Tesla's Zero Point Energy

Will it Allow the World to go off the Grid?

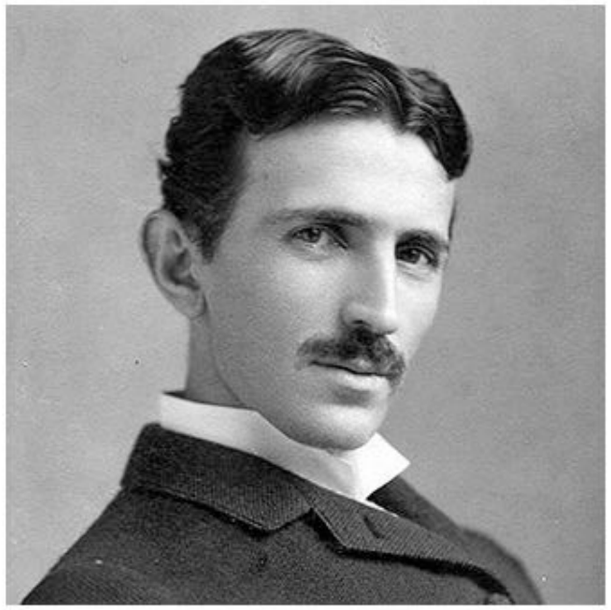
By William G. Hawkins. Ph.D.

Nicola Tesla's Early Years

- Born 10 July 1856 in Smiljan, Austria-Hungarian Empire (modern-day Croatia)
- His father was a Greek Orthodox priest, and his mother was a very bright woman who had an eidetic memory and who had a reputation for helping the other villagers with new technology like appliances and radios and electricity. These were already wending their way through central Europe. Not so much for autos.

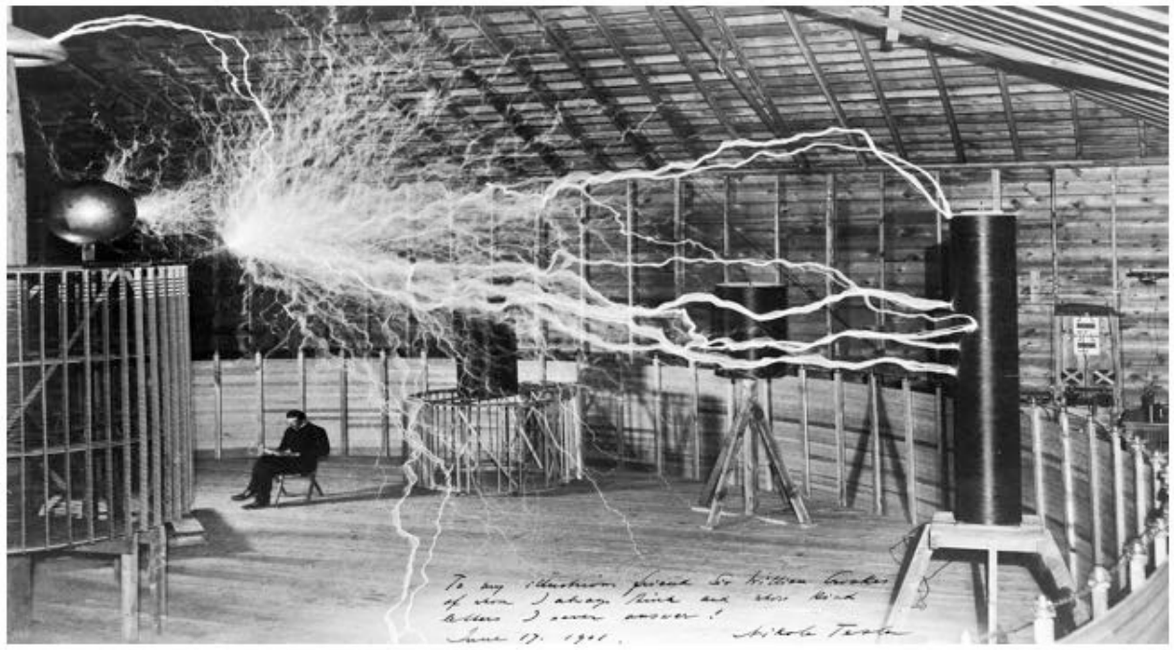
- He was very academically talented and was selected to attend the Polytechnic Institute in Graz, Austria, and the University of Prague.
- He worked for the Central Telephone Exchange in Budapest. There, he got the idea for an AC current motor and generator.
- Failing to find much interest in his invention, he emigrated to the USA in 1884 with nothing but the clothes on his back and a letter of introduction to Thomas Edison.

The Future’s So Bright (I gotta wear shades)



But he loved the cosmopolitan life and he enjoyed living in the Waldorf Astoria Hotel in Manhattan. The slide title is also the title of a song by Timbuk3 that was a hit in the early 1980’s.

Tesla in his Lab



Tesla was a bit eccentric and was considered by some to be the quintessential “mad scientist”. He also possessed super-keen hearing and could hear someone writing three rooms away. He also had an aversion to perfumes and colognes, so he tried to avoid social gatherings. He also hated jewelry, especially pearls. He was also a compulsive hand washer and had a phobia about germs. Nicolai probably was an aspie (aspburger’s syndrome).

What is meant by "Zero-Point Energy?"

- One meaning is that it is just the ground state energy of a harmonic oscillator. The vacuum is thought to be composed of particle-antiparticle pairs that come into existence and annihilate each other so rapidly that they cannot be detected.
- But the ionosphere is more than that. And there also are the Van Allen Radiation Belts...

