FREEENERGY GENERATION

THANK YOU for allowing us to offer you the perfect solution for a free energy lifestyle. Your choices are valuable to us and your care for the environment can only bring us Joy. We appreciate your trust in our product and we are confident that you will be more than satisfied. In the next few moments we will introduce you to one of the greatest scientists in history and guide you into building your own Tesla Generator which will change your life forever.

The Tesla Secret Team

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Introduction

Energy in our lives

In the modern world, energy is needed for almost everything. It's almost impossible to imagine life without electric lights, without televisions, cell phones, laptop and desktop computers and more. Energy is consumed by almost every device that makes your life easier and more comfortable. It is also needed by lifesaving devices, such as heart defibrillators, nebulizers and an uncountable host of other things.

Energy is most often used in the context of energy resources, their development, consumption, depletion, and conservation. Since economic activities such as manufacturing and transportation can be energy intensive, energy efficiency, energy dependence, energy security and price are key concerns.

In short, without energy, modern life would be impossible. However, all of that energy comes at a cost. The environment pays dearly for our energy generation, as do the animals and plants that share this world with us. In addition, energy generation comes at a financial cost to you - constantly mounting electric bills are another hallmark of the "modern age."

What if there was a way to offset those costs?

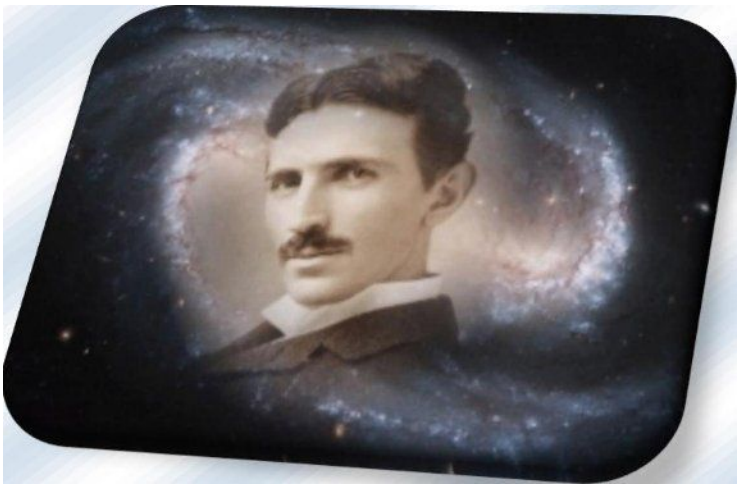
What if there was a source of free energy?

The words "free energy" have been bandied about so much in recent years that you have every right to look at the subject with some skepticism. However, the fact remains that, thanks to one man's amazing contributions to science and technology, free energy can be a reality for you.

Who was this man?

What indention might give you the ability to generate energy at no cost?

The man was NIKOLA TESLA - a name synonymous with electricity, innovation and, yes, eccentricity. His invention, the Tesla generator, has the potential to offer you limitless free energy. This book will explore the subject of free energy at some length, giving you an in-depth look at the device, how it works, and how you might be able to implement it within your home and lifestyle. You will also learn more about the man behind the technology, dispelling some of the myths that have grown up surrounding this inventor and innovator.



Chapter 1

The Increasing Need for Energy Conservation

Before we delve into the character and inventions of Nikola Tesla, a few things need to be said about the importance and increasing need for energy conservation. While this is certainly a hot topic in today's modern world, many people are not fully aware of just how dire the situation truly is. In this chapter, you will learn a bit more about energy conservation, and why it is so important.

What Is Energy Conservation?

