Chapter 5: Energy-Tapping 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.

One very interesting feature of free-energy devices is that although various devices which appear to be completely different and have different apparent applications, the background operation is often the same. It is clear that a sharp positive going DC electric pulse interacts with the surrounding energy field, making large quantities of free-energy available for anyone who has the knowledge of how to gather and use that extra energy.

Let me stress again that "over-unity" is an impossibility. Over-unity suggests that more energy can be taken out of a system than the total energy which goes into the system. This is not possible as you can't have more than 100% of anything. However, there is another perfectly valid way of looking at the operation of any system, and that is to rate the output of the system relative to the amount of energy that the user has to put in to make it work. This is called the "Coefficient Of Performance" or "COP" for short. A COP = 1 is when all of the energy put in by the user is returned as useful output. A COP>1 is where more useful energy comes out of the device than the user has to put in. For example, a sailing boat in a good breeze transports people along without the need for the energy of movement to be supplied by the crew. The energy comes from the local environment and while the efficiency is low, the COP is greater than 1. What we are looking for here is not something to tap wind energy, wave energy, sunlight energy, river energy, thermal energy or whatever but instead we want something which can tap the invisible energy field which surrounds us all, namely the "zero-point energy" field or the "ambient background".

For this, let us look at pulsing circuits used by a wide range of people in a number of apparently quite different devices. An electrical "pulse" is a sudden voltage rise and fall with very sharply rising and falling voltages. However, pulses are seldom generated as isolated events when working with practical devices, so it is probably better to think of a train of pulses, or a "waveform" with very sharp rising and falling edges. These can be called oscillators or signal generators and are so commonplace that we tend not to give them a second thought, but the really important factors for using an oscillator for zero-point energy pick-up is the quality of the signal. Ideally, what is needed can be a perfect square wave with no overshoot, and the voltage level never going below zero volts, or a complex waveform, also with very sharp attack and decay times. These waveforms are a good deal more difficult to generate than you might imagine.

Even in these days of sophisticated solid-state electronic devices, the best method of creating a really sharp voltage pulse is still considered to be a spark gap, especially one which has the spark chopped off suddenly by the use of a strong magnetic field at right angles to the spark gap. For an example of this style of operation, consider the following device.

Frank Prentice's COP=6 Pulsed Aerial System.

Electrical Engineer Frank Wyatt Prentice of the USA invented what he described as an 'Electrical Power Accumulator' with an output power six times greater than the input power (COP = 6). He was granted a patent in 1923 which says:

In the development of my WIRELESS TRAIN CONTROL SYSTEM for railways, covered by my United States Letters Patent Number 843,550, I discovered that with an antenna consisting of one wire of suitable diameter supported on insulators, three to six inches above the ground and extending one half mile, more or less in length, the antenna being grounded at one end through a spark gap, and energised at the other end by a high frequency generator of 500 watts input and having a secondary frequency of 500,000 Hz, would produce in the antenna, an oscillatory frequency the same as that of the earth currents and thus electrical power from the surrounding media was accumulated along the length of the transmission antenna and with a closed oscillatory loop antenna 18 feet in length run parallel with the transmission antenna at a distance of approximately 20 feet, it was possible to obtain by tuning the loop antenna, sufficient power to light to full candle power a series bank of 50 sixty-watt carbon lamps. Lowering or raising the frequency of 500,000 Hz resulted in a diminishing of the amount of power received through the 18 foot antenna.

Likewise, raising the transmission antenna resulted in a proportionate decrease of power picked up on the receiving antennae and at 6 feet above the earth no power whatsoever was obtainable without a change of voltage and frequency.

It is the objective of my generic invention to utilise the power generated by the earth, by the means described here and illustrated in the drawings. The two drawings show simple and preferred forms of this invention, but I wish it to be understood that no limitation is necessarily made as to the exact and precise circuits, shapes, positions and structural details shown here, and that changes, alterations and modifications may be made when desired within the scope of my invention and as specifically pointed out in the claims.

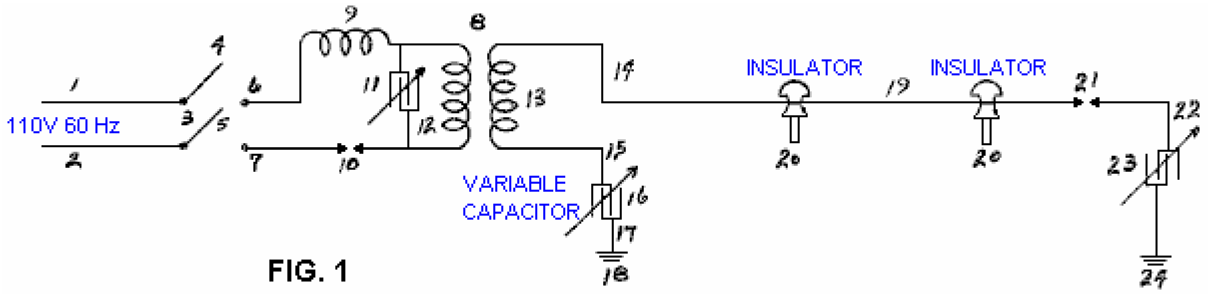


FIG. 1

Referring particularly to **Fig.1**, **1** and **2** are alternating current feed wires supplying 110 volts 60 cycles per second to a high-frequency generator. **3** is a switch with poles **4** and **5**, while **6** and **7** are the connections to the high-frequency transformer **8**, which is used to step-up the frequency to 500 kHz and the voltage to, say, 100 kV. **9** is an inductor, **10** is a spark gap, **11** is a variable capacitor, **12** is the primary winding and **13** the secondary winding of transformer **8**. The secondary winding is connected to ground through variable capacitor **16**, and wire **17**. Wire **14** connects transformer **8** to the main transmission antenna **19** which is supported along it's length on insulators **20**. Spark gap **21** is positioned between the main transmission antenna **19** and the ground **24**, passing through connecting wire **22** and variable capacitor **23**. The main transmission antenna **19**, can be any desired length.