6

there is no consensus on the energy contained in the vacuum. Estimates range from impossibly small (10E-12 joules per cubic meter) based on General Relativity and the Cosmological constant to impossibly large (10E113 joules per cubic meter) based on the physics of the small and the Planck temperature.

The ionosphere consists of two bands of charged particles. The inner band consists of positively protons or molecules that have lost an electron. The outer band, or belt, consists of very energetic electrons. They are traveling so close to the speed of light that their energy and mass are nearly infinite. This phenomenon is called *Relativistic Boost.*

Newtonian physics indicates that there is *no energy* in the vacuum, or rather that the energy level is relative and has no definite value.

Another Definition of Zero-Point Energy...Lenz' Law

- Charged particles moving with a velocity relative to the lab's inertial frame can be "steered" by magnetic fields in the laboratory frame of reference.
- The magnetic fields do no work on the charge because the force is applied perpendicular to the direction of travel of the charge.
- Thus we can at least convert linear momentum to angular momentum and vice-versa.
- For the math freaks, Lenz' Law states that the force **F** on a charged *q* and mass *m* moving at velocity ***v*** is

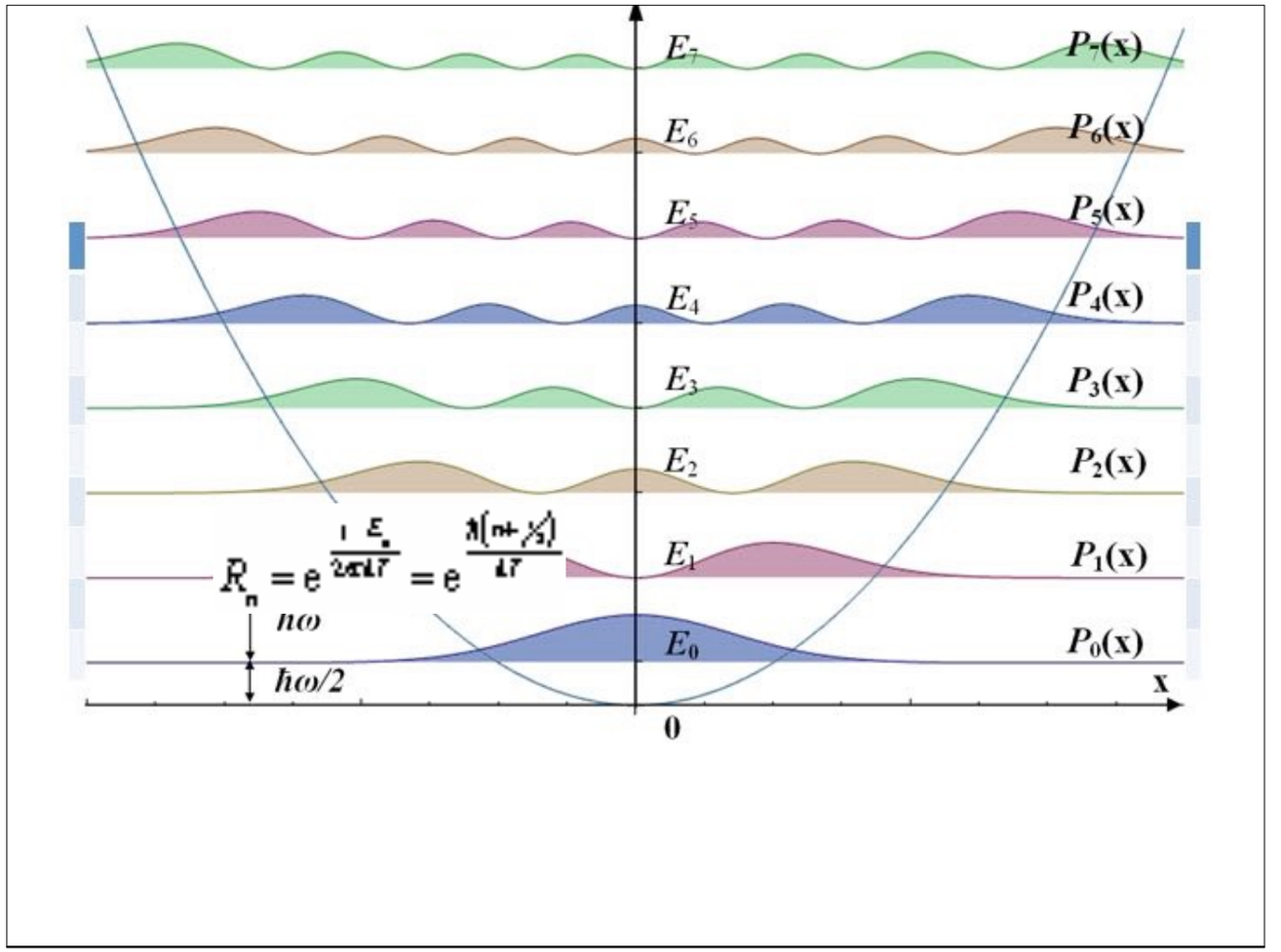
$$\mathbf{F} = q\left(\mathbf{E} + \mathbf{v} \times \mathbf{B}\right)$$

7

The effect of a magnetic field on a moving charge is analogous to gyroscopic forces in Newtonian physics. The charge reacts as if a torque were applied to it. That is the contribution of the *q***v** x **B** term. The *q***E** term is the divergent force that is analogous to the attraction of gravity, except that the direction of the force (repulsion or attraction) depends on the sign of the charge *q.*

See the link https://images.search.yahoo.com/yhs/search;_ylt=A0LEV7qifLJWfFIAepEPxQt.;_ylu=X3oDMTByMjB0aG5zBGNvbG8DYmYxBHBvcwMxBHZ0aWQDBHNlYwNzYw--?p=Lorentz+Force&fr=yhs-adk-adk_sbnt&hspart=adk&hsimp=yhs-adk_sbnt

for more information about Lenz's Law.



In Quantum Mechanics, the charged particle, usually an electron in free space, makes discrete jumps in energy level. This slide depicts the allowable states of the harmonic oscillator. Classically, the ground state E_0 should be zero. But in QM the ground state contains some energy. Some refer to the ground state as the zero-point energy of the harmonic oscillator. Recall that Max Planck had solved the black-body radiation paradox of classical physics by fitting a model that consisted of evenly spaced discrete energy levels $E = nh,\ n = 1,2,\ldots,$ where h is Planck's constant. The integer n is the wave number (number of wave crests per unit length).

Pre-quantum physics required a continuous distribution of energies, and the result was the prominent failure of 19th century physics known as the *Ultraviolet Catastrophe.* Planck's use of discrete energy levels for measuring energy versus wave number was first thought to have been a computational trick. Later, in the 1920's Werner Heisenberg created the first version of QM called Matrix Mechanics. It can be mastered by an intelligent high school student who is adept at matrix algebra with complex numbers. He was able to solve the quantum mechanical oscillator problem and he found that energy states did indeed differ by integer multiples of h except that the ground state had a "zero-point" energy of $E_0 = (1/2)h.$ So Planck had to modify his energy spectrum a little:

$$R_n = exp(E_n/(kT)),\ n = 0,1,2,\ldots\ ,$$

where k is Boltzman's constant, and T is the temperature in degrees Kelvin: Kelvin = Centigrade + 273 deg.

These are the Schumann resonances caused by lightning in the lower atmosphere. The fundamental frequency of these resonances is about 7.83 Hz (cycles per second). This is also the fundamental frequency of alpha waves of the human brain. These alpha waves indicate a relaxed but alert mental state. I give the name to this electromagnetic frequency the “speed of life” since this is the “clockrate” of the human CPU.

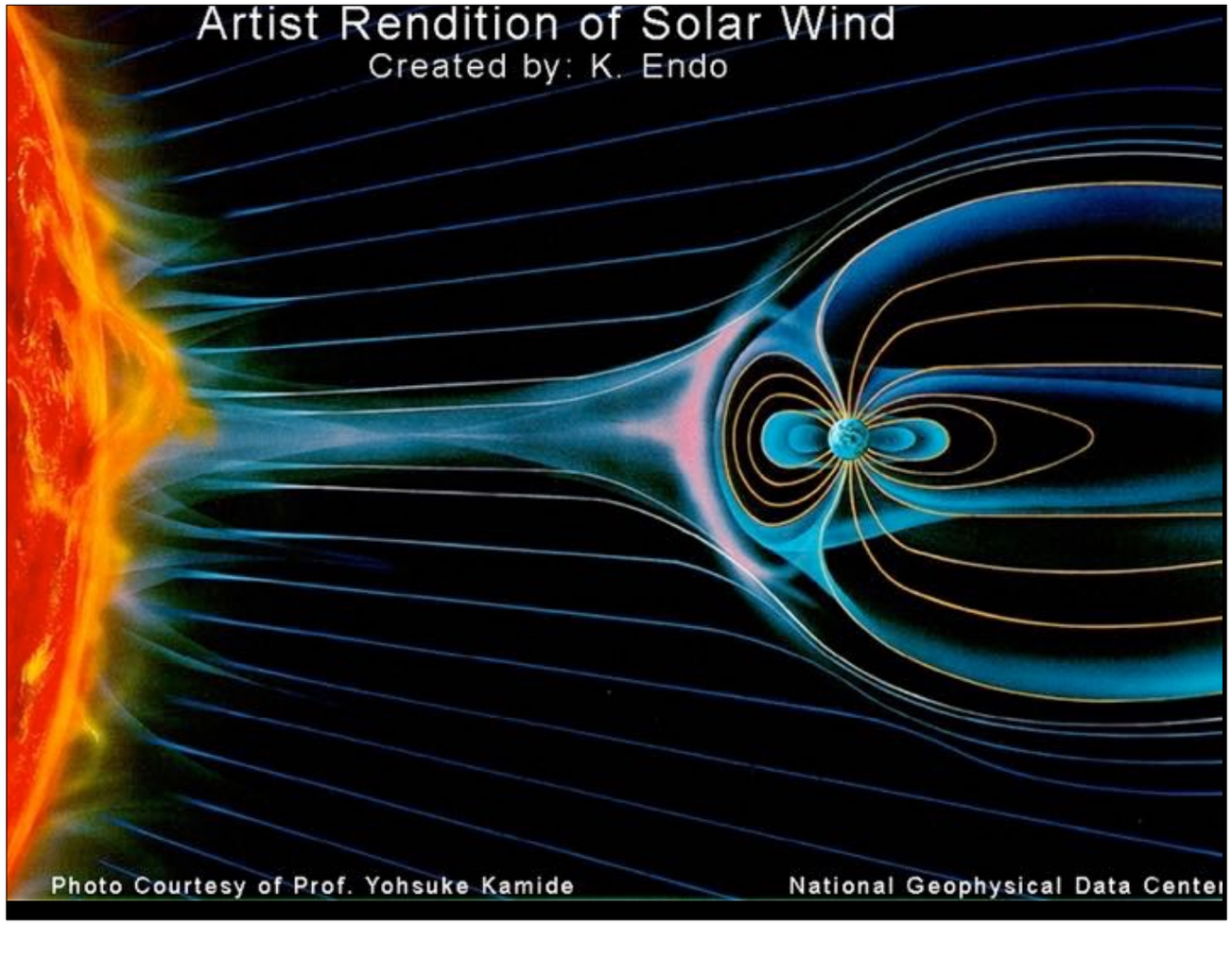
Speed of LIfe = 7.83 cycles per second.

The wavelength corresponding to this frequency is approximately 38,000km, which is close to the circumference of the earth.

From: The NASA/Goddard Space Flight Center/Conceptual Image Lab.

To see the animation, go to this link:

https://upload.wikimedia.org/wikipedia/commons/6/67/Schumann_resonance_animation.ogv



The Ionosphere is just a small part of a much larger phenomenon, the Solar Wind and its interaction with the Earth’s magnetic field to produce the Van Allen radiation belts. At about 200km from the surface of the Earth, the energy flux from the Sun is about 1kW per square me

Infinite Energy from "Relativistic Boost"

All of the electrically charged particles buzzing about in the Ionosphere, on average move at about 1/3 the speed of light. This means that there are some particles that are traveling close to the speed of light. Special Relativity tells us that as a particle approaches the speed of light, its energy becomes infinite. For you math freaks out there, the energy *E* for a particle of mass *m* with speed v is

$$E = \frac{mc^2}{\sqrt{1 - \frac{v^2}{c^2}}}$$

When $v = 0$, we obtain "Emck" {from the film "Young Einstein"} or *E = mass * speed of light squared*. As *v* approaches *c,* the speed of light, the energy becomes infinite. When we consider all of the charged particles in the plasma constituting the Van Allen Radiation Belts, there could be considerable energy in the form of relativistic boost that we have not accurately accounted for. There are many so-called hyper-relativistic electrons in the Van Allen Belts. These are electrons traveling close to the speed of light.

It's not your grandfather's ionosphere

- To understand how energy from the sun is transferred to the ionosphere and Van Allen radiation belts, we need to understand a new type of plasma.
- The ionosphere is a low temperature, low density plasma several thousand kilometers in size that have a supply of charged energetic particles.

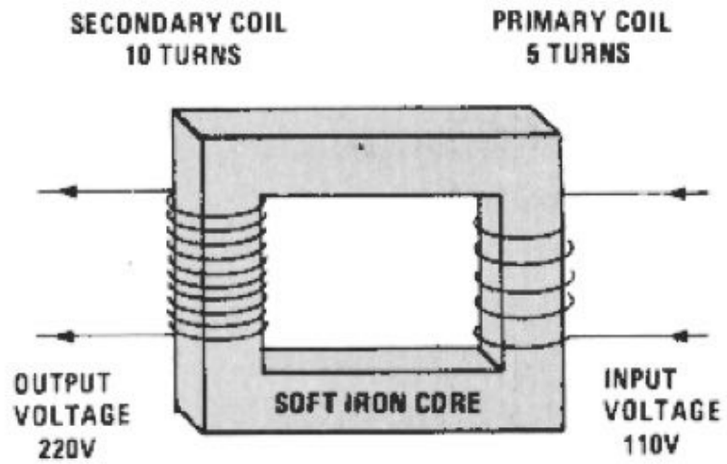
There are skeptics who think we fully understand these plasmas. In fact, Nicola Tesla has many critics. However, he never redacted any of his claims, including the one of providing unlimited free energy from the ionosphere. He also claimed to have invented a death ray and an energy shield to protect a city like the "shields" of Star Trek fame. Another anecdotal claim never fully verified was that the Wardencliffe tower was able to power light bulbs 26 miles away from the tower. He had over 300 patents internationally, and about 100 U. S. Patents but very few publications. It is said that most of his inventions were lost. There were two fires, the first in Colorado Springs and another later at his Manhattan lab when he was building the Wardencliffe tower. The Manhattan fire totally destroyed his lab, and personally devastated him. There were no victims or injuries. Eye witnesses describe the smell of accelerant at the scene. it was officially ruled arson, but the perpetrators were never captured nor were there even any credible suspects. He returned to Croatia for many years.

The extraction of free unlimited energy had no viable business plan. When financier J. P. Morgan asked Tesla how he would meter the power from Wardencliffe, Tesla told him it could not be metered. Without any way to make money from the project, Morgan pulled his financial support for Wardencliffe just as it was ready for its first major test, that of powering ships at sea. The tests were never attempted, and the tower was eventually torn down.

It is true that no one has tried to "weaponize" these plasmas because they seem to be very poor candidates. Their average energy density seems to be too low. However, if someone succeeds in making a standalone ionospheric "substation" practicable, then someone else will weaponize it. A similar thing happened with the invention of GPS, or the Global Positioning System. GPS was thought to be blue-sky because it was based on experimental confirmation of esoteric predictions of General Relativity. Satellite orbits were used to measure time dilation caused by relative velocity and gravitational fields.

Once these predictions were confirmed, a GPS system was built out in the mid 1970's. It was justified as a defensive system, because it could help minimize the 'fog of war' by updating in real time the position and velocity of all military assets globally. However, GPS was immediately expropriated by the CIA for black-ops in Central America and elsewhere.

Conventional transformer



Energy In = Energy Out (Conservation of Energy Axiom)

Volts*Current*phase (in) = Volts*Current*phase (out)

Ratio of Turns = (No. of Windings in the Secondary Coil)/(No. of windings in the Primary Coil)

Volts Out = (Volts in) * ratio of turns

Current Out = (Current in) / ratio of turns

This is a conventional A.C. transformer. If the core is soft iron and the input is (forced) alternating current, magnetic polarity will oscillate to line up with the direction of the magnetic field in the solenoid and the device will transform voltage and current as the ratio of the number of windings, as given the the equation above. The iron acts as a powerful amplifier of the magnetic field. This type of transformer is used in power transmission in an alternating current system.

The Soft Iron core of the conventional transformer

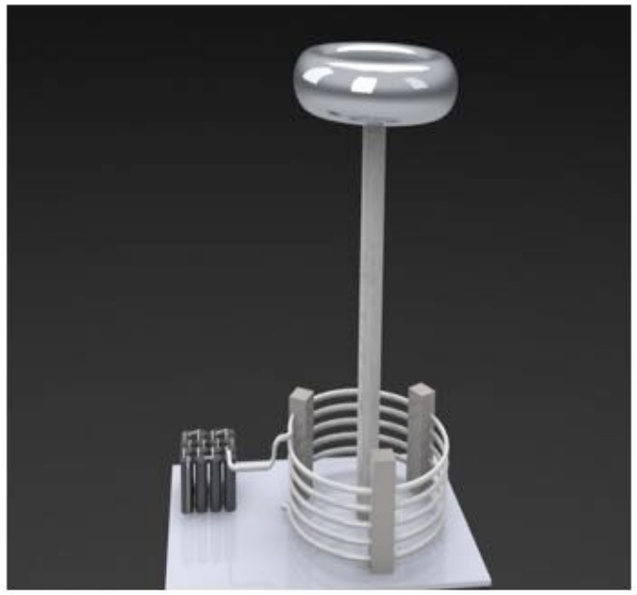
- Ratio of turns as with iron core transformers: For low frequency, stepping up or stepping down of voltage or current.
- A solenoid generates a magnetic field on its own due to Faraday's law of induction.
- The iron core served the purpose of greatly increasing the magnetic field of the solenoid.
- Tesla also experimented with air-coil transformers that have no iron core.

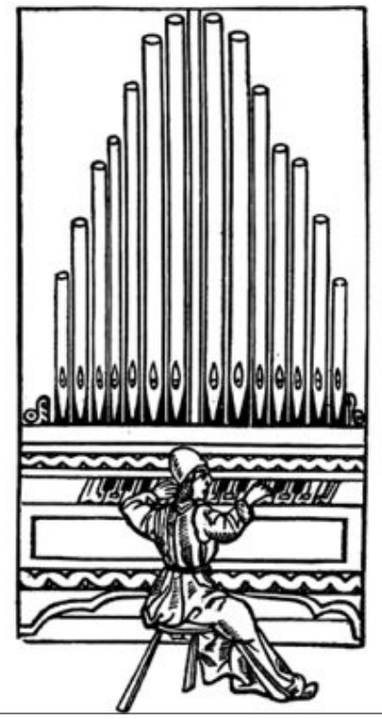
Faraday's Law says that circular loops of current generate a magnetic field perpendicular to the plane of the loop. The magnetic field is North or South depending on the direction of the current flow (clockwise or counter-clockwise).

Tesla Transformers vs. Conventional Transformers

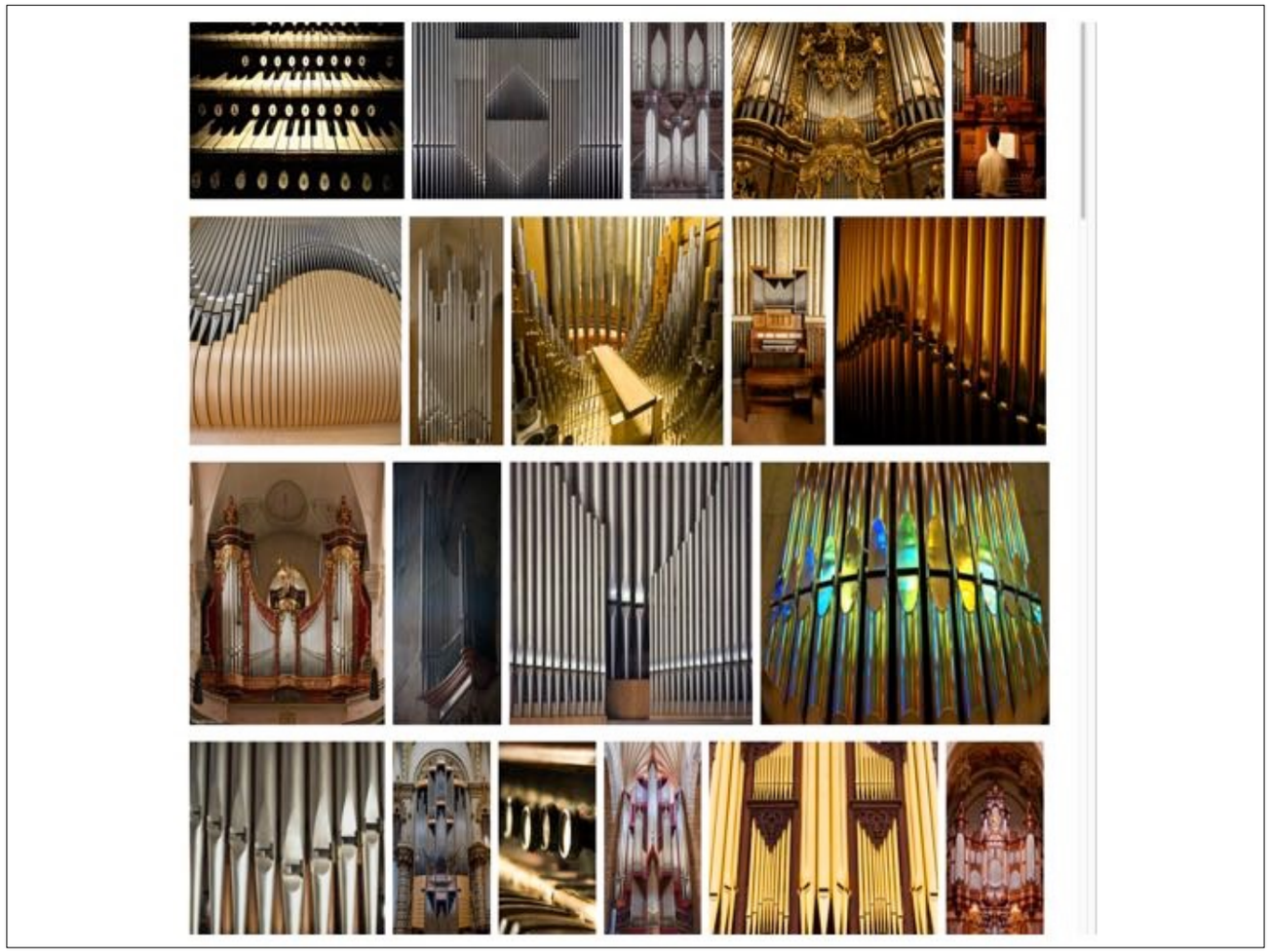
- The removal of the usual iron core meant that different plasma dynamics came into play.
- It was not possible to observe this behavior with iron cores.
- It was like having organ pipes to the universe.

Tesla Coil – an “Organ Pipe” to the Cosmos

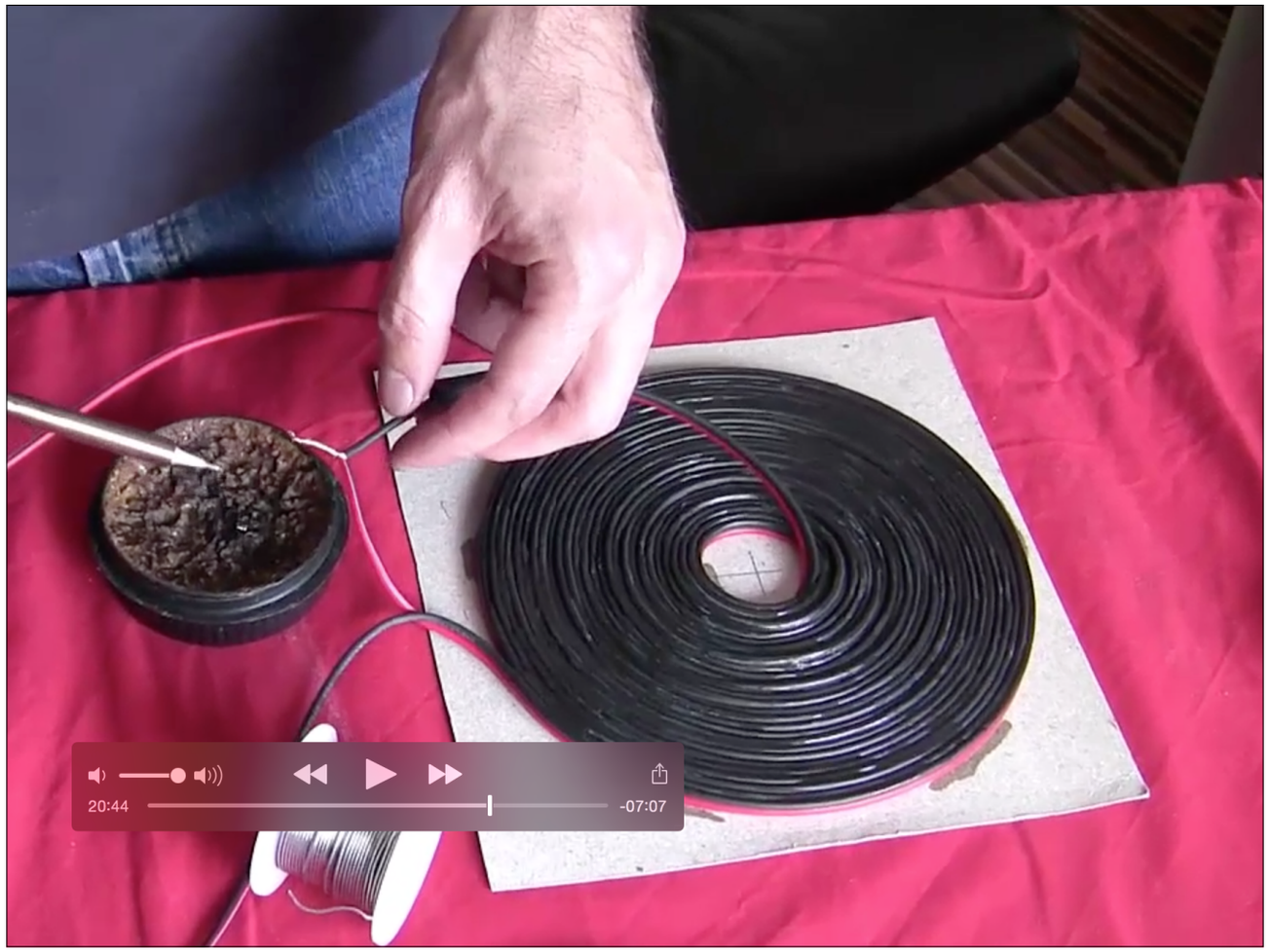




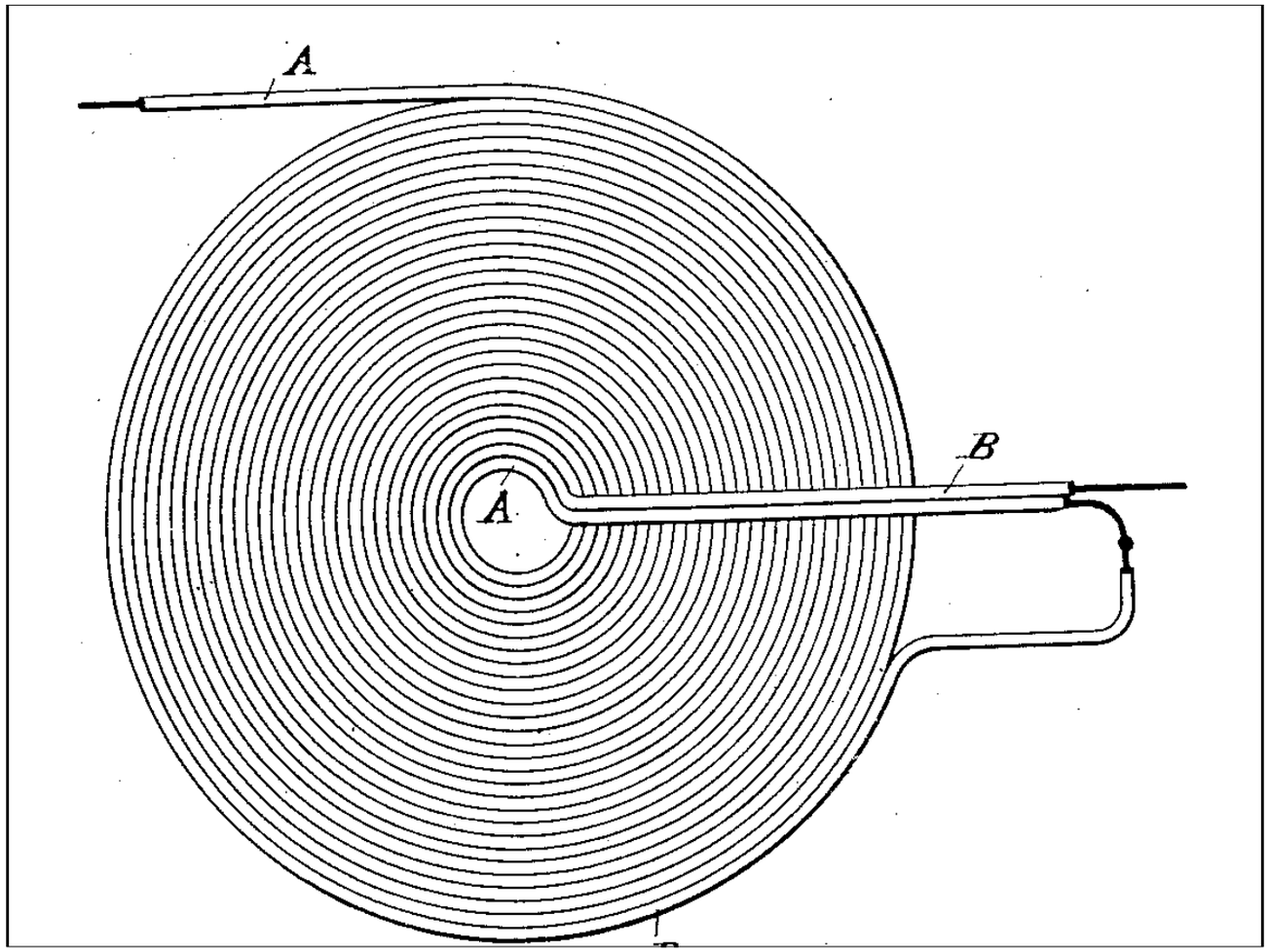
The output frequency of an air coil transformer depends on the length of the secondary coil, NOT the input frequency of the charging system. In this sense, it is like a wave guide. The typical pancake coil is a two-wire design, with the current and voltage amplitudes locked together. This frequency will be determined by the area of the coil, not a windings ratio.



INTERMISSION



The typical pancake coil is a two-wire two phase design with both phases running in parallel. Its frequency is proportional to the area of the pancake coil. This pancake coil is made from two-wire lamp cord and crazy glue.



A schematic of a pancake coil. Very simple, very elegant.

. 685,957. Patented Nov. 5,

N. TESLA.

APPARATUS FOR THE UTILIZATION OF RADIANT ENERGY.

(Application filed Mar. 21, 1901.)

Model.)

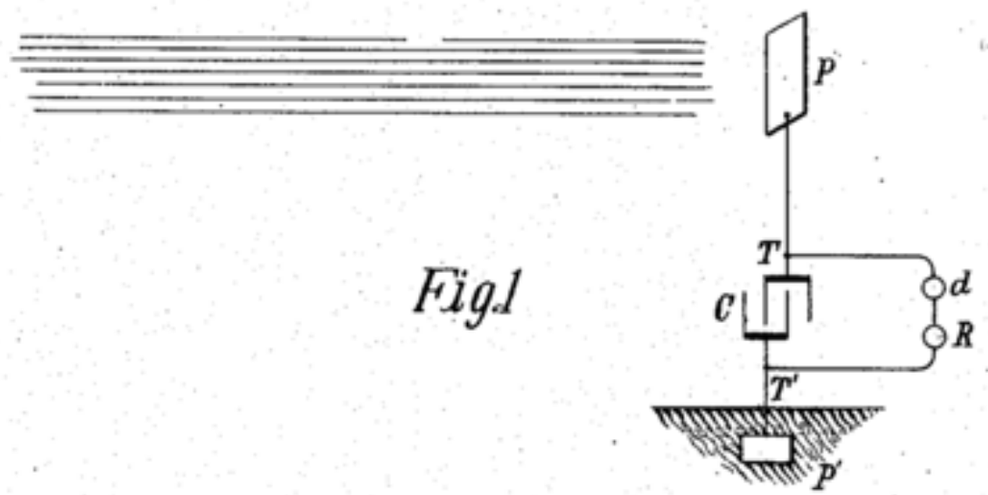


Fig.1

This is the first figure in the patent. *P* and *P'* are copper plates of the same size One is aimed toward the source of radiant energy (the Sun) and the other is buried in the ground. A capacitor is placed at *C*. A spark gap is played at *d* and *R* is a nominal resistance to limit current surge. Tesla described the antenna as a source of positive particles and the ground as an infinite source of negative particles. Positive charges from the antenna fill the capacitor and the voltage across the capacitor gradually increases. When the voltage reaches a threshold level an arc appears across the spark gap and all of the charges in *C* drains to the ground. Then the process starts over. We now know that Tesla's positive electricity consists of positive charge carriers created by the photoelectric effect. If the radiation contains photons for which the energy exceeds the work function of the copper, electrons will be liberated from the surface, leaving positive charges (holes) to charge the capacitor. This device is generally not practicable because little voltage is generated, and the copper is likely to corrode in air, losing its conductive properties very rapidly. Nicolai Tesla was issued this patent on Nov. 1, 1901. He did this work well before A. Einstein's 1905 article that explained the photoelectric effect. Such were Tesla's intuitive powers.

Another device based on the Radiant Energy Patent 685957

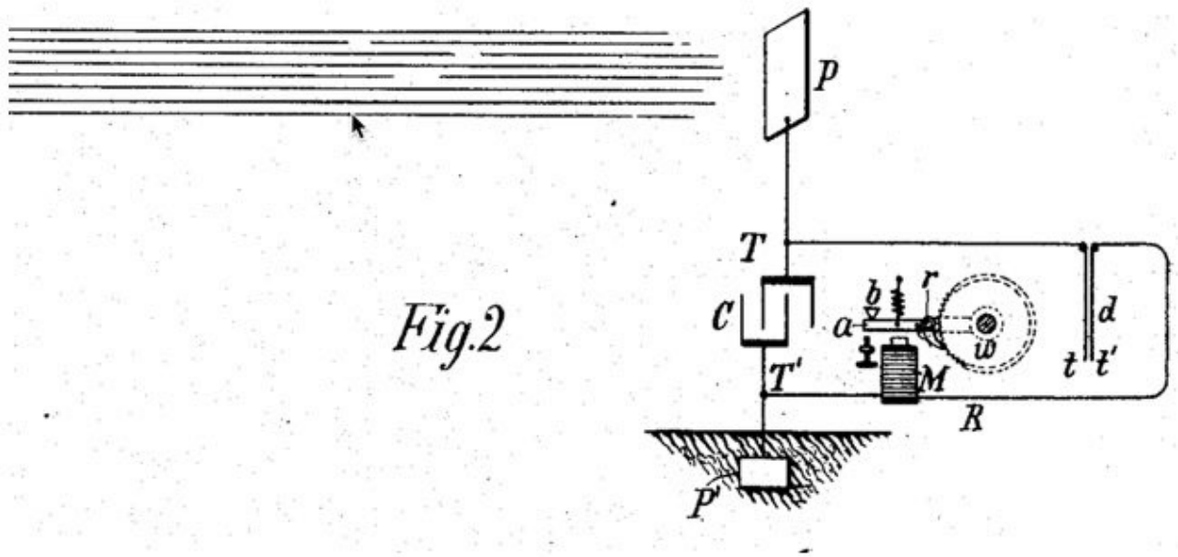


Fig.2

Here the spark gap at *d* is replaced by a reed switch with two leaves *t* and *t'*. As the voltage builds at *C*, the two leaves are drawn together until they make contact. Then a current flows through the electromagnet *M* causing an iron bar *b* to move down and ratchet arm *r* to move a cogwheel ω.

Tesla's Accomplishments

- Over 300 Patents worldwide, 110 U. S. Patents.
- He invented the 3-phase electrical power system still in use today.
- He invented the A. C. induction motor and generator. Both were highly efficient.
- He invented a bladeless turbine.

A more accurate picture is that several people were working on these concepts. The Westinghouse Corp. used Richard Dean Adam's patent for three phase current at Niagara Falls.

Tesla, Marconi, and the Invention of the Radio

- Marconi worked as an intern in Tesla's NYC lab and Tesla freely shared his ideas with him. Marconi basically stole the invention from Tesla. He applied for a patent when he returned to England.
- Marconi won the Nobel Prize in 1911. Tesla was furious.
- Tesla started a legal battle that lasted for years and he eventually won substantively on 15 of 16 claims. No one today disputes Tesla's priority.

On the other hand, money was no concern to Tesla. Westinghouse bought and used Tesla's patent for the induction motor. For each horsepower of an induction motor that Westinghouse sold, Tesla was to receive a royalty of $2.50. Before or during the panic of 1904, Tesla, hearing that the Westinghouse company was in dire straits, voluntarily relinquished the royalty. If he had not, the sum of money forthcoming would have been over a trillion dollars. In 1897, Tesla received a patent for a radio transceiver that was so powerful and sensitive that it was not surpassed until the 1950's with a device that required vacuum tubes for current amplification. Tesla's device was called a "coherer".