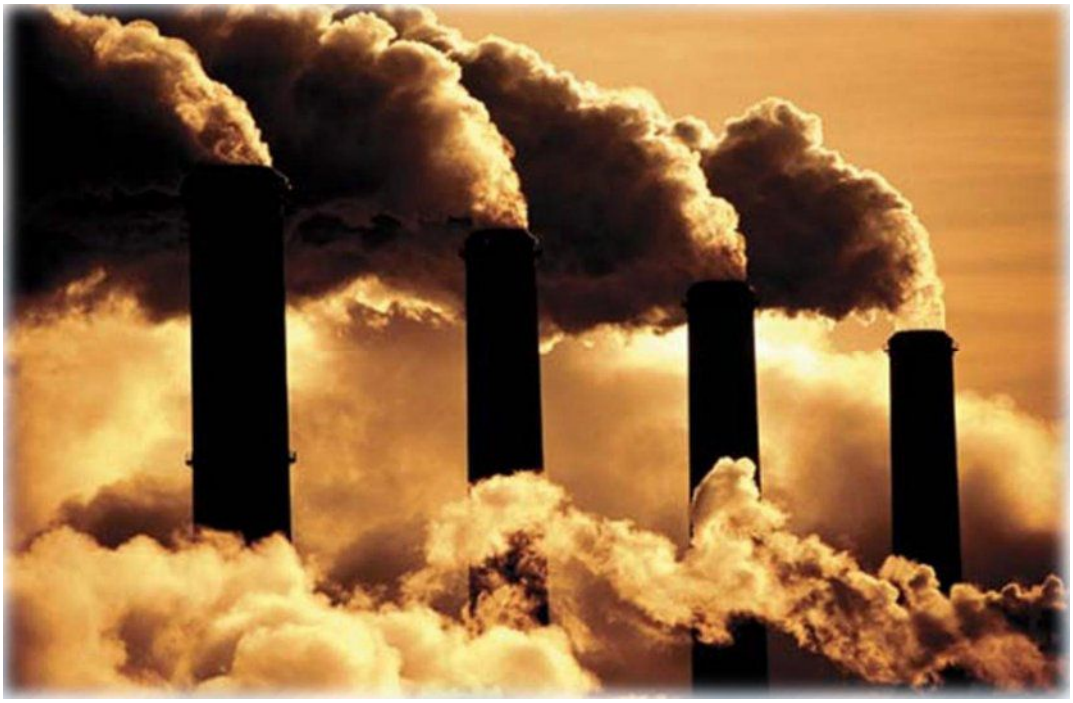
Conserving energy can be defined as anything that reduces the amount of electricity produced through traditional methods and used by consumers or businesses. The "standard" means of producing electricity are harmful to the environment, use short-lived natural resources that are not replenished and come at a high cost to humankind. There are several ways in which electricity is generated in the modern world.

- Burning fossil fuels, such as coal, petroleum or natural gas
- Hydroelectric generation systems that harness the power of moving water
- Nuclear reactors that create electricity by splitting the atom

Each of these has a considerable number of drawbacks that affect the environment, the quality of life for human beings, and even the sustainability of the technology itself. Below, you will find a few of these drawbacks to help highlight the need for energy conservation.

Burning Fossil Fuels

A wide range of different fossil fuels can be burned in the process of creating electricity. COAL is one of the most common fuels used, though natural gas and petroleum are also used. There are two main problems with these systems. The first problem is the fact that burning these fuels creates an immense amount of pollution. In addition, the harvesting methods used to obtain these fuels from the earth are harmful in and of themselves.



Besides, these are nonrenewable natural resources. The earth possesses only a finite amount of coal, oil and natural gas. When those sources are gone, it will be millions of years before there are any more available. This means that any method of generating electricity that relies on these methods cannot be sustained indefinitely.

Many people surmise that this is not truly an issue. After all, there should be enough fossil fuels left in the earth that their depletion will be a problem for some future generation, not for the here and now.

However, this is misleading. In fact, many scientists are beginning to suspect that we will run out of these resources within the next few decades. That means that many of the people living right now will see the end of these resources.

Hydroelectric Energy Generation

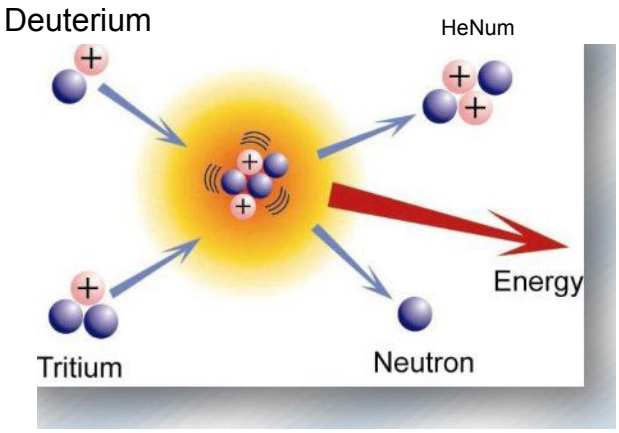
Hydroelectric generation practices rely on the power of moving water to turn turbines. This mechanical energy is then turned into electricity. In addition, these are billed as "renewable" sources of energy, because the water is not consumed during energy production, the way fossil fuels are. In addition, they produce no pollution the way that other generation methods do. However, this can be a bit misleading.