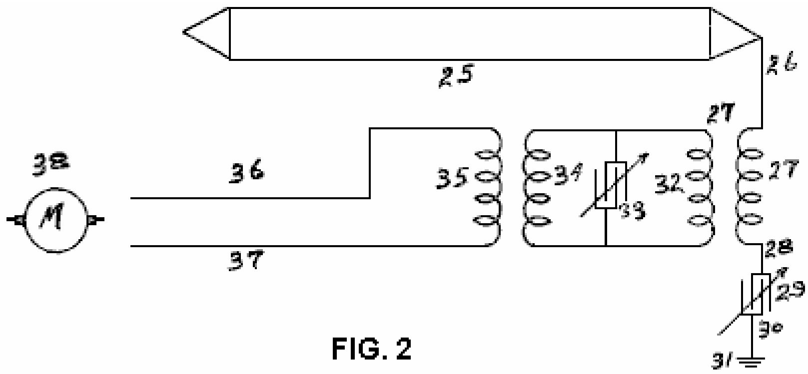
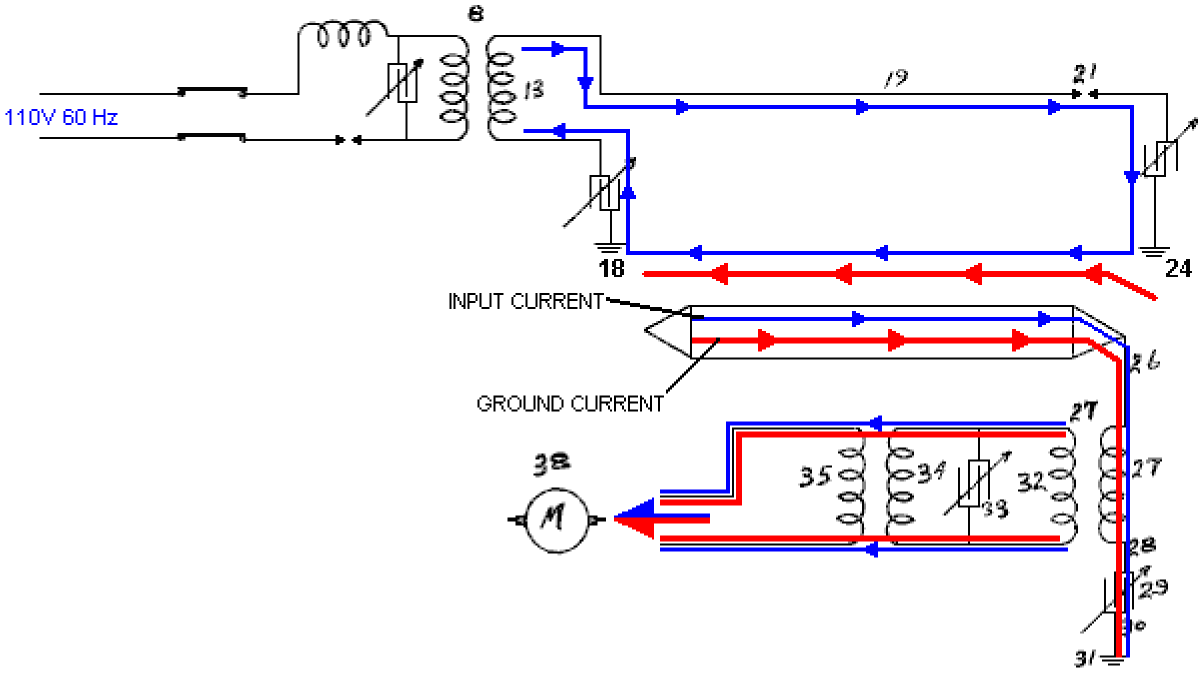


FIG. 2

In **Fig.2**, **25** is a closed oscillating loop antenna of any desired length. For greatest efficiency, it is run parallel with the main transmission antenna **19** of **Fig.1**. Wire **26** is connected to the secondary winding **27** of a step-down transformer which winding then goes to ground **31** through variable capacitor **29**. The primary winding **32** of the step-down transformer has variable capacitor **33** connected across it and it feeds directly into winding(s) **34** of frequency transformer(s) which supply current through winding(s) **35** to a motor "**M**" or other electrical load(s).

Having described the drawings, I will now describe the operation of my invention. Operate switch **3** to connect the input power. Adjust spark gap **10** and variable capacitor **11** so that 100,000 volts at a frequency of 500,000 cycles per second is delivered to step-up transformer **8** of **Fig.1**. Next, adjust spark gap **21** of the transmission antenna **19** so that all (voltage) peaks and nodes are eliminated in the transmission of the 100,000 volts along the antenna by the current surges across spark gap **21**. The high-frequency alternating current flowing through spark gap **21** passes through variable capacitor **23** to ground **24** and from there, back through the ground to earthing point **18**, through variable capacitor **16** and back to winding **13** of transformer **8**. As the 500,000 Hz current is the same as the earth-generated currents and in tune with it, it naturally follows that accumulation of earth currents will amalgamate with those for transformer **8**, providing a reservoir of high-frequency currents to be drawn upon by a tuned circuit of that same 500 kHz frequency, such as that shown in **Fig.2**, where the antenna **25** is turned to receive a frequency of 500 kHz, which current then passes through transformer **27**, any frequency-adjusting transformer(s), and on to power the load(s) **38**.



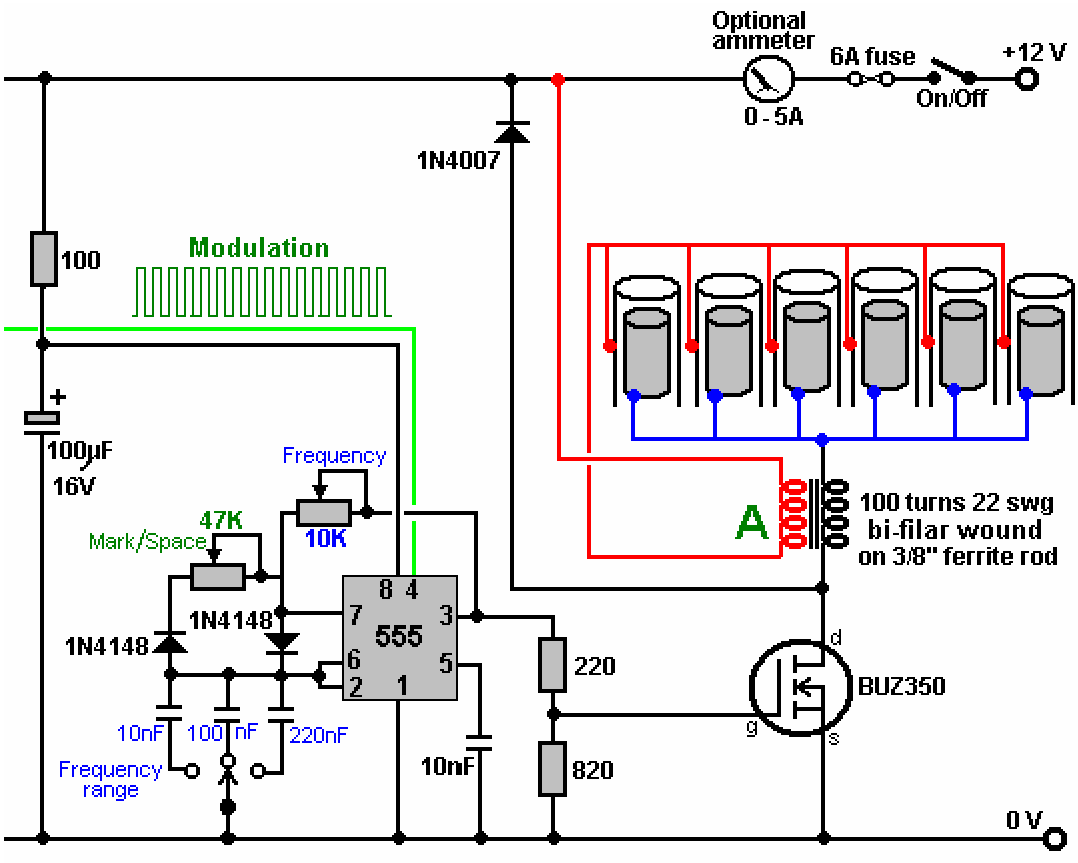
The return of current through the earth from transmission antenna **19**, is preferable to return through a wire as the ground return current picks up more earth currents than a wire does. I also prefer under certain conditions, to use a single antenna wire in place of the closed loop antenna shown in **Fig.2**. Under certain operational requirements, I have had improved performance by having the transmission antenna elevated and carried on poles many feet above the earth, and with that arrangement it is necessary to use a different voltage and frequency in order to accumulate earth currents.

This system of Frank's effectively applies very sharply pulsed DC pulses to a long length of wire supported in a horizontal position not far above the ground. The pulses are sharp due to both the spark gap on the primary side of the transformer, along with the spark-gap on the secondary (high voltage) side of the transformer. An input power of 500 watts gives a 3 kW power output from what appears to be an incredibly simple piece of equipment.

Dave Lawton's Solid-State Circuit.

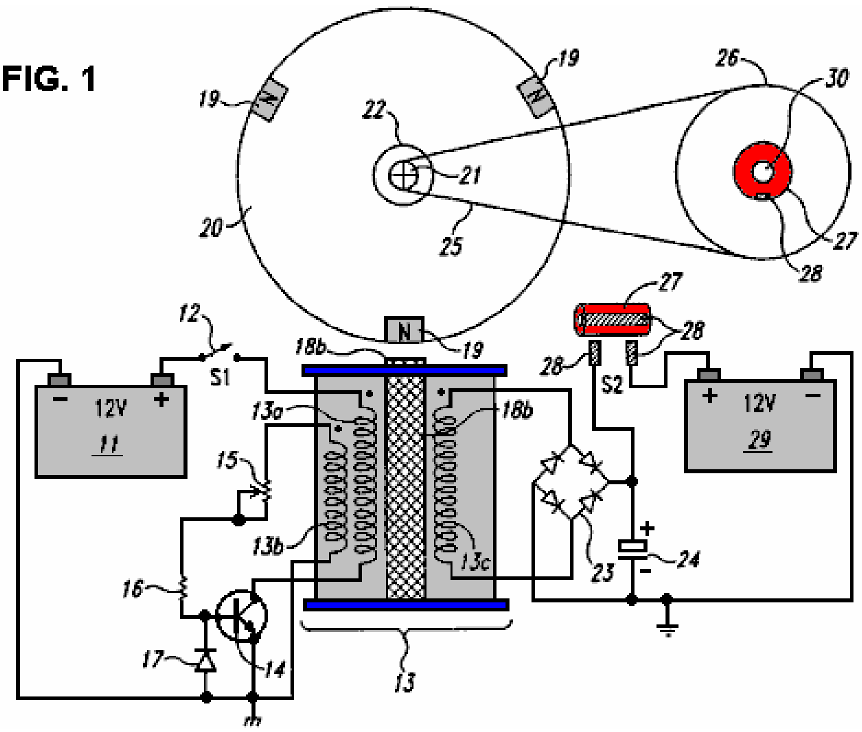
A solid-state semiconductor circuit which has proved successful in producing pulses like this is shown as part of Dave Lawton's replication of Stan Meyer's Water Fuel Cell. Here, an ordinary NE555 timer chip generates a square wave which feeds a carefully chosen **F**ield-**E**ffect **T**ransistor the BUZ350 which drives a water-splitter cell via a combined pair of choke coils at point "A" in the diagram below.

Stan Meyer used a toroidal ferrite ring when he was winding these choke coils while Dave Lawton uses two straight ferrite bars, bridged top and bottom with thick iron strips. Chokes wound on straight ferrite rods have been found to work very well also. The effects are the same in all cases, with the waveform applied to the pipe electrodes being converted into very sharp, very short, high-voltage spikes. These spikes unbalance the local quantum environment causing vast flows of energy, a tiny percentage of which happens to flow into the circuit as additional power. The cell runs cold, and at low input current, quite unlike an ordinary electrolysis cell where the temperature rises noticeably and the input current needed is much higher.

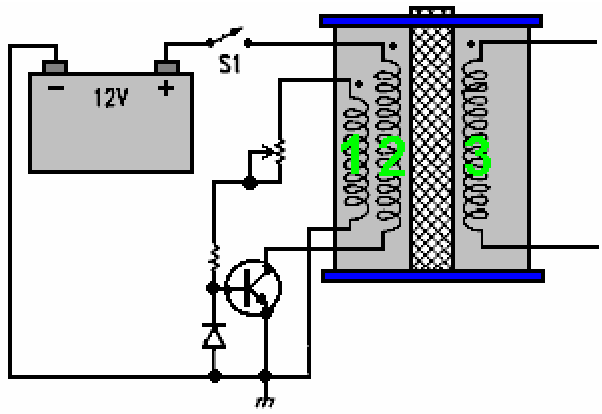


John Bedini's Battery-Charging Circuit.
John Bedini uses this same pulsing of a bi-filar wound coil to produce the same very short, very sharp voltage spikes which unbalance the local energy field, causing major flows of additional energy. The figure shown here is from his US patent 6,545,444.

FIG. 1



John has produced and generously shared, many designs, all of which are basically similar and all using a 1:1 ratio bi-filar wound transformer. This one uses a free-running rotor with permanent magnets embedded in it's rim, to trigger sharp induced currents in the windings of the coil unit marked "**13b**" which switches the transistor on, powering winding "**13a**" which powers the rotor on its way. The pick-up coil "**13c**" collects additional energy from the local environment, and in this particular circuit, feeds it into the capacitor. After a few turns of the rotor (dictated by the gear-down ratio to the second rotor), the charge in the capacitor is fed into a second "on-charge" battery.



The rotor is desirable but not essential as the coils marked **1** and **2** can self-oscillate, and there can be any number of windings shown as **3** in the diagram. Winding **3** produces very short, sharp, high-voltage spikes, which is the essential part of the design. If those sharp pulses are fed to a lead-acid battery (instead of to a capacitor as shown above), then an unusual effect is created which triggers a link between the battery and the immediate environment, causing the environment to charge the battery. This is an amazing discovery and because the voltage pulses are high-voltage courtesy of the 1:1 choke coils, the battery bank being charged can have any number of batteries and can be stacked as a 24-volt bank even though the driving battery is only 12 volts. Even more interesting is the fact that charging can continue for more than half an hour after the pulsing circuit is switched off.

It can be tricky to get one of these circuits tuned properly to work at peak performance, but when they are, they can have performances of COP>10. The major snag is that the charging mechanism does not allow a load to be driven from the battery bank while it is being charged. This means that for any continuous use, there has to be two battery banks, one on charge and one being used. A further major problem is that battery banks are just not suitable for serious household use. A washing machine draws up to 2.2 kilowatts and a wash cycle might be an hour long (two hours long if a "whites" wash and a "coloureds" wash are done one after the other which is not uncommon). During the winter, heating needs to be run at the same time as the washing machine, which could well double the load.

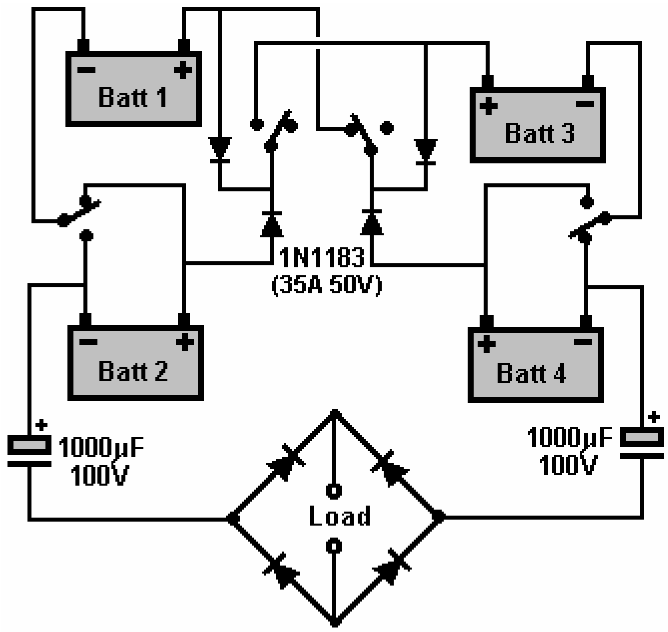
It is recommended that batteries are not loaded much beyond their "C20" rate, that is, one twentieth of their Amp-Hour nominal rating. Say that 85 Amp-Hour deep-cycle leisure batteries are being used, then the recommended draw rate from them is 85 Amps divided by 20, which is 4.25 amps. Let's push it and say we will risk drawing double that, and make it 8.5 amps. So, how many batteries would we need to supply our washing machine assuming that our inverter was 100% efficient? Well, 2,200 watts on a 12-volts system is 2,200 / 12 = 183 amps, so with each battery contributing 8.5 amps, we would need 183 / 8.5 = 22 large, heavy batteries. We would need twice that number if we were to treat them right, plus twice that again for household heating, say 110 batteries for an anyway realistic system. That sheer size of battery banks is not realistic for your average householder or person living in an apartment. Consequently, it appears that the Bedini pulse-charging systems are not practical for anything other than minor items of equipment.

However, the really important point here is the way that when these short pulses are applied to a lead-acid battery, a link is formed with the environment which causes large amounts of energy to flow into the circuit from outside. This is extra "free-energy". Interestingly, it is highly likely that if the pulses generated by Dave Lawton's water-splitter circuit shown above, were fed to a lead-acid battery, then the same battery-charging mechanism is likely to occur. Also, if a Bedini pulse-charging circuit were connected to a water-splitting cell like the Lawton cell, then it is highly probable that it would also drive that cell satisfactorily. Two apparently different applications, two apparently different circuits, but both producing sharp high-voltage pulses which draw extra free-energy from the immediate environment.

The Tesla Switch.

It doesn't stop there. Nikola Tesla introduced the world to Alternating Current ("AC") but later on he moved from AC to very short, sharp pulses of Direct Current ("DC"). He found that by adjusting the frequency and duration of these high-voltage pulses, that he could produce a whole range of effects drawn from the environment - heating, cooling, lighting, etc. The important point to note is that the pulses were drawing energy directly from the local environment. Leaving aside the advanced equipment which Tesla was using during those experiments and moving to the simple-looking 4-battery switch, we discover the same background operation of sharp voltage pulses drawing free-energy from the environment.

I seriously doubt that this circuit had anything to do with Tesla, but instead it probably originated with Carlos Benitez. Strictly speaking, this particular version was probably produced by the staff of the Electrodyne Corp. of America. This circuit (shown in "The Manual of Free-Energy Devices and Systems" Vol.1, 1986) was tested by them for a period of three years:



Please understand that the car batteries which they used in their circuit had become “conditioned” during their years of testing and they each had a voltage of 36 volts even though they were manufactured as 12-volt batteries. This circuit is a lot more subtle than it appears. The 1N1183 diodes are an essential part of the operation because those diodes break down when they are supposedly blocking current flow, and instead, they pass through them sharp voltage pulses. Those battery-charging pulses are the reason why the diodes appear to be connected backwards and supposedly blocking current flow to the positive contacts of the batteries.

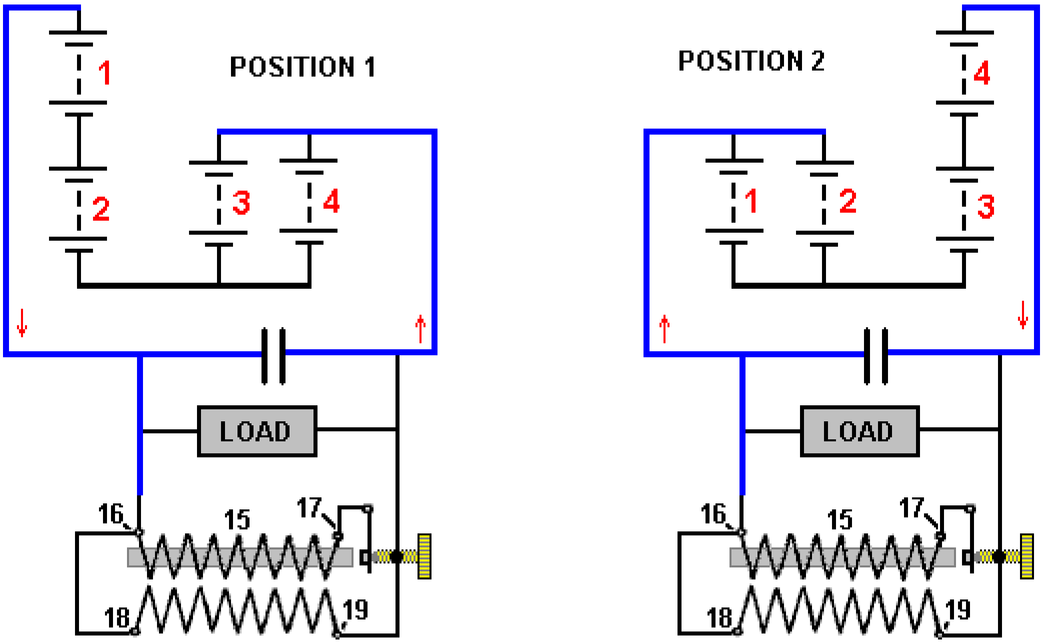
I suggest that this circuit is abandoned and instead the Benitez method of feeding charging pulses directly to both the batteries and the load be used instead. There has to be battery recharging. If you doubt this, then do the math:

The load is powered by current which flows from two batteries in series (72 volts) into two batteries in parallel (36 volts). The batteries are lead-acid types which have an efficiency of only 50%, that is, they waste half of all of the charging energy fed into them. Let’s work an example: Say the two batteries in series provide 10 amps for a one-second period. Both of those batteries lose 10 amp-seconds of power.

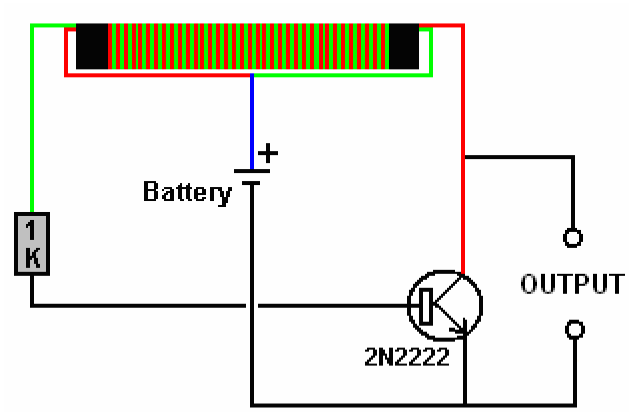
That 10 amps divides equally and 5 amps flows into each of the two batteries for a period of one second. That would be 5 amp-seconds of additional power **IF** it were not for the 50% efficiency of the battery. So only 2.5 amp-seconds of that power can be recovered from that battery, which in the next second is expected to supply 10 amp-seconds of power.

So, effectively, we have 2.5 amp-seconds of recoverable power received for every 10 amp-seconds of actual power expended. This means that the battery will run down unless some form of battery charging takes place during the operation. Consequently, a battery charging system needs to be part of the “Load”.

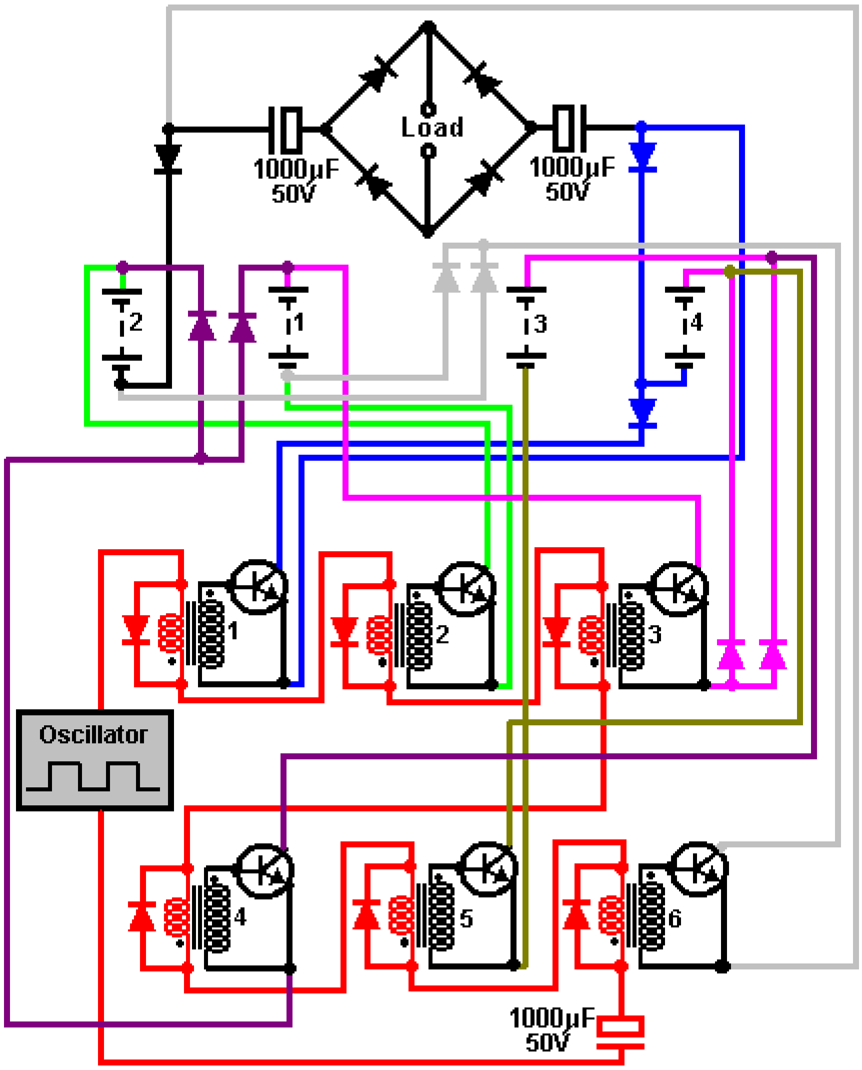
Carlos Benitez used switching of only once per hour and he added charging power to both the batteries and the load which was being power by his circuit. He did that like this:



As there were no readily available electronic components back then, Carlos used an induction coil to produce the voltage spikes needed for charging the batteries. The equivalent nowadays is the much cheaper and easier to build "Joule Thief" circuit as described in chapter 6:



Here is a solid-state version of the circuit:



Here, six 2N3055 transistors (or the more convenient version the TIP3055) are switched On and Off by six audio transformers (possibly the Radio Shack #273-1380 transformers). The 8-ohm transformer primary windings are connected in series and driven by a square-wave generator through a large capacitor. This circuit is shown in red in the circuit diagram above. When the square wave is positive, transformers 1, 2 and 3 have their primary windings loaded by a forward-biased diode which limits the voltage across them to a maximum of about 0.7 volts and that keeps their operation short when they switch On. The other three transformers 4, 5 and 6 have the diodes across their primary windings positioned to block a positive voltage and so their transistors remain Off.

When the output voltage of the square-wave generator goes negative, the situation is reversed and transformers 4, 5 and 6 switch on briefly while transformers 1, 2 and 3 remain Off. The diodes across the primary windings are 1N4148 diodes which have a very fast switching time which can be very important for circuits of this type. The other diodes are 1N1183 which are rated at 50 volts and 40 amps.

The Self-powered Free-Energy Generators of Carlos Benitez

The Mexican Civil Engineer Carlos Benitez devised what is essentially the 3-battery switch discussed above. He was working at a time when solid-state electronics was not available and so his design is all the more impressive for that. Here is some of his patent information:

Carlos Benitez Patent GB 17,811 13th May 1915

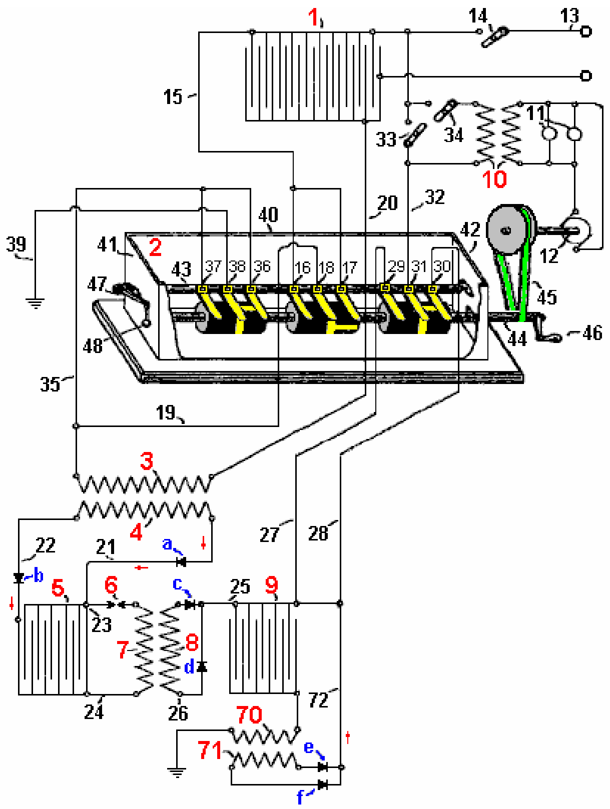
System for the Generation of Electric Currents

I, Carlos F. Benitez, Civil Engineer, 141 Ocampo Street, Guadalajara, Mexico, do hereby declare the nature of this invention:

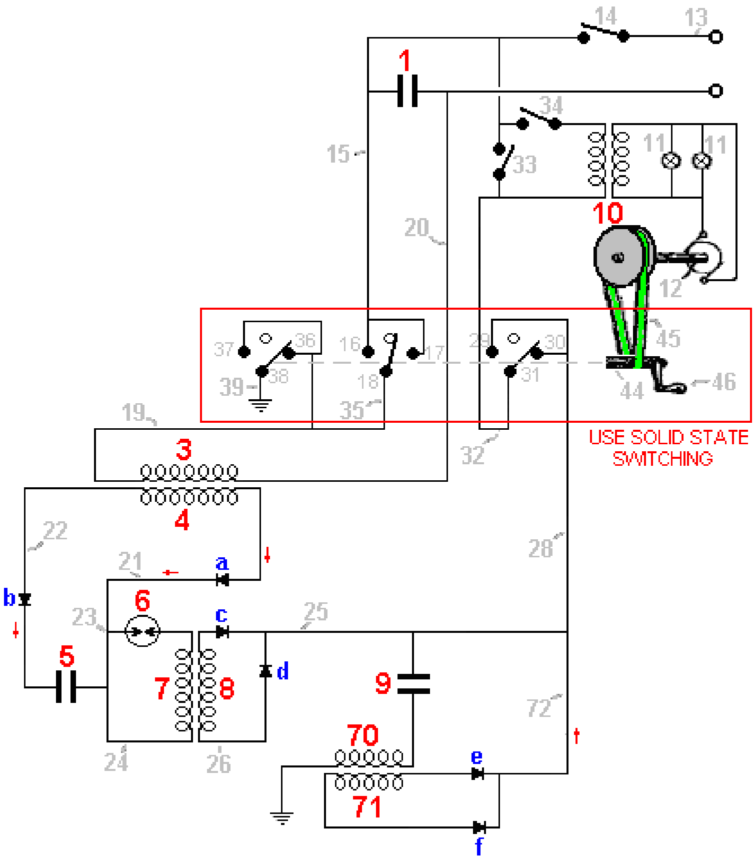
The invention relates to a new process for obtaining electric currents under unusually simple, economic and practical conditions. I use synthetically in combination: apparatus for the production of electric currents for charging one or several capacitors whose collectors or inner coatings are connected to one of the terminals of the primary winding of one or several induction coils and the other coatings of those capacitors are alternately grounded through the primary winding of a transformer, or connected through the transformer primary to the above collectors, appropriate means for collecting the currents produced in the secondary windings of these transformers and for applying charging to the above collectors, and an appropriate means for discharging those collectors, and for the application of all or part of its energy to the successive replication of the process already described, in this way, increasing the generation of electrical energy, or maintaining a constant, pre-determined electrical output.

Furthermore, the invention consists of a new combination of parts from which are derived advantages which will be fully understood by the consideration of the two different cases illustrated in the accompanying drawing, in which:

1 is a bank of capacitors.
2 is a rotating commutator to make and break the circuit connections at the appropriate instants.
3 is the primary winding of a transformer or induction coil.
4 is the secondary winding of that transformer or induction coil.
5 is a second bank of capacitors.
6 is an oscillator spark gap.
7 is the primary winding of a second transformer.
8 is the secondary winding of that transformer.
9 is a third bank of capacitors.
70 is the primary winding of a third transformer
71 is the secondary winding of that transformer.
10 is a fourth transformer.
11 is a series of incandescent lamps.
12 is an electric motor.
(a), (b), (c), (d), (e) and **(f)** are mercury-vapour converters or cathodic valves, allowing electric current flow only in the direction shown by the arrows.



Or using current day symbols:



The capacitor bank **1**, is connected through wire **13** to a source of electric current, providing the initial charge to capacitor bank **1**. This initial charge is used to start the system running and can be disconnected at any time by means of switch **14**.

Wire **15** connects the inner leaves of capacitor bank **1** with poles **16** and **17** of the commutator **2**, and it's pole **18** is connected via wire **19** to one of the terminals of transformer primary winding **3**, whose other end is connected through wire **20** to the outer leaves of capacitor bank **1**. The secondary winding **4**, of this transformer, is connected by wire **21** to the inner plates of capacitor bank **5**, and by wire **22**, to the outer plates of capacitor bank **5**. In the same manner, wires **23** and **24** pass those connections on to the two sides of the primary winding **7** of the second transformer. Wire **23** also contains an oscillator spark gap **6**, and wires **21, 22, 25, 26** and **72** contain the one-way cathode valves **a, b, c, d, e** and **f**. The secondary winding **8**, of this second transformer, connects to the inner plates of capacitor bank **9**, whose outer plates are connected to ground through the primary winding **70** of the third transformer. The secondary winding **71**, of this third transformer is also connected through wire **72**, to the inner plates of capacitor bank **9**. Wires **27** and **28** also connect these inner plates to commutator poles **29** and **30**, which form a change-over switch through commutator contact **31** which is connected to the inner plates of capacitor bank **1** through wire **32**. Switches **33** and **34**, allow the connection or disconnection of the primary winding of transformer **10**, whose secondary winding supplies current to the incandescent lamps **11** and motor **12**. Finally, one of the ends of primary winding **3** is connected through wire **35** to both pole **36** and pole **37** of the commutator **2,** and their corresponding commutator contact **38** is connected to ground by wire **39**.

As the construction and use of all of these components (with the exception of the commutator) is perfectly understood, it would be pointless to describe them. The commutator **2**, is enclosed in a tank **40**, whose end walls **41** and **42** support the ends of the contact-mounting bar **43,** and the bearings of the rotating shaft **44**. The contact bar is made of a non-conducting material to which are immovably attached, the copper contact strip brushes **16**, **17** and **18**, **36**, **37** and **38**, and **29**, **30** and **31**. Secure contact between these brushes and the rotating cylinders mounted on shaft **44** is ensured by the rotating lever arm **47** and its associated weight **48**.

The three rotating cylinders mounted on shaft **44**, are made of a non-conducting material and have a conducting strip around their centre. This strip has two conducting spurs running outwards, one to the right and one to the left, positioned 180 degrees apart around the circumference of the cylinder. When shaft **44** is rotated, this causes the central contact (for example, **18**) to connect first to one of its associated contacts (say, **17**) and then disconnect and connect to the other contact (say, **16**) forming a change-over switching mechanism.

The switching strips on the central cylinder are positioned 90 degrees around the circumference when compared to the position of the switching strips on the two outer cylinders which are aligned with each other.

This can be seen in the diagram, where in the shaft position shown, **38** and **36** are connected and **31** and **30** are connected, while **18** is not connected to either **16** or **17**.

When shaft **44** is rotated through 90 degrees, **18** will be connected to **17**, while **31** and **38** will both be isolated.

When shaft **44** is rotated through an additional 90 degrees, brush **18** will be isolated while brush **38** will be connected to **37** and brush **31** will be connected to **29**.

When shaft **44** is rotated through an additional 90 degrees, brush **18** will be connected to brush **16**, while brushes **31** and **38** will be isolated.

[Note: if the diagram is correctly proportioned, there will be four positions in each rotation where the three central brushes are not connected to any of the outer brushes, producing the switching sequence Make, Break, Make, Break, Make, Break, Make, Break for each revolution. These breaks in the switching sequence have been shown to have a significant effect when batteries are being charged. This mechanism would be built as solid state switching nowadays.]

Shaft **44** is elongated and projects through the end wall **42**, so that a belt drive **45**, or other suitable method, may be used to rotate the shaft, driven by motor **12** or possibly by crank handle **46**. The tank **40**, is filled with oil or any other insulating liquid, in order to prevent sparking between the brushes, which would lower the efficiency of the system.

This system is operated as follows:

With the commutator in the position shown in the drawing, that is, with brush **36** connected to **38** and brush **30** connected to **31**, and supposing capacitor bank **1** is connected through wire **13** to a source of electric power (say, a Wimshurst Machine), switch **14** being closed, electric current passes through wire **13** to charge capacitor bank **1**, causing a current to flow through wire **20**, primary winding **3**, wire **35**, brush **36**, brush **38** and wire **39** to earth. This current flow through primary winding **3** induces an inverse current in secondary winding **4**, which flows through wire **21**, charging capacitor bank **5** and then a direct induced current flowing through conductor **22**, charging capacitor bank **5**.

The current flow to both sets of plates in capacitor bank **5**, charges it and creates a spark across the spark gap **6**, causing a very sharp current pulse through primary winding **7**. This in turn, causes a considerable number of high-frequency oscillating current flows in the secondary winding **8** and these pass along wires **25** and **26**, and via diodes **c** and **d**, thus charging capacitor bank **9** and causing a corresponding set of high-frequency pulses to flow to ground through the primary winding **70**. This induces current flow in the secondary winding **71**, which flows through diodes **e** and **f**, and onwards via wire **72**, further boosting the charge on capacitor bank **9**.

Therefore, capacitor bank **1** being charged by an external source, capacitor bank **9** will be charged indirectly and successively re-charged several times, resulting in a quantity of electricity considerably greater than that of capacitor bank **1**. By this means, the system can be self-powered with no need for the power source used to start it, which means that switch **14** can be opened.

When shaft **44** rotates through 90 degrees, brush **17** connects with brush **18**, while brushes **31** and **38** are both disconnected. This causes capacitor bank **1** to be completely discharged through transformer primary **3**, causing the already described process by which capacitor bank **9** receives a substantially larger electrical charge. This results in capacitor bank **1** being totally discharged and capacitor bank **9** being highly charged with a great deal of electricity. Consequently, if we now close switch **33** and rotate shaft **44** through another 90 degrees, the following situation results:

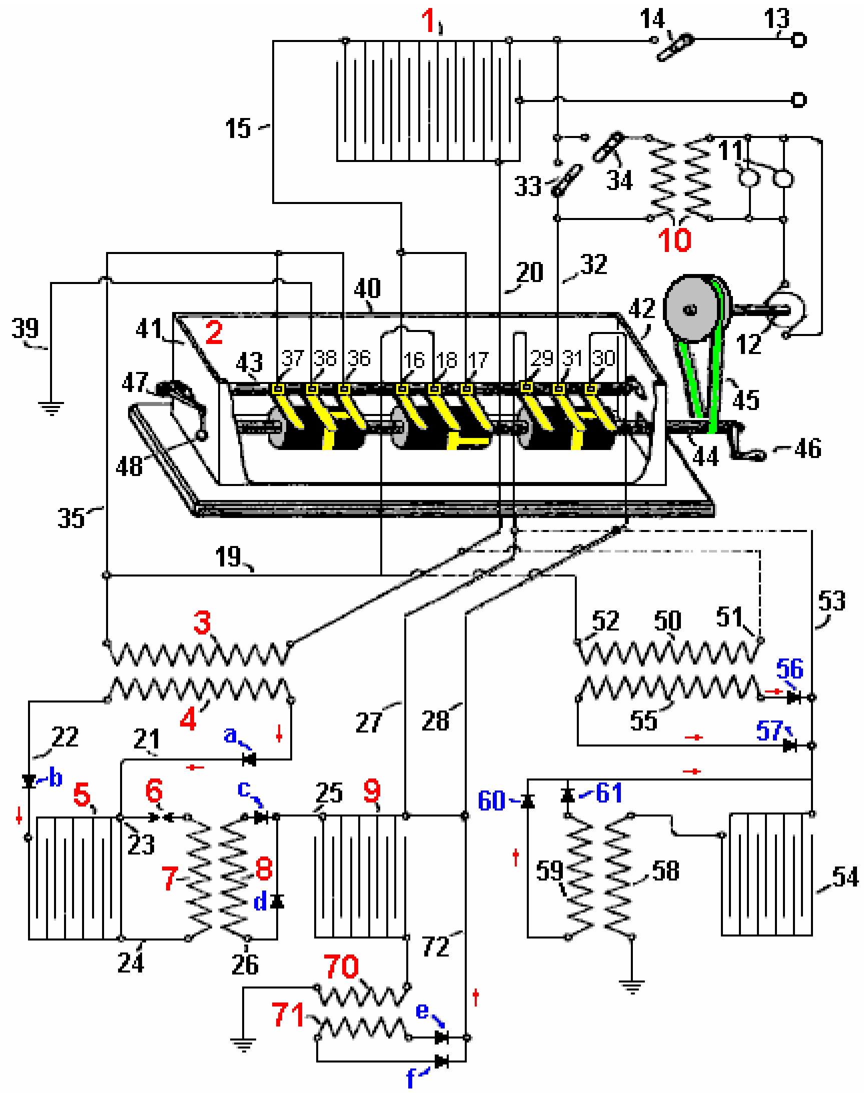
1. Brushes **17** and **18** will be disconnected.
2. Brushes **37** and **38** become connected which in turn connects the outer plates of capacitor bank **1** to ground. Brushes **29** and **31** are connected, which then connects the inner plates of capacitor bank **9** to the inner plates of capacitor bank **1**.
3. Part of the high charge on capacitor bank **9** will flow as an electric current, through wire **32** and into capacitor bank **1**.
4. This current flow from the inner plates of capacitor bank **9** causes an immediate matching negative charge to flow from ground through primary winding **70**, to offset the charge imbalance.

5. This induces a current flow in the secondary winding **71**, which passes additional electrical power to the outer plates of both capacitor bank **9** and capacitor bank **1**, and that further intensifies the current flow through primary winding **70** quite considerably.
6. Further, as capacitor bank **1** has just been newly charged, it drives additional current through primary winding **3**, causing new induced currents which will, as before, produce much increased charge on the inner plates of both capacitor bank **5** and capacitor bank **9**, as described earlier.

If shaft **44** is rotated through a further 90 degrees, then a connection between brushes **16** and **18** will be made and all other circuits will be opened, causing capacitor bank **1** to be discharged again, thus repeating the entire process described above provided that shaft **44** is rotated continuously.

This system produces a constantly increasing supply of electric current flowing through wire **32**, and so, switch **34** can be closed, allowing transformer **10** to provide the electrical power to run motor **12** which maintains shaft **44** in continuous rotation, making the system self-powered with no requirement for any form of outside power supply. Additional transformers inserted in wire **32** can be used to power additional equipment.

Without employing the high-frequency currents described above, similar results may be attained by means of the arrangement shown at the lower right hand side of the following drawing:



Here, primary winding **50** is connected as shown by the dashed lines, with wires **19** and **20** of the former arrangement, and wire **53** connects to both wire **27** and wire **28**. This arrangement has primary winding **50** connected through its end **51** to wire **20** and so is permanently connected to the outer plates of capacitor bank **1**, and its other end **52** being connected to wire **35** will be intermittently connected to ground. Wire **53** being connected to wires **27** and **28** will intermittently connect together, the inner plates of capacitor bank **54** and the inner plates of capacitor bank **1**.

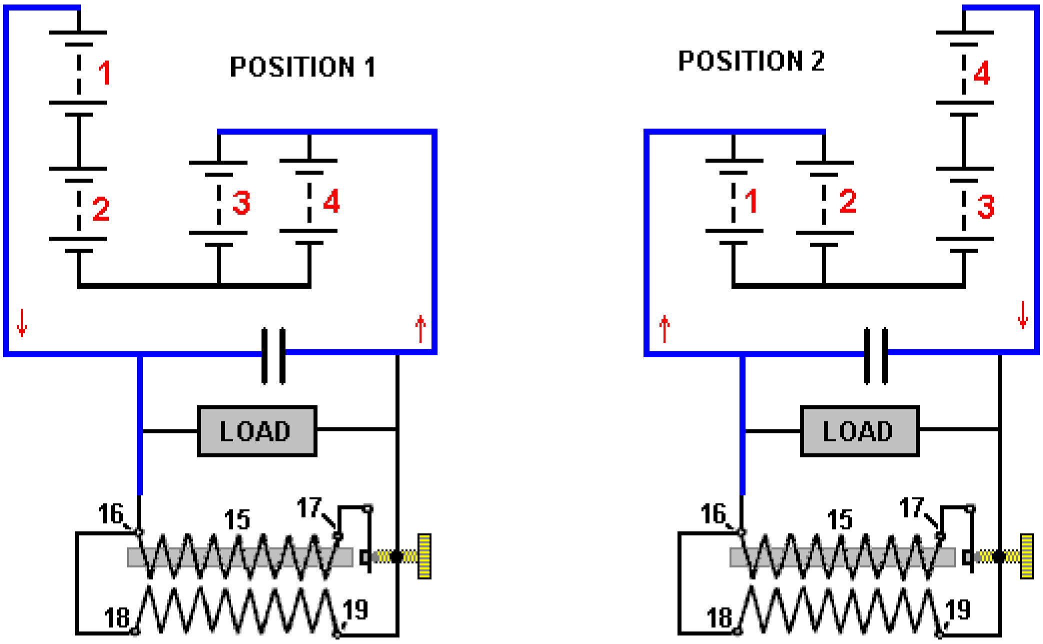
With this arrangement, both ends of the secondary winding **55** are connected through diodes **56** and **57**, to wire **53**. The outer plates of capacitor bank **54** are permanently connected through primary winding **58** to ground. Both ends of the secondary **59** are connected through diodes **60** and **61**, back to wire **53**. As a result, if capacitor bank **1** is charged, it drives a current through wire **20** and so, through primary winding **50**, and on to ground through wires **35** and **39**. This induces current in secondary winding **55** which gets stored in the inner plates of both capacitor bank **54** and capacitor bank **1**, as in this moment, the circuit is closed between brushes **29** and **31**, and so, wire **53** is connected to wire **32**. On receiving these new charges, both capacitor bank **1** and capacitor bank **54** will create new induced electric currents flowing through primary windings **50** and **58**. These multiple charging pulses will decrease with time until they are insignificant, at which time, due to the rotation of shaft **44**, the connection between brushes **29** and **31** and between brushes **36** and **38** will no longer be maintained, and instead, brushes **18** and **17** will become connected, discharging capacitor bank **1** through primary coil end **50** which is a very strong discharge, charging capacitor bank **54** as wire **53** is now disconnected from wire **32**. This, in turn, causes powerful current flow through primary winding **58**, further charging capacitor bank **54** which then feeds capacitor bank **1** when shaft **44** rotates further, making the system both self-powered and capable of supplying useful electrical power to other equipment.

It should be clearly understood that the use of mercury-vapour converters or cathodic valve diodes as described, are not in any manner indispensable in the system as those devices can be replaced by a suitable arrangement of capacitors which would receive separately, the direct and inverse currents of the secondaries.

When a bell is struck just once, it vibrates many times, passing those vibrations to the air and so, making the sound which we hear. The bigger the bell, the slower the vibrations and the lower the pitch of the note which we hear. The same thing happens when a sharp voltage pulse is applied to a coil of wire as just one pulse causes many vibrations in the coil. Like the bell, the frequency of the vibrations depends on the structure of the coil and not on how it is pulsed, although, like a bell, a sharp pulse for a coil or a sharp blow for a bell, produces a greater effect.

You will notice here that Carlos uses the resonant ‘ringing’ of an air-core coil to get an energy gain which is then used as positive feedback to further charge a capacitor bank. A single sharp pulse generated by one spark, causes a large number of coil oscillations, each of which contributes output power, producing an energy gain. The ringing frequency is liable to be around 3 MHz. It is also worth noting that with this design, electricity generation can be achieved without any battery and just the manual turning of a Wimshurst electrostatic generator and the initial operation of the commutator shaft **44**.

Carlos also produced another design, this time working with batteries (although he tended to think in terms of 60-volt battery banks rather than 12-volt batteries) and his patent includes what we tend to call “the Tesla Switch” nowadays. However, instead of switching it rapidly, Carlos uses a switching time interval of one hour. The lower voltage overcomes the need for the switching contacts to be submerged in oil. The problem with lead-acid batteries is that they are only 50% efficient. In practical terms, you only get out of a charged battery half of the current fed into it when it is being charged. So, if you just switch four batteries and power a load that way, the batteries will definitely discharge. In the case of the Electrodyne Inc. staff, they used fast switching and interconnecting diodes which break down when reverse-biased, passing a sharp voltage spike to the batteries at a rate of perhaps, 400 times per second. Benitez, working before electronic components were readily available, chose to use the standard technology of his day - an induction coil which produces at least 10 pulses per second, and through a step-up transformer winding on the induction coil, feeds power to both the load and the drive battery, using an arrangement like this:



Carlos Benitez Patent GB 14,311 17th August 1916

System for the Generation of Electric Currents

I, Carlos F. Benitez, Civil Engineer, 141 Ocampo Street, Guadalajara, Mexico, do hereby declare the nature of this invention:

The invention which forms the object of this Patent of Addition, relates to new improvements in the system for the generation of electric currents, described in the main patent No. 17,811 and in the patent of addition No. 5591, filed 14th April 1915.

The system may be still further simplified and improved by the addition of batteries, which, suitably adjusted in conjunction with system previously described, can be charged and discharged alternately, producing an excess of electrical energy which can be used in any desired manner.

In other words, in this arrangement, I use in combination: two batteries connected in series and two batteries connected in parallel, these pairs being used so that the discharge of one pair is used to charge the other pair, and *vice versa*.

Another object of this new arrangement is to allow the use of low voltages, small capacity capacitors and additional facilities for starting the system.

The advantages of such an improvement will be better understood by considering the following drawing which illustrates one method of carrying out the invention: