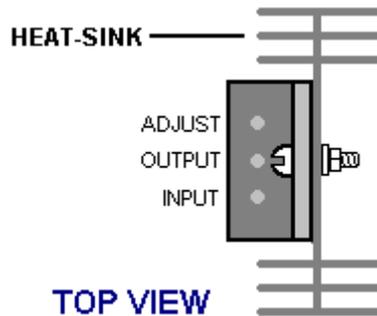
There are various pulsing circuits which have been used successfully with this system. 'UFOpolitics' considers the NE555 chip to be the most straightforward, so perhaps my suggestion for this arrangement might be a suitable choice:
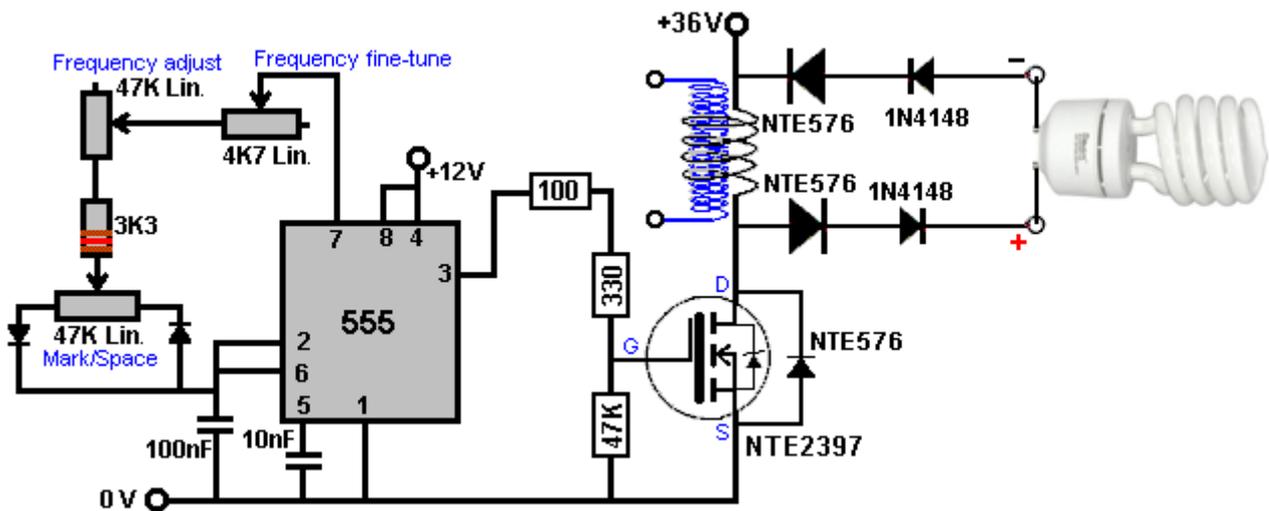
This gives fine control of the frequency and independent adjustment of the Mark/Space ratio or 'Duty Cycle' and it needs only three very cheap components other than the controls. If the expensive multi-turn high quality variable resistors are available, then the 4.7K 'fine-tune' variable resistor can be omitted as those variable resistors make the adjustments easier to control. The 'Lin.' In the diagram stands for 'Linear' which means that the resistance varies steadily at a constant rate as the shaft of the variable resistor is rotated.

In the 'UFOpolitics' circuit, it is important to turn the frequency down to it's minimum value and set the Mark/Space ratio to 50%, before powering the circuit down. Otherwise it would be easy to power the circuit up with a much higher frequency than is advisable and so, causing damage to some of the circuit components.

There are ways to boost the performance over what has already been described. One way is to insert a stainless steel core inside the coil. Stainless steel is supposed to be non-magnetic but in practice, that is not always the case. However, ideally, this steel core is improved by altering it's crystalline structure by heating it up and then quenching it by submerging it in cold water.

Another improvement is to isolate the coil better at switch-off through the use of a second transistor. Having a 'switched-off' transistor at each end of the coil certainly blocks the flow of hot electricity, but if Tom Bearden is correct, the resistance of the transistors in their OFF state will actually boost the flow of cold electricity as it reacts in the reverse way to how hot electricity reacts. The arrangement is like this:
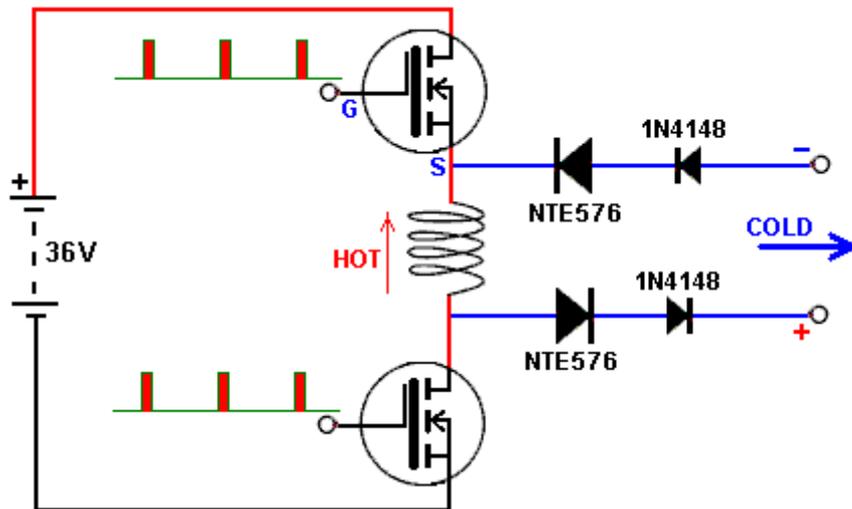
While this looks like a very simple circuit to implement, that is not the case. The upper transistor is switched ON by the voltage difference between it's Gate "G" and it's Source "S". But, the voltage at it's Source is not fixed but varies rapidly due to the changing current in the coil, and that does not help when solid and reliable switching of the upper transistor is needed. A P-channel FET could be used instead and that would have it's Source connected to the fixed voltage of the Plus of the 36V battery. That would help the switching enormously, but there would still be timing issues between the two transistors switching ON and OFF at exactly the same time. Other circuits have been suggested for doing that type of switching, but in the early stages, 'UFOpolitics' recommends that things be kept as simple as possible, so using just one transistor is the best option.

Switching speed is an item of major importance, even to the extent that the reduction in the speed of switching caused by using more than one transistor in parallel has caused the suggestion to be made that it might actually be a better option to use just one FET since these high-performance FETs are capable of carrying the whole of the switching current, and it is mainly to lower the FET operating temperature that multiple FET use is suggested. Every extra FET used in parallel, slows the switching down. However, it should be realised that there is a somewhat greater risk of burning the FET out if just one is used.

The coil dimensions recommended are two-inch (50 mm) diameter and 2-inch length. The wound coil is likely to be about three-inches (75 mm) so making the flange diameter 4-inches (100 mm) is realistic:
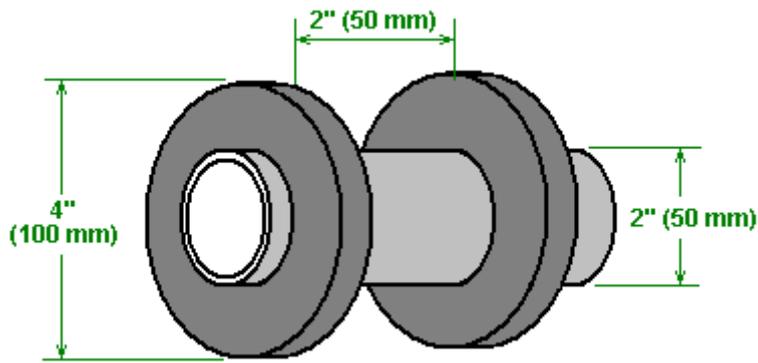
The recommended material is fibreglass which has high heat-resisting properties as well as being easy to work, the personal choice of 'UFOpolitics' is Polyester Resin with Methyl Ethyl Kethol (MEK) Hardener. A suggested alternative is acrylic, which is not as heat resistant. Acrylic is excellent for high-frequency applications but this circuitry does not operate at high frequencies. Whatever spool material is chosen, it needs to be non-magnetic. When connected in the circuit, the start of the coil winding wire goes to the battery positive.

Here is another coil wound on acrylic tube and with all four diodes connected to the ends of the coil:

It should be understood that cold electricity provides almost unlimited power and it has uses which are not readily understood by many people.

'UFOpolitics' suggests that the hot electricity drive circuitry be tested initially using just a resistive load. If everything checks out correctly, then test with a lesser value resistor in series with the coil, and if that checks out satisfactorily, then testing cautiously with the coil on it's own.

Cold electricity can charge batteries rapidly and after a series of charge and discharge cycles, batteries become 'conditioned' to cold electricity and the experiences of Electrodyne Corp. staff show that large conditioned batteries which are fully discharged, can be recharged in under one minute. A member of the present forum has tried this with the 'UFOpolitics' circuit and he reports:

Yesterday a friend and I took 6 identical, old, 12V, 115Ah batteries and made two 36V banks. We set up bank "A" (the better three) to power the device to charge bank "B". Bank A was 37.00v at rest and Bank B was 34.94V.

My lowest frequency was 133Hz (I need to change my cap and add another 100k pot with the one which is controlling the frequency) and the duty cycle was at 13%. We started at 2A draw on the Primary circuit.

As I raised the frequency, the batteries on charge jumped up to 38.4V then dropped evenly to 36.27V and started up again (at about 0.01V every 2 seconds). After two and a half hours, they were up to 39.94V. At this point we stopped the charging and let everything rest for 10 minutes. So far everything seems very normal for this kind of charging, except that the device appears to be very stable and powerful...pushing the batteries right on up continuously. The Primary battery voltage dropped initially to 36.20V and stayed there the whole time, then recovered to 36.98V during the 10 minute rest.

Then we switched battery banks A and B and charged the opposite way for about 20 minutes. We stopped and rested things again, swapped the banks back and started charging bank B again for another 20 minutes and stopped. After letting the batteries rest for a few hours in order to get truer readings, bank A was at 37.07V and bank B was at 38.32V. Both battery banks had gained power. These were not very good batteries, either. One of the bank B batteries was at 10.69V at the start. Another interesting note: The amp draw on the Primary dropped from 2A to 1.5A as the frequency was raised from 133Hz to about 550Hz.

This was with the very first use of cold electricity with these low-grade batteries and a major improvement can be expected after many additional charge/discharge cycles. This completely overcomes the factors which make a battery bank unsuitable for household power. If an entire battery bank can be recharged in just minutes, then it opens the way for serious household power using a battery bank.

Cold electricity can also run motors very powerfully. Forum member 'Netica' found that putting a capacitor across the motor terminals improved the running very substantially, giving impressive performance. His video of this is at http://www.youtube.com/watch?feature=player_detailpage&v=7uAYKhrPDPc and the motor, running off an air-core coil with no steel insert. His set-up looks like this:
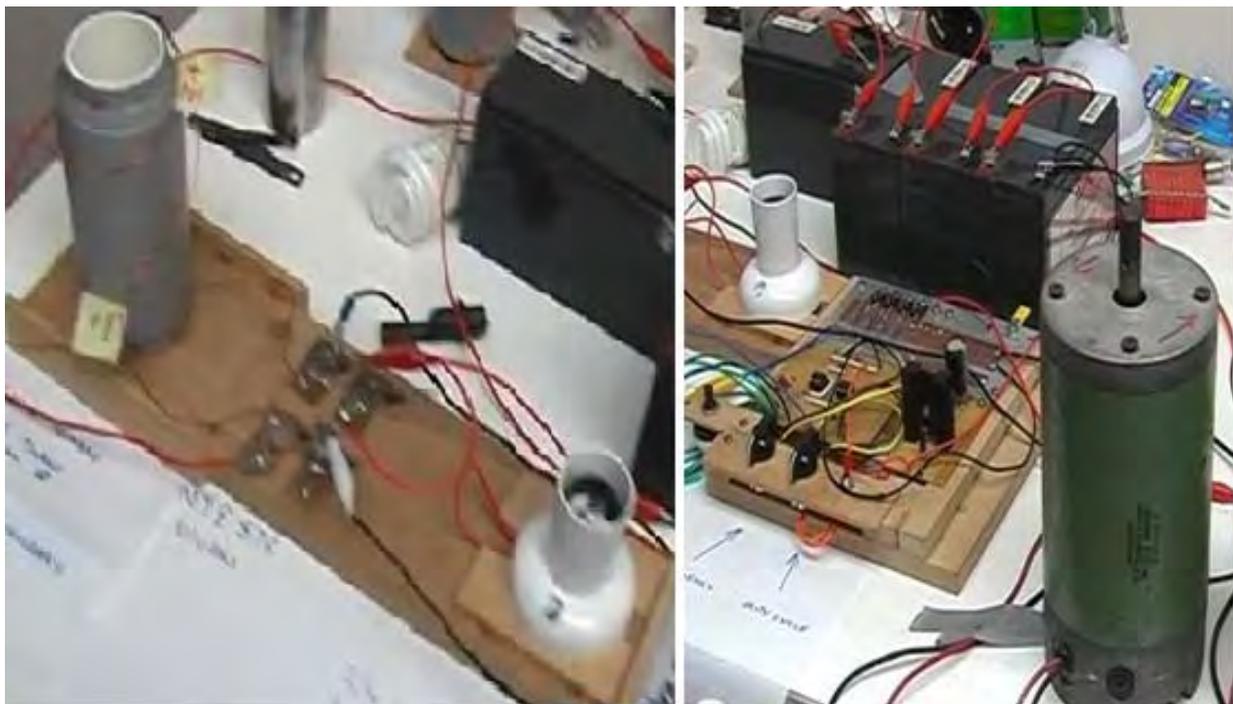
It is also possible to submerge cold electricity circuits in water without causing any harm:

A video of this is located here: http://www.youtube.com/watch?v=W1KALMgFscg&feature=channel&list=UL including demonstrating the use of very powerful light bulbs. A general running demonstration is here: http://www.youtube.com/watch?v=yVzhKpEqUgc&feature=player_embedded .

Stanley Meyer's Electrical Particle Generator.

Stan, who is famous for his water-splitting and related automotive achievements, actually held about forty patents on a wide range of inventions. Here is one of his patents which circulates magnetic particles in a fluid, and while the fluid does move, none of the other components in the device move and a high level of constructional skills is not called for. This is a highly efficient generator of electricity.

This is a slightly re-worded excerpt from this Stan Meyer patent. Although it does not state it in the patent, Stan appears to make it understood that this system produces a significant power gain – something with Patent Offices find very difficult to accept.

Patent CA 1,213,671   4th February 1983   Inventor: Stanley A. Meyer

ELECTRICAL PARTICLE GENERATOR

ABSTRACT

An electrical particle generator comprising a non-magnetic pipe in a closed loop having a substantial amount of magnetised particles encapsulated inside it. A magnetic accelerator assembly is positioned on the pipe, which has an inductive primary winding and a low-voltage input to the winding. A secondary winding is positioned on the pipe opposite to the primary winding. Upon voltage being applied to the primary winding, the magnetised particles are passed through the magnetic accelerator assembly with increased velocity. These accelerated particles passing through the pipe, induce an electrical voltage/current potential as they pass through the secondary winding. The increased secondary voltage is utilised in an amplifier arrangement.