While hydroelectric generation systems certainly produce less harmful emissions, and do not pollute the environment, they do have a decidedly negative impact on the ecosystems that surround them. In order for a hydroelectric installation to be truly useful, it must be large. This means damming rivers. While damming a river can provide valuable watershed areas behind the installation, it also destroys the ecology that was present in the area before construction.

In addition, the presence of a damn has a distinct effect on the ecology downriver, as well. With the dam in place, vital sediments, nutrients and even animal populations are no longer able to move down the river. This affects animals, plant life, water levels and even the quality of the soil throughout the remainder of the river's course.

Nuclear Power Generation

Nuclear power has been billed as some of the cleanest technology in the world. Proponents of these solutions claim that the only byproduct of nuclear power generation worth noting is steam. However, this is very misleading. The process of creating electricity through nuclear generation creates some very frightening problems, which will last for generations to come.

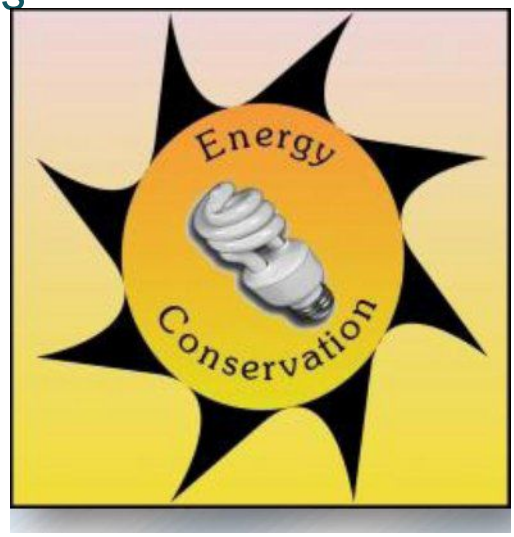


One inescapable fact with nuclear power is that it produces toxic waste. Spent fuel rods, radioactivity and the enormous potential for disaster all loom large here. One needs only recall Three Mile Island or Chernobyl to understand the implications here.

Nuclear power does offer an alternative to burning fossil fuels or remaking the landscape to use the power of water. However, it is not necessarily a viable solution. Spent fuel rods alone take many lifetimes to "cool down" to levels where they are not toxic to life.

Viable alternatives still need to be found.

Energy Conservation Reduces Power Consumption



Energy conservation is an essential consideration for anyone living in the modern world. The more energy that can be conserved or produced through alternative, renewable methods, the lower the load placed on traditional electricity generation stations.

This means that the more energy that is conserved or created through an alternate method, the less coal, petroleum or oil needs to be burned. The more energy that is conserved, the less need there is for new hydroelectric installations or new nuclear reactors.

Energy must be conserved, and new sources of energy generation brought online as quickly as possible. Of course, there are several alternative sources of energy currently available to consumers.

Alternative Energy Production and Energy Conservation

Several alternative options exist for those who want to conserve as much energy as possible, or even produce enough electricity to remove themselves from the equation completely. Most of these technologies have been around for a number of years, though they have been refined considerably during that time. These sources include:

- Solar power generation
- Wind power generation
- Geothermal power generation
- Ocean wave power generation

Solar Power

Solar solutions have been around for decades. However, they gained a reputation early on for high cost and low efficiency. New methods of design and manufacturing have allowed modern solar panels to be both more affordable and more efficient, though. This means that homeowners can more easily harness the power of the sun and transform that into energy for their home.

However, the problem here is that not all geographic areas are good options for solar energy. Many locales do not receive optimum sunlight throughout the year to make this a feasible choice. Solar power generation can usually be used as a supplement, allowing greater energy conservation, but is not often able to provide a full solution to electricity generation.

Wind Power Generation

Wind power has been in the news quite a bit lately. These solutions use the flow of wind to turn turbines, which then create electricity. Wind is a renewable resource, and there is no pollution from the turbines, other than blocking the view and possibly creating an eyesore. However, the fact that wind power does not create any environmental pollution means that these can be valuable options in the drive for greater energy conservation.

Of course, wind power has its drawbacks as well. Many areas of the world do not have the required wind speeds to produce power on a regular basis. While certain days, weeks or even months might bring gusts of wind that are viable, these are not sustained on a long-term basis. Therefore, wind power is not a good solution for all people, though it can often be used in a supplemental manner, much like solar power.

Geothermal Power Generation

Geothermal power generation relies on the thermal power of the earth. Small installations generally use the constant temperature of the earth to help with home heating and cooling, rather than power generation. Therefore, this should be considered a means of supplementing the electricity needs of a home, rather than a means of providing electricity directly to a home.

Larger installations, however, are able to make use of geothermal features like geysers, mud pots and others to create electricity. These installations rely on water in the underground system, or inject water if none is present. The heat in the earth turns the water to steam, which is then used to turn turbines and create electricity.

Of course, most areas of the globe do not have sufficient geothermal activity for large installations to be viable. Therefore, smaller heating and cooling-related solutions are the most frequently used form of this technology.

Ocean Wave Power Generation

The ocean is an incredible source of energy. This technology harnesses the power of waves and tides to create energy without the need for any fuel at all. Wave generators are capable of creating enormous amounts of electricity, enough to sustain entire communities, rather than just individual homes.

However, wave generation is very expensive, and the technology is rather new. This means that these systems are not as efficient as they might be, nor can the average person afford to install one. Of course, the vast majority of the world does not live in close enough proximity to the ocean for this technology to benefit them anyway.

Another Alternative

As you can see, the need for energy conservation is incredible. While there are numerous alternative energy systems that can be used, few of them are able to provide you with a full solution to your needs. However, there is another alternative available; one that:

- Can offer free energy for your needs
- Can be built on your own

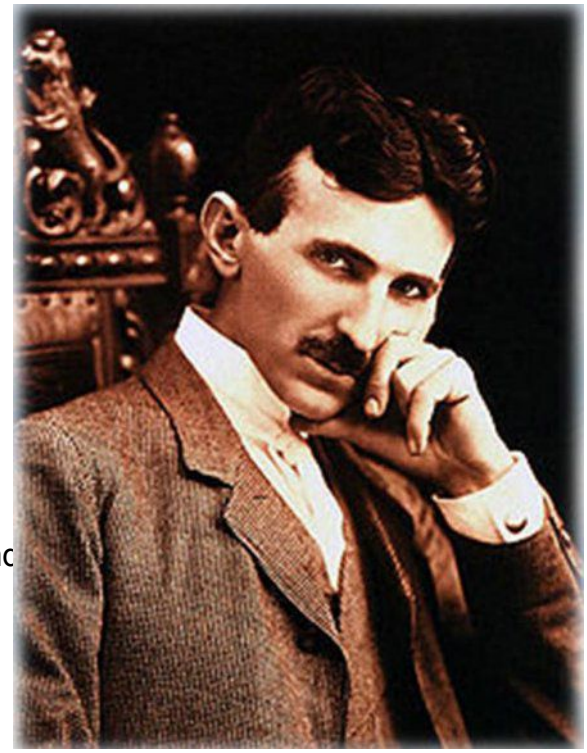
This system relies on the principles discovered by Nikola Tesla during his experiments with electricity. In fact, Tesla had a fully developed system for electricity generation during his lifetime - the proof is in his patents The world has waited decades for this information to be brought to light, after having been buried by Tesla's detractors and the decision of world governments to follow a different path, as dictated by their financial strategies.

During his lifetime, Nikola Tesla was an innovator and inventor, a brilliant mind who thought on a different path from others of his time. Many of his devices and inventions were so spectacular that they were beyond his time. In the next chapter, you will learn more about the life and inventions of one of the world's greatest inventors.

Chapter 2

A Look into the Person of Nikola Tesla

In order to understand the Tesla generator, how it can be used in your life and the benefits it offers, you will need to know a bit more about the man behind the machine - Nikola Tesla.



Who was this man?

Where did he come from?

What were his contributions to modern society?

Tesla's story begins quite some years ago, and far from anywhere that most Americans might recognize.

Tesla - The Formation of Genius

Looking into the life of Tesla is an essential ingredient to understanding his "free energy" generator. The man was born in 1856, in Smiljan, a village on the Croatian Military Frontier of the Austrian Empire. Tesla was born to two ethnic Serbian parents, in what would today be modern Croatia.

At birth, Nikola was the fourth youngest of five children. He had one older brother, Dane, who was killed when Nikola was 5, during an accident while riding a horse. Nikola had three sisters, named Milka, Angelina and Marica.

During his early years, the family moved to Gospic, where Nikola attended Higher Real Gymnasium. He completed a full term of study in just three years, going on to study at the Austrian Polytechnic in Graz.

Tesla, for all his brilliance, did not receive a degree from the university. He actually stopped attending school after the first semester of his third year. This also marked the period when he severed all ties with his family, leaving Graz behind.

His whereabouts during this time were unknown, and many of his friends believed that he had drowned while swimming in a river. In actuality, Tesla had moved to Maribor, which would become Slovenia at a later date. Here, he worked as an assistant engineer.

This portion of Tesla's life was relatively short-lived. He suffered a nervous breakdown during this time, forcing him to quit his job and move once more. Tesla reconnected with his family, and his father convinced him that studying at Charles-Ferdinand University in Prague was the best option. Tesla entered the university, but his father's death soon after forced him to leave again after completing just a single term.

Sickness and Disability

Throughout his life, Tesla was subjected to various illnesses. He was also prone to suffer from "visions" and "bright lights," which may have been the ocular hallucinations that sometimes accompany migraine headaches.

During these episodes, Tesla professed to receive inspiration that supplied him with the answer to a particular problem with which he had been wrestling, or having a fully formed vision in his mind of a particular word or item. Modern synesthetes

suffer similarly.

Beginning in early childhood, Tesla was also subjected to flashbacks of previous events that had happened in his life. This was to go on throughout his life, and figured prominently in his later life and eccentricity.

Further Changes - Life Abroad

After the death of his father and withdrawal from the university, Tesla moved to Budapest. Here, he worked for a telegraph company, and later went on to be involved to a considerable degree with the National Telephone Company, where he became the engineer for the nation's first telephone system. During this time, he invented a device that might have been a loudspeaker, or might have been a telephone repeater/amplifier (sources are unsure).

His stint in Budapest only lasted for two years. In 1882, he moved to France, where he found a job in Paris. The Continental Edison Company was his source of employment, where he worked as a designer, improving equipment based on the ideas of Thomas Edison. He also began working on his rotating magnetic field devices and developed the induction motor at this time, though it was not until 1888 that he received any type of patent.

Tesla's mother died shortly after his arrival in Paris (a death he claimed to have experienced in a dream), and Tesla himself became ill once more and spent several weeks recovering in Gospic, where his mother had been born.

Working with Edison

1884 marked the first time Tesla visited the United States. He arrived in New York City, where he applied to work with Thomas Edison, based on the recommendation of a former employer. He was hired to work in the Edison Machine Works, and the position initially involved electrical engineering.

However, Tesla soon progressed to a position of importance, and was responsible for solving a number of serious problems for the company, including redesigning the direct current generators manufactured by Edison.

This actually saw the start of a deteriorating relationship between Edison and Tesla, as Tesla claimed Edison offered him the equivalent of $1 million dollars (in today's currency; $50,000 by that year's currency) to redesign the direct current generators. After Tesla had done so, Edison is reported to have broken his word, saying, "Tesla, you don't understand our American humor."

Tesla then asked for a raise to $25 per week, but was denied - he resigned from his position immediately.

It was after this that Tesla decided to form his own company. The Tesla Electric Light and Manufacturing Company was born in 1886, though Tesla did not head up the company for very long. His initial investors felt that his plans for an alternating current motor were incorrect and relieved him of his duties within a short time.

He went on to build a brushless alternating current induction motor in 1887. The same year, he developed the principles of the Tesla coil, and embarked on a new job with George Westinghouse Electric & Manufacturing Company in Pittsburgh. His ideas were well received by Westinghouse, as well.

Later that same year, Tesla began experimenting with X-rays, via a device of his own invention. This system differed considerably from those of other inventors and researchers, and he even identified the damage caused by X-rays, which was later attributed to Wilhelm Rontgern.

However, the fact that Tesla did not make his findings widely known contributed to his not being credited with any important discoveries in the field, at least in period writings.

In 1891, Tesla demonstrated another of his inventions, one that would allow the transmission of electricity without the need for conductive wires. This came to be called the Tesla Principle, and has been shown to work very effectively by passing electricity through space and matter, without the need for cumbersome "power lines."

Tesla Becomes an American Citizen

The War of Currents

Nikola Tesla officially became an American citizen (through naturalization) on July 30, 1891. He was 35 years old at the time. The same year, he started another laboratory, located on South Fifth Avenue in New York City. Another laboratory on East Houston Street followed shortly thereafter. Tesla used these two locations to demonstrate how the Tesla Principle worked, lighting two electric lamps (one in each laboratory) without any wires involved.

About this same time, Edison and Westinghouse began what came to be known as the "War of the Currents." Edison was a proponent of DC voltage, while Westinghouse and Tesla preferred the more efficient AC voltage. However, the battle between Westinghouse and Edison left both companies on the brink of ruin and prompted Tesla to release Westinghouse from his contract, eliminating royalty payments for Tesla's work.

After the conclusion of the War of Currents, Tesla actually filed the first radio patent, and showed a radio-controlled boat to the US military only a year later. A public demonstration of a radio-controlled boat took place in 1898, though the technology did little until it reemerged in the 1960s. Tesla also patented a design for what would later become the standard spark plug used in gasoline engines, as well.

The Move to Colorado Springs

In 1899, Tesla moved his base of operations from New York City to Colorado Springs. He felt that the area was better suited to his research in electricity, as well as in wireless telegraphy.

At his new lab, Tesla made some of his most astonishing discoveries and created some of his most unique inventions. For instance, he proved that the earth was a conductor, and that it resonated at about 8 Hz. This was confirmed years later, and named the Schumann Resonance, leaving Tesla's contribution out entirely.

He also experimented more with the Tesla Principle, using wireless light bulbs of his own design to experiment and refine his technology. Ultimately, while his time in the area produced numerous devices and new technology, the lab was closed and torn down.

Tesla's mountain of debt was paid off by selling his equipment. However, this was not the end for Nikola Tesla. He made the move to a new lab and began construction of the Wardenclyffe Tower, with money borrowed from J.P. Morgan.

It was also during this time that Tesla demonstrated his bladeless turbine design, with several of the devices operating at very high RPM (up to 5,000 RPM).

The Wardenclyffe Years

Nikola Tesla lived a life filled with invention and controversy, development and disappointment.

He was simultaneously immensely successful, yet ignored.

No period during his life better embodies this contradiction than the time that he spent at his Wardenclyffe development. This was potentially one of his greatest personal triumphs, yet it ended in failure, to all appearances.

Wardenclyffe was a development by James S. Warden, a successful lawyer and banker. He built a resort community in the area, and planned for Tesla's development to be the hub around which it grew. Warden fully believed that Tesla's World System would be the way of the future, and he granted Tesla 200 acres on which to build his tower.

Tesla began planning the development in 1898, but construction did not actually begin until 1901. Funding was provided by numerous venture capitalists, though the majority of it was provided by J. P. Morgan, to the tune of $150,000, which would add up to more than $3 million in today's terms.

Construction of the facility was sufficiently advanced that Tesla decided to move his laboratory to the site in 1902. He moved all of his equipment from the Houston Street

laboratory to the new site at this time, though the tower itself did not near completion until a year later, in 1903.

However, it was during this same promising period that the inventor met with financial disaster. One of the main purposes of the Wardenclyffe development was to provide wireless transmission of electricity to consumers.

The problem was that J.P. Morgan, the principle financier, learned of a rumor stating that this power could not be metered. Morgan, fearing that there would be no financial gain, pulled his funding.

Of course, he did much more that eventually led to the ruination of the development. He actively discouraged other investors from putting their money into the project. As Morgan was the financial giant of the day, and possessed enormous influence, this worked to dry up Tesla's funding completely.

In addition, the inventor's patents on his A/C generator design expired at the same time. This cut out all funding from royalty payments, further worsening Tesla's financial situation.

In 1906, Tesla laid off most of his workers at the site, though he managed to keep some areas in operation. In 1908, the property was foreclosed. The inventor was able to get a new mortgage on the property through George Boldt, but it was not enough. The property remained empty for several years, before finally being fully transferred to Boldt in 1915.

Newspapers of the day dubbed the Wardenclyffe project "Tesla's million dollar folly," and it seemed to be true enough. However, it was not for a lack of innovation or quality. Rather, it was pure financial concerns that ended this promising era.

Tesla's Final Years

The final years of Nikola Tesla's life were marked by mounting debt, controversy and battles for patent control. The US government reversed their initial decision concerning Tesla's radio patent, giving it to Marconi, instead. This started a lengthy battle between Tesla and Marconi, which Tesla eventually lost.

This also marked the date when the Wardenclyffe Tower property was seized by US marines and demolished (1917), because it was feared the facility could be used by spies of the German government.

During these years, Tesla began experimenting with radar, and actually established the first principles for its operation. However, he is most notorious for the "ray gun" systems that he attempted to sell to world governments during this time. No government entered a bid for such a weapon, so it was never constructed (and its operation thus never assessed).

It was during these later years that the inventor began suffering from what appeared to be obsessive-compulsive disorder. However, at the time, there was no scientific diagnosis, and the condition was simply believed to be a manifestation of insanity. This was bolstered by Tesla's arguments concerning the work of Albert Einstein, calling it "filled with underlying errors."

Tesla died in 1943, of heart failure. He was indebted to a considerable degree, but the US Supreme Court did uphold one of his patents, which became the basis for patented radio technology, at least within the United States. During his life, Nikola Tesla was awarded 111 different patents, and one patent was reissued (Method of Insulating Electric Conductors). He also had patents in Great Britain, in Canada and in Spain.

However, while the man contributed immense amounts to science and technology, it is his theoretical and implied inventions that garner the most interest in the modern day. These were all theorized, planned or claimed to have been built by Tesla.

Thought Camera

Antigravity Aircraft

Free Energy Earthquake

Machine Teleforce

Electric Submarine

Death Ray

Mechanical Oscillator

Force Field

Of course, the free energy device is one of the most important on this list. This device worked based on renewable electricity and heat gathered from the surrounding natural world, rather than creating energy from nothing at all. Many are more familiar with this concept as Tesla's Fuel-less Generator, which incorporated two of his more famous inventions - his bladeless turbine and his radiant energy device.

Chapter 3

Tesla's Inspiration for Radiant Energy Generation

In order to understand Tesla's inventions and how the system actually works, it is important to know how he derived his inspiration.

How did Nikola Tesla arrive at the idea of a radiant energy system?

What spurred his imagination? What factors influenced his thinking?

In this chapter, you will learn more about the "how" and "why" of Tesla's invention.

Tesla's Introduction to Radiant Energy

Interestingly, it was while Tesla was employed by Thomas Edison that he had his first brush with what he would come to call radiant energy. At the time, it was simply referred to as "the blue spike phenomenon."

At this time, Edison's DC generators were the only devices capable of providing electricity to homes and businesses. However, the fact that these generators produced direct current was a problem, though Edison refused to admit this.

Long transmission lines leading to the generators built up an enormous amount of electrical resistance. In order to overcome this, Edison had to build very powerful generators, capable of producing very high voltage. This electricity was then transmitted through the power lines and into the homes and businesses of Edison's customers.

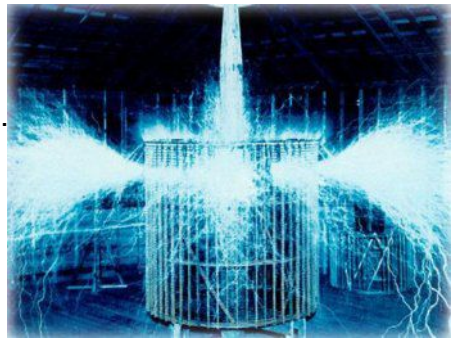
The blue spike phenomenon was noticed when the generators were first switched on. When the switch was thrown to send the electricity from the generator through the power lines, blue electrical spikes were noticed along the power line. This lasted only for an instant - once the resistance of the line was overcome, the spikes disappeared.

If a particularly strong voltage was released from the generator, the phenomenon was much stronger. A strong "stinging" sensation was noticed in the people nearby. In these instances, Tesla occasionally observed the spike jumping from the power line and grounding itself into the earth. If a worker happened to be in the way, the arc would ground through him, killing him immediately.

What Did the Blue Spike Phenomenon Mean?

Tesla was unsure of what caused the blue spike phenomenon, though it greatly piqued his curiosity. He did know that the conclusion others had reached, that electrons caused the phenomenon, was incorrect. In fact, he had a strong suspicion that the phenomenon was related to his current studies on energy.

However, other scientists were more interested in finding a means to stop the phenomenon from occurring than in determining the underlying cause of it. This was achieved by using super insulated switches, which seemed to eliminate the blue spikes and excess energy.



Tesla Begins Experimentation

His curiosity aroused by the blue spike phenomenon, Tesla began experimenting to determine the source. He started by using highly charged capacitors that were discharged in extremely short intervals. These pulses seemed to duplicate the "stinging" sensation noticed with Edison's generators.

Tesla immediately saw the connection between his own experiments and the discharge phenomenon in DC generators, and was able to calculate that the electrical discharge responsible for the stinging sensation and the blue spikes was hundreds of times stronger than the voltage flowing through the power lines. For Tesla, the question was:

Where did the energy come from? What caused it?

Through his ongoing research, he was able to replicate the high voltage Shockwaves at any time. He noted that the sensation happened no matter where he might be in the laboratory - the waves were able to penetrate any substance that might be between him and the capacitor. He decided that he would call this new form radiant energy, as it clearly was not an electromagnetic wave.

The Conclusion of Tesla's Experiments

In addition to conducting his own experiments, Nikola Tesla also searched for corresponding evidence in the experiments of other scientists and innovators. He found a few instances where the results of various experiments mirrored his thinking, but no other person had thought to continue investigating.

In conclusion, he determined that there was a presence of some conductive medium, other than air. He surmised that this medium filled all the space around the earth, pervading everything. In addition, whatever composed this medium had to be smaller than an atom, as it was capable of carrying electricity through solid objects.

Further Experimentation with Radiant Energy

In an attempt to further his understanding of radiant energy, Tesla continued experimenting in various ways. One way in which he did this was the development of a charging dynamo to provide power and a magnetic discharger. However, this resulted in yet another discovery.

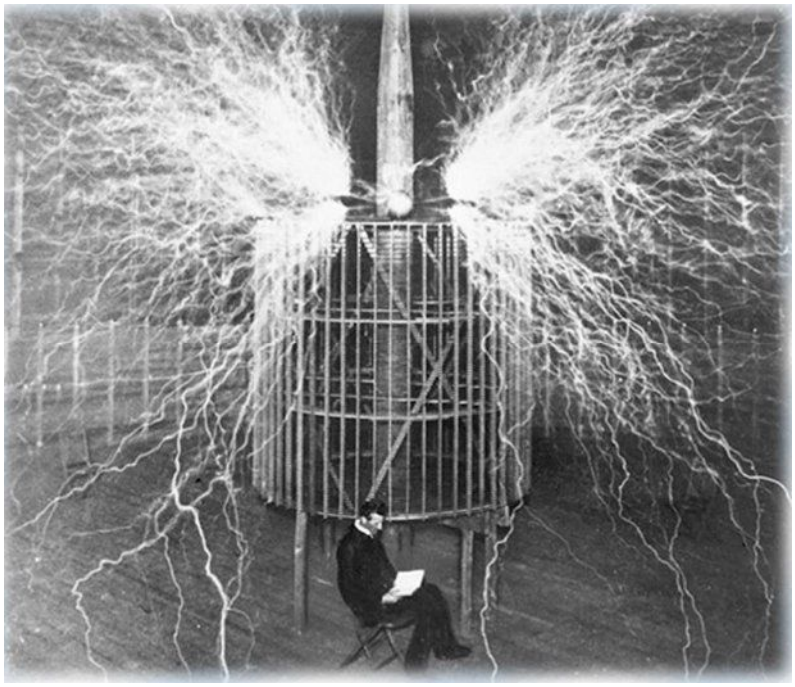
If he placed the magnetic discharger on one side of the dynamo, then the charge was positive. However, if he placed it on the other side of the dynamo, the charge was negative. This showed that the new energy form traveled like a light ray, rather than like an electromagnetic wave.

He also found that a chain of electrical pulses with less than 100 microseconds between bursts caused pain in people, and would also cause mechanical pressure. However, if the duration were reduced to less than 100 microseconds, the pain was eliminated and the force did not exert mechanical pressure. In addition, if the pulse duration was 1 microsecond, heat was produced, and even shorter duration pulses could create white light that would illuminate a room.

However, it was the discovery that a single-turn copper helix coil placed nearby the device would begin emitting sparks that climbed the coil and discharged from the top that most excited the inventor. This was the earliest form of what would eventually become his Tesla coil.

During the course of this experiment, Tesla found that the voltage contained within the coil was far greater than what was being applied to it. This was also interesting because, unlike other structures, the charge did not pass through the coil. Instead, it