BACKGROUND AND PRIOR ART

The prior art teachings expound the fundamental principle tat a magnetic field passing through inductive windings will generate a voltage/current or enhance the voltage across it if the winding is a secondary winding.

It is also taught by the prior art, that a magnetic element in a primary inductive field will be attracted at one end of the coil and repelled at the other end. That is, a moving magnetic element will be accelerated in motion by the attraction and repulsion of the magnetic field of the primary inductive winding.

In the conventional step-up transfer, the voltage across the secondary is a function of the number of turns in the secondary relative to the number of turns in the primary winding. Other factors are the diameter of the wire and whether the core is air or a magnetic material.

SUMMARY OF THE INVENTION
The present invention utilises the basic principle of the particle accelerator and the principle of inducing a voltage in a secondary winding by passing a magnetic element through it.

The structure comprises a primary voltage inductive winding having a magnetic core, plus a low-voltage input. There is a secondary winding with a greater number of turns than the turns in the primary winding, plus an output for using the voltage induced in that winding.

The primary winding and core are positioned on one side of an endless, closed-loop, non-magnetic pipe. The secondary windings are positioned on the opposite side of the endless pipe. The pipe is filled with discrete magnetic particles, preferably of a gas, and each particle has a magnetic polarised charge placed on it.

Due to their magnetic polarisation charges, the particles will sustain some motion. As the particles approach the accelerator assembly, which is the primary coil, the magnetic field generated by the coil attracts the particles and accelerates them through the coil. As each particles passes through the coil, the repulsion end of the coil boosts the particle on it's way. This causes each particle to exit from the coil with an increased velocity.

As the magnetic particles pass through the secondary coil winding, they induce a voltage across the ends of that coil. Due to the larger number of turns, this induced voltage is much higher than the voltage across the primary coil.

The main objective of this invention is to provide an electrical generator which is capable of producing a voltage/current of much greater magnitude than has been possible previously. Another objective is to provide a generator which uses magnetic particles and a magnetic accelerator. Another object is to provide a generator which can control the amplitude of the output. Another objective is to provide a generator which can be used with DC, AC, pulsed or other configurations of waveforms. Another objective is to provide a generator which can be used in either a single-phase or a 3-phase electrical system. Another objective is to provide a generator for developing magnetised particles for use in an electrical particle generator. Another objective is to provide an electrical generator which uses readily available components to construct a simple embodiment of this invention.

BRIEF DESCRIPTION OF THE DRAWINGS
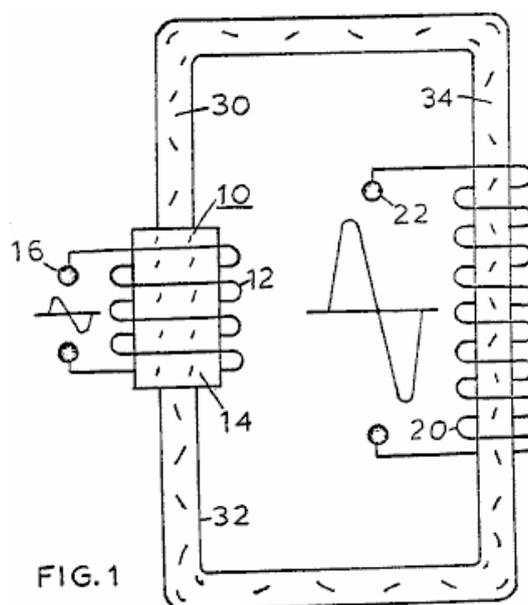
FIG.1

Fig.1 is a simplified illustration of the principles of the invention, shown partially in cross-section and partially pictorially.
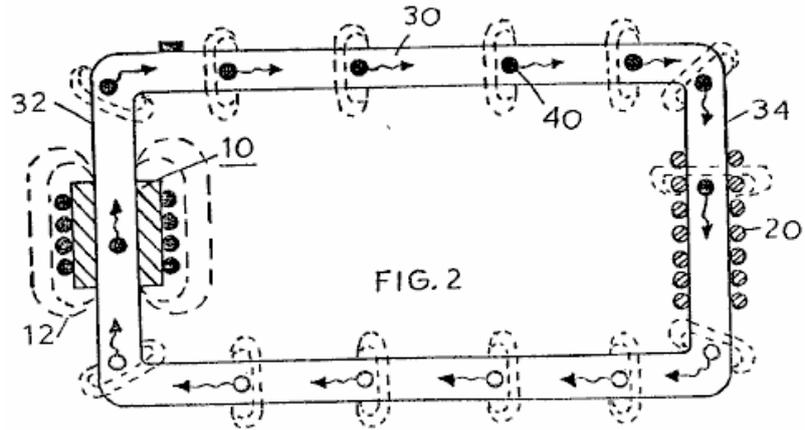
**Fig.2** is an electrical schematic illustration of the embodiment shown in **Fig.1**.
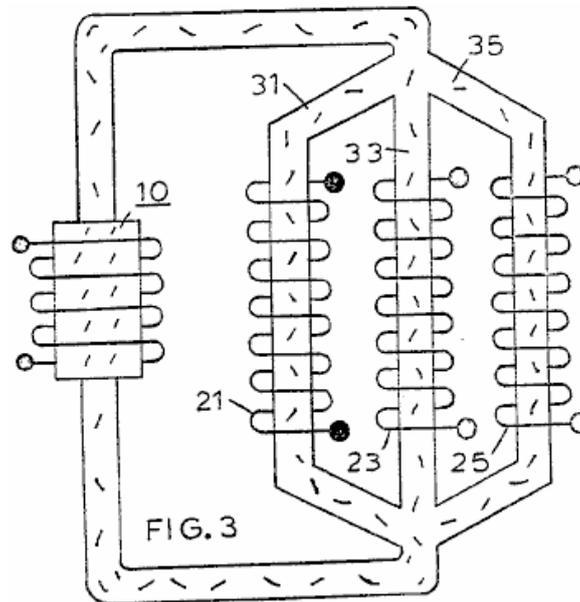
Fig.3 is an illustration similar to **Fig.2** but which is adaptable to 3-phase use.
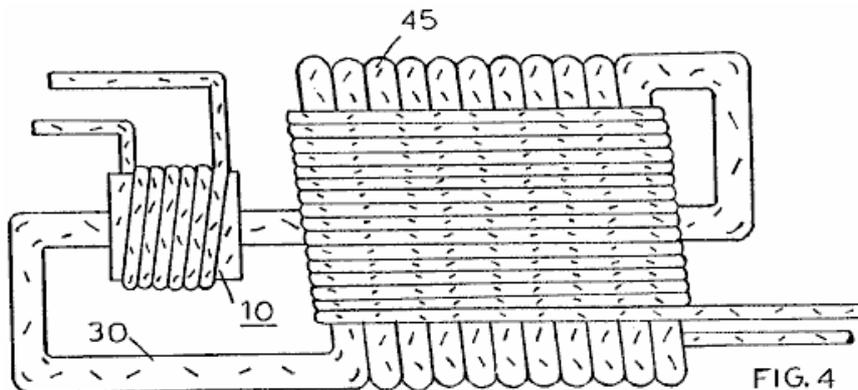

**Fig.4** is a first alternative arrangement of a preferred implementation of the invention.
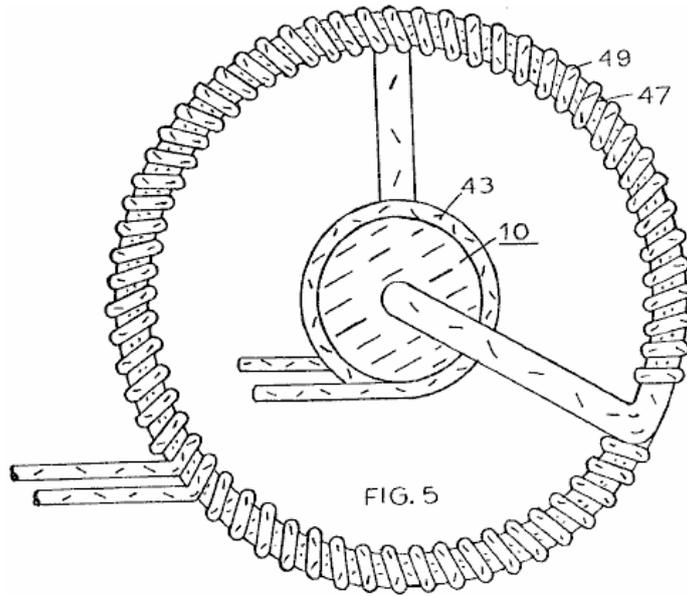
FIG. 5

**Fig.5** is another alternative arrangement of a preferred embodiment of the invention.
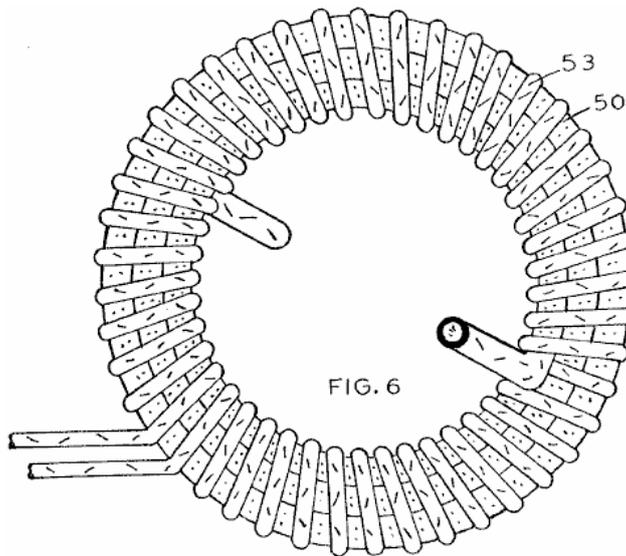
FIG. 6

Fig.6 is another alternative arrangement of a preferred embodiment of this invention.
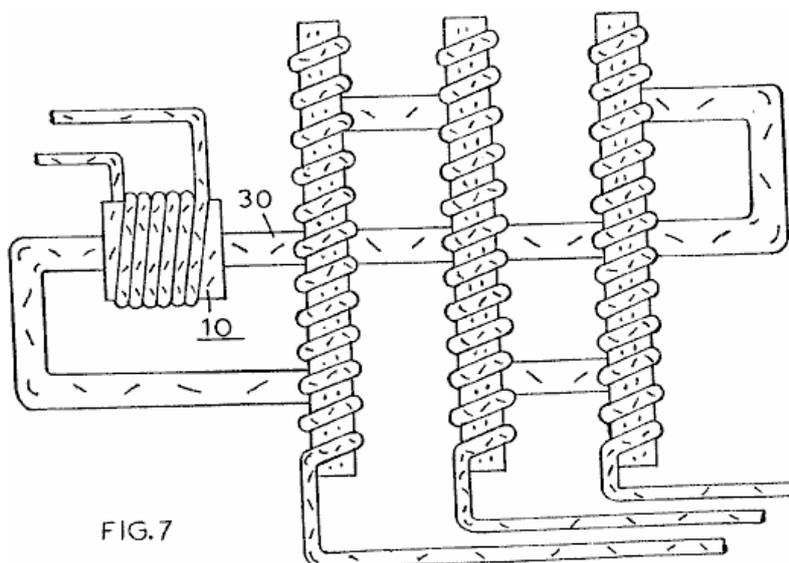
FIG.7

Fig.7 is another alternative arrangement of a preferred embodiment of this invention.
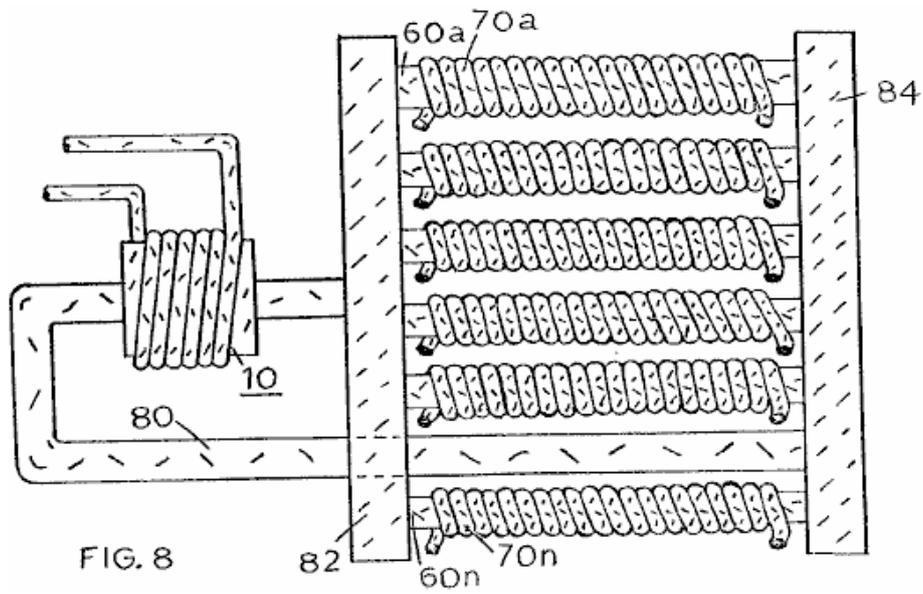
FIG. 8

Fig.8 is another alternative arrangement of a preferred embodiment of this invention.
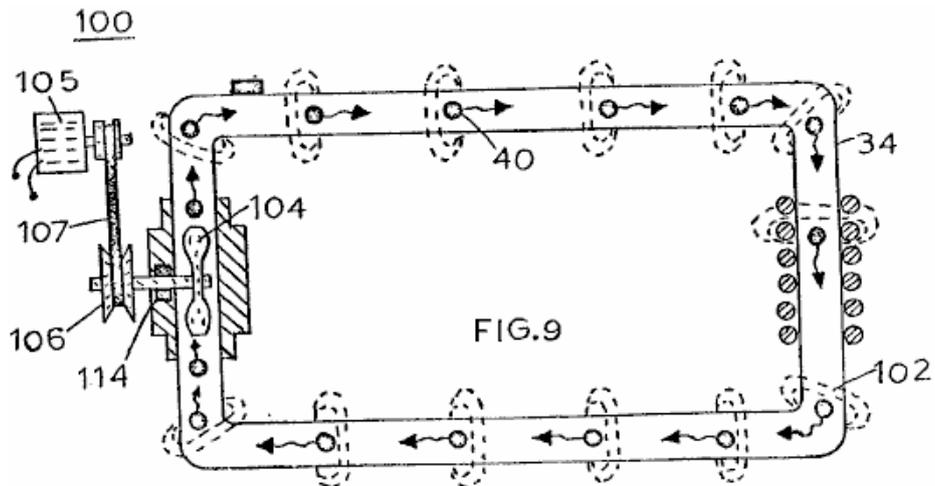
FIG.9

Fig.9 is an alternative arrangement for a magnetic drive particle accelerator assembly.
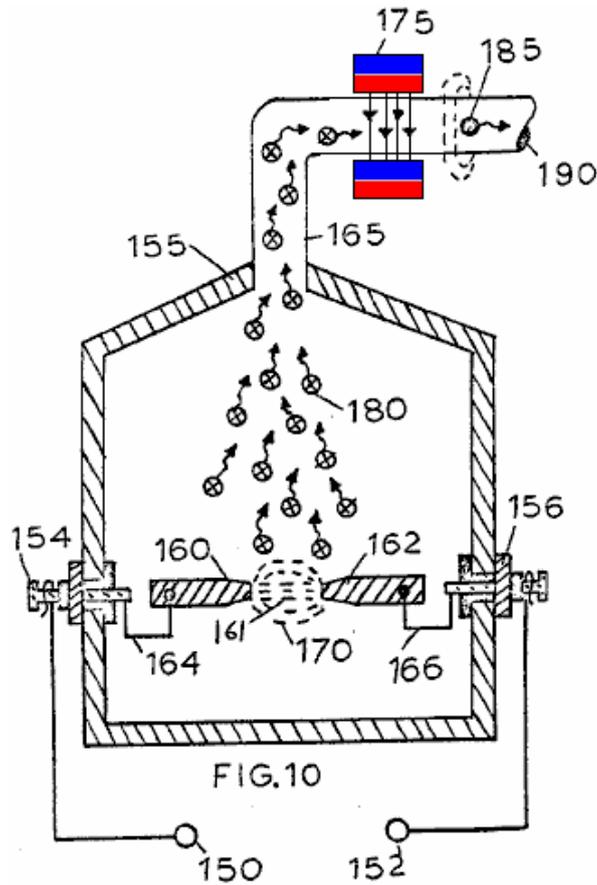
FIG.10

Fig.10 is an illustration of an alternative method of producing the magnetised particles used in this invention.

DETAILED DESCRIPTION

Fig.1 and **Fig.2** show the invention in it's most simplified schematic form:

FIG.1

FIG. 2
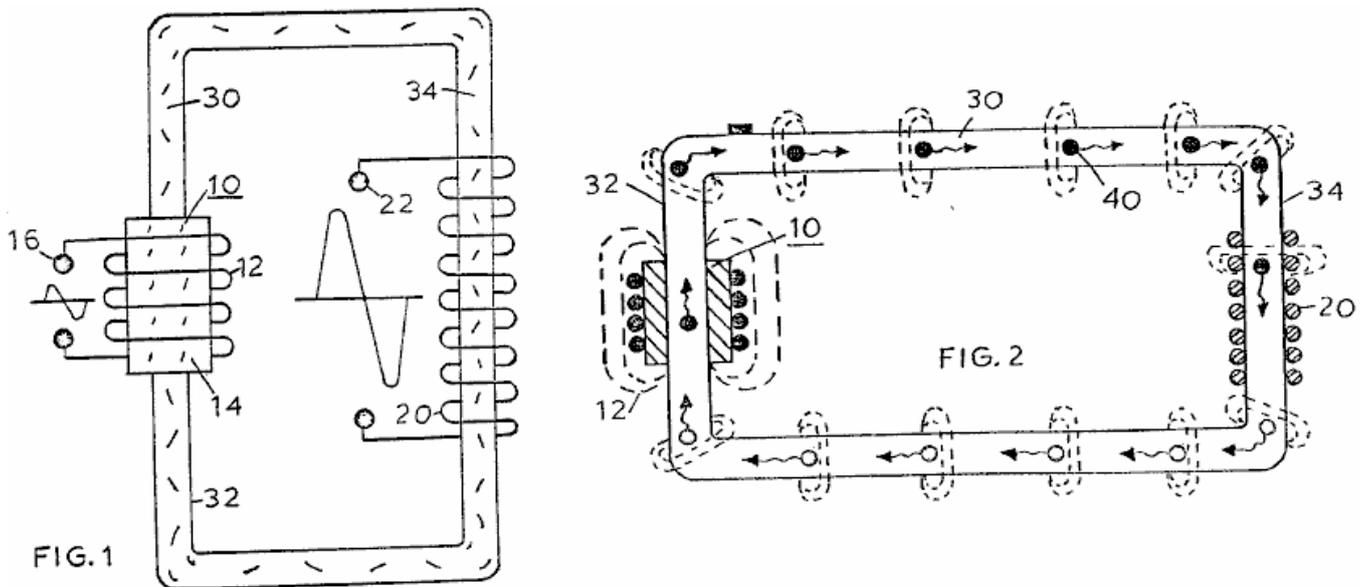
It comprises a primary coil magnetic accelerator assembly **10**, a closed-loop non-magnetic pipe **30**, and a secondary winding **20**. The magnetic accelerator assembly is comprised of primary windings **12**, a magnetic core **14**, and voltage taps **16**. The primary windings are positioned around end **32** of the closed-loop pipe **30** which is made from non-magnetic tubing.

At the opposite end **34** of the closed-loop pipe **30**, are the secondary windings **20**. The end terminals **22** of the secondary winding **20**, allow the voltage generated in the winding to be used. Contained inside pipe **30**, there is a substantial number of magnetic particles **40** as shown in **Fig.2**. The particles **40** must be light enough to be freely mobile and so may be particles suspended in a fluid medium such as gas, liquid or light-weight movable solid particles. Of these options, the use of a gas is preferred. If solid particles are used as the transporting medium, then it may be desirable to remove all air from inside the pipe in order to reduce the resistance to the flowing particles. Each of the particles **40** is magnetised and the following description refers to one individual particle and not to the mass of particles as a whole.

The voltage applied to terminals **16** of primary winding **12**, is a low voltage, and it's magnitude may be used as an input signal control. By varying the input voltage, the accelerator will vary the speed of the circulating particles, which will, in turn, vary the magnitude of the voltage/current output of the secondary winding **20**. The output **22** of the secondary transformer winding **20**, is a high voltage/current output.
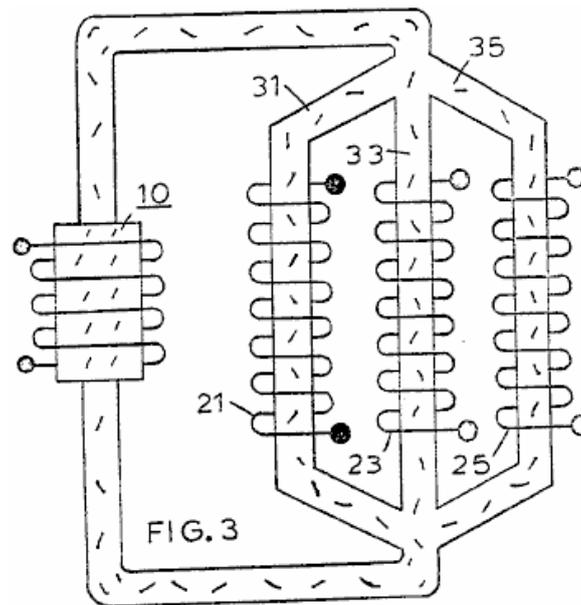
FIG.3

It can be appreciated that the system shown in **Fig.1** and **Fig.2** where there is just one closed loop, provides a single-phase output in the secondary winding **20**. **Fig.3** shows a closed-loop arrangement with three parallel non-magnetic tubes **31**, **33** and **35**, each with it's own output winding **21**, **23** and **25**. Each of these three windings are a single-phase output, and as their three pipes share a common input junction and a common output junction, these three output windings provide a balanced 3-phase electrical system.
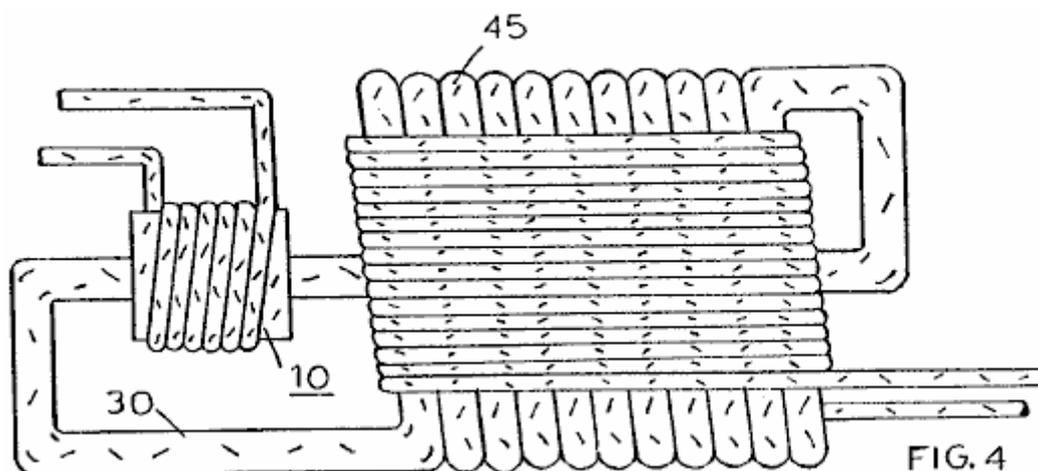

FIG. 4

Fig.4 shows an electrical power generator which operates exactly the same as those shown in **Fig.1** and **Fig.2**. Here, the arrangement is for use in an environment where there is a high moisture content. An insulating coating **45**, completely covers pipe **30** as well as all of the electrical windings. **Fig.4** also illustrates the fact that increasing the number of turns for any given wire diameter increases the voltage/current output of the device. In this physical configuration, both vertical and horizontal directions are used which allows a large-diameter pipe to be used with a substantial number of turns of heavy-gauge high-current wire.
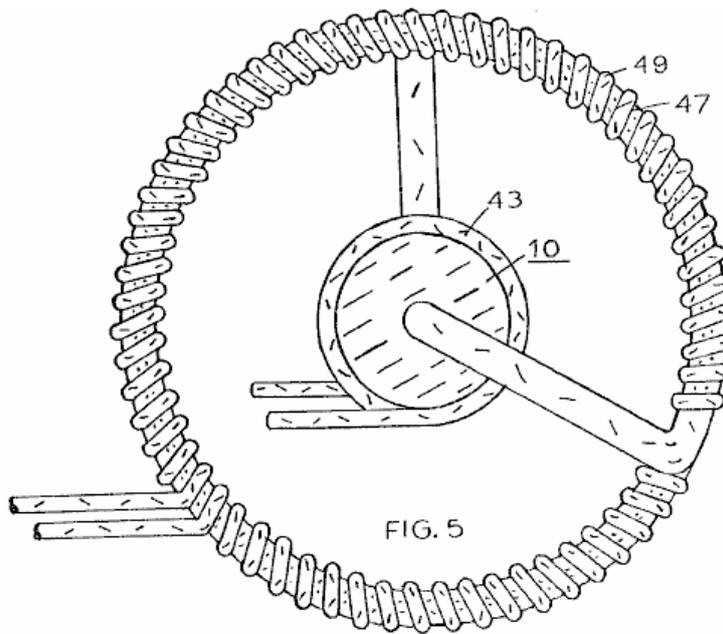
FIG. 5

Fig.5 shows a coil arrangement **49**, which uses the entire magnetic flux in the closed-loop tubing **47**. This is a co-axial arrangement with the primary winding **43** as a central core.
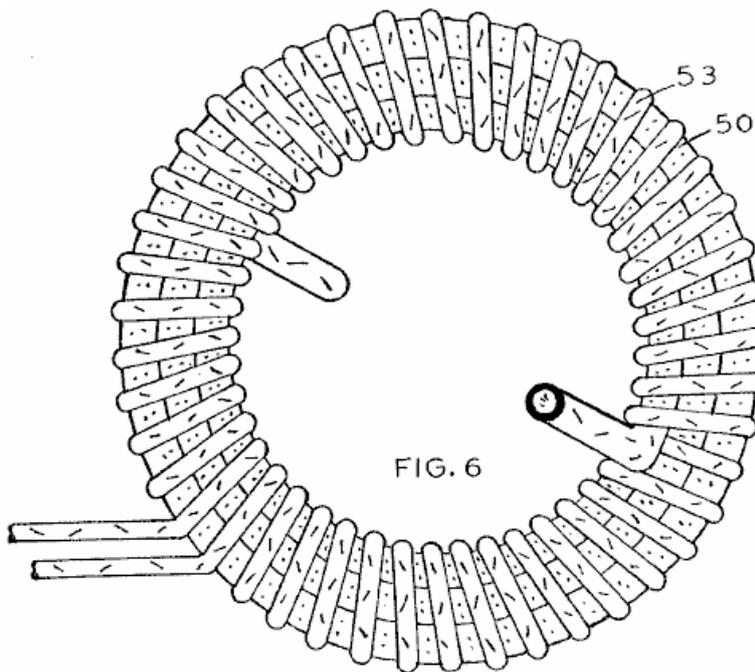

FIG. 6

Fig.6 illustrates a concentric spiral configuration of the tubing **50**, with the secondary windings **53** covering it completely.
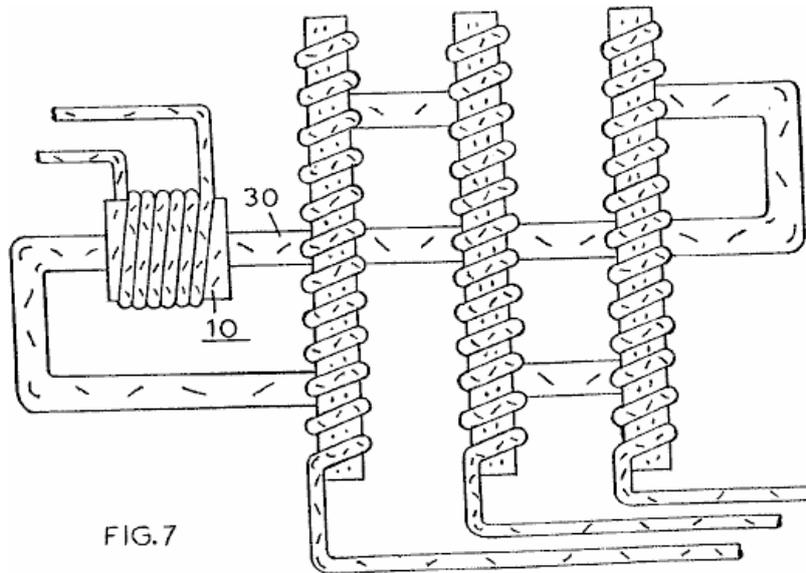
FIG.7

Fig.7 shows an arrangement where the particle accelerator **10** is wound over the tubing **30** in much the same way as in **Fig.1** and **Fig.2**. However, in this arrangement, the tubing **30** is a continuous closed loop arranged in a series-parallel configuration where there are three secondary windings providing three separate outputs while the tubing **30** runs in series through those three windings.
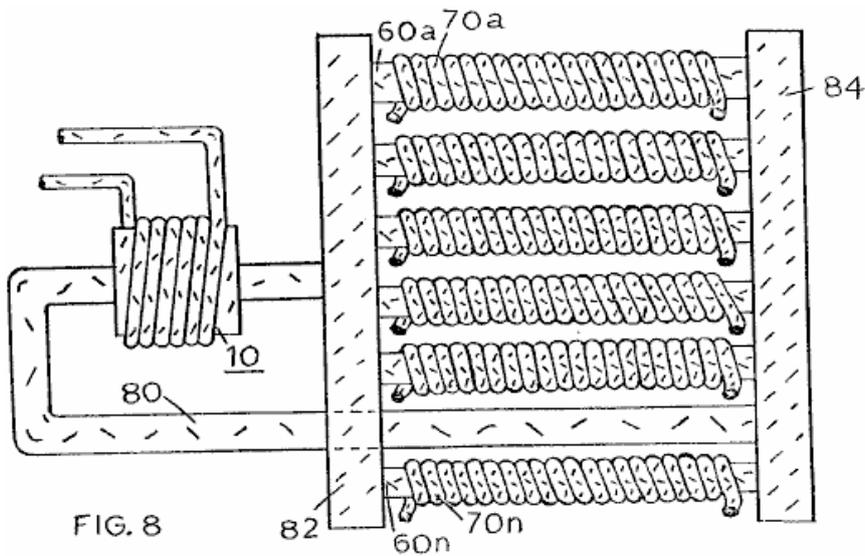

FIG. 8

Fig.8 shows a configuration which is the reverse of that shown in **Fig.7**. Here, there are several pick-up coils wound in series and unlike the earlier configurations, the tubing **80** is not continuous. In this arrangement, there is an input manifold **82**, and an output manifold **84**, and several separate tubes **60a, 60b, 60c, ….. 60n** interconnecting those two manifolds. Each of those separate tubes has it's own separate secondary coil **70a, 70b, 70c, ….. 70n** wound on it.
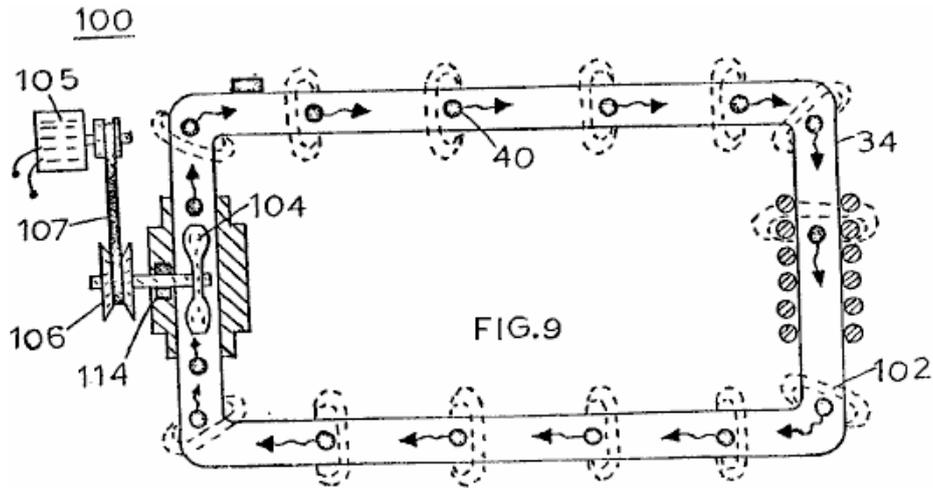
FIG.9

The magnetic particle accelerator **10**, can be different in design to that shown in **Fig.1**. **Fig.9** shows a mechanical particle accelerator **100**. In this arrangement, the magnetic particles **102** are permanently magnetised prior to being encapsulated in the non-magnetic pipe **110**. The particles 102 are accelerated by fan blade or pump **104** rotated by mechanical drive assembly **106**. The mechanical drive for assembly **106** may be a belt-drive pulley **112**, or similar device driven by an electric motor. A sealing bearing **114** keeps the particles **102** inside the pipe **110**.

It has been stated that the magnetic particles traversing the secondary coils, generate a voltage/current in them. It must be understood, however, that that the particles are actually traversing the magnetic field of those coils.

Also, the pipe **30** has been described as a non-magnetic pipe. There are certain non-magnetic pipes which would not work with this invention. Pipe **30** must be capable of passing magnetic lines of force.

A significant feature of each of the various embodiments already described, is the generation of the magnetic particles which are encapsulated within the tubing.
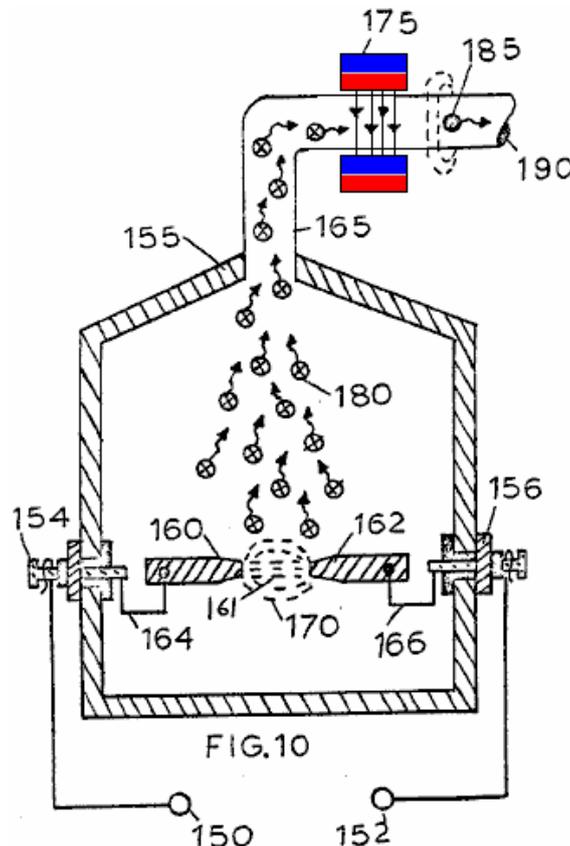

FIG.10

Fig.10 shows an apparatus for carrying out the process of vaporising material to produce suitable particles which are then magnetised by being subjected to a magnetic field. The chamber **155** is an evacuated chamber having

electrodes, made from magnetisable metal, **160** and **162**. A voltage is applied between terminals **150** and **152**, and this drives a current through terminals **154** and **156**, to spark-gap electrodes **160** and **162**, generating an arc which vaporises the tip material of the electrodes, producing particles **180**. These particles rise and enter tube **190**, passing through a magnetic field generator **175**. This gives each particle a magnetic charge and they continue on their way as magnetically-charged particles **185**, passing through port **190** to reach the electrical particle generator described above.

In the simplified embodiment shown in **Fig.1** and **Fig.2**, as well as the other preferred embodiments mentioned, it was indicated that a low voltage was applied to the particle accelerator **10**. Upon acceleration, a high voltage/current would be induced in the secondary pick-up coil **20**. A most significant advantage of the present invention is that the voltage amplification is not related to the shape of the waveform of the input voltage. Specifically, if the input is DC a DC voltage will be output. An AC input will produce an AC output. A pulsed voltage input will produce a pulsed voltage output and an input voltage of any other configuration will produce an output having that same configuration.

The Work of Russ Gries.
Russ Gries has produced a video presentation and analysis of the above Stan Meyer patent. http://www.youtube.com/watch?v=OnAmTmxBpAQ .

The very experienced Alex Petty is joining with Russ in working on replicating Stan's system and Alex's web site is at www.alexpetty.com. A discussion forum linked to this is at http://open-source-energy.org/forum/ and there is information at http://www.overunity.com/index.php?topic=5805.285 and high-resolution pictures can also be seen in Russ' video at http://www.youtube.com/watch?v=JOarpi6sDD4. Russ' own website is at http://rwgresearch.com/ and an additional video of the most recent developmental work being undertaken at: http://www.youtube.com/watch?v=adzVQRsS1KY&feature=youtu.be.

There are various important things which are commented on and Russ is to be commended for drawing attention to them. For the moment, please forget about HHO as that is a separate issue. As far as I can see, the patent does not claim that the device is COP>1 but instead that the device is a power transformer which potentially has a greater power output than conventional transformers since there is no Lenz Law reverse magnetic path from the output coil winding to affect the input power.

Having said that, Stan in his video points out ways to boost the power of the device, namely:

1. Increase the strength of the magnetic particles

2. Increase the speed of the magnetic particles

3. Lower the distance between the magnetic particles and the output winding.

The magnetic particles can be produced in various ways, but the most effective appears to be by filling the arcing chamber with argon gas and using iron, nickel or cobalt electrodes. The reason for this is that the electric arc does not only generate minute particles of the electrode material, but it also interacts with the argon, stripping off electrons and causing some of the metal particles to combine with the modified argon gas molecules to form a magnetic gas. That gas will always remain a magnetic gas due to the atomic bonding as it is not just minute particles of metal physically suspended in a gas due to their tiny size.

You will recall from chapter 1, that the very successful ShenHe Wang magnet motor/generator has a magnetic liquid as a key component. Here, Stan is producing a much lighter magnetic gas and the advantage of that lightness is that it can be boosted to very high speeds without any danger. The larger the number of modified argon molecules, the greater the magnetic effect when they pass through a coil of wire. The argon gas can be passed through the arc chamber over and over again so that a very high percentage of the gas is magnetic. Alternatively, if you are sophisticated in the design of the particle generator, you can arrange for the molecules which have become magnetic, to be pulled off into storage by a magnetic field.

Stan talks about pumping the magnetic gas through whatever pipe loop arrangement you decide to use, by a pump, but he promptly moves on to using a magnetic coil to boost the gas forward as the coil has no moving parts and so, no mechanical wear. This is only one reason. The main reason is that with magnetic acceleration, the gas speed can become very high indeed and in his video he talks about the speed of light. However, I personally do not believe that anything remotely like a speed that great could be achieved inside a pipe loop of small diameter. Nevertheless, speeds well in excess of what a mechanical pump can achieve are likely to be produced by magnetic acceleration.

Russ, in his discussion, points out that on most of Stan's surviving prototypes, the coil which is used for the acceleration is constructed using several apparently separate coils, and he speculates that each coil section is powered sequentially, causing a rippling magnetic field. While that is definitely possible, I don't see that a style of coil powering would have any advantage as opposed to powering all of the coils continuously. However, if sequential powering is believed to be an advantage, then the 'Divide-by-N' circuitry of chapter 12 can be used to provide the sequential powering or any more complex sequence.

Stan then points out that the output voltage can be increased by increasing the number of turns on the output coil and/or having additional output coils. This is easily understood conventional electrics. But, he then goes on to point out that the output will also be increased if the electrons of the modified argon molecules are raised to a high orbital level. This places the electromagnetic electrons (as described in chapter 11) closer to the output coils and presumably also allows the gas to be accelerated to a greater speed by the driving magnetic field.

This power boosting of the gas is achieved using Stan's "Gas Processor" described in chapter 10. The Gas Processor pumps electromagnetic energy into the gas through the use of banks of Light-Emitting Diodes which produce light of the correct wavelength to add energy to that particular gas.

If you check on the internet for the wavelength of argon, you find conflicting information, with some sites saying that the wavelength is 1090 nanometres ("nm") and most others saying both 488 nm and 514.5 nm. Most LEDs produce a band of frequencies, so it would be a case of picking LEDs whose band of frequencies include the wanted wavelength.

The Gas Processor itself, consists of a central tube which is polished to a mirror finish on the outside, surrounded by a larger tube which is highly polished on the inside. The LED light is then bounced between these polished surfaces until it is absorbed by the gas which is passed through the gap between the two tubes. This is not easy to illustrate, but it might be shown like this:
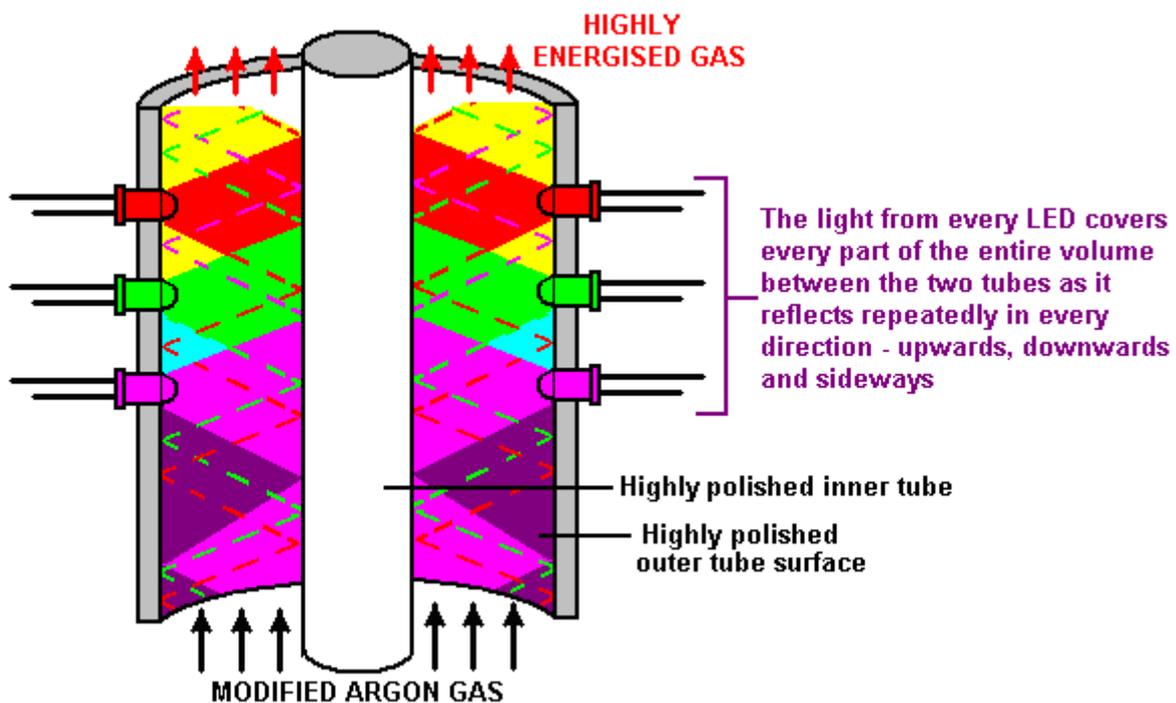
In Stan's design, he uses six columns of sixteen LEDs, with each column of LEDs spaced out evenly around the outer tube. So, to boost the Magnetic Particle Generator to greater power levels, a Gas Processor is placed in the loop of tubing:
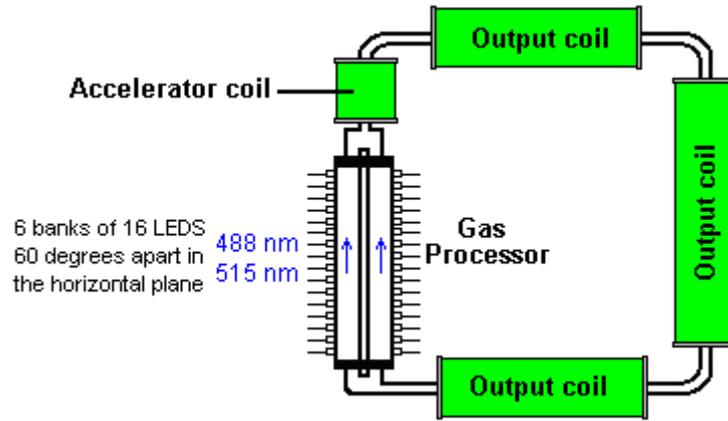
The Gas Processor normally has a coil mounted at each end and it may be convenient to use coils in those positions as accelerator coils. It may also be an advantage to apply a pulsed high-voltage between the inner and outer tubes of the Gas Processor. As it stands, this looks as if it has a high possibility of being a COP>1 electrical device.

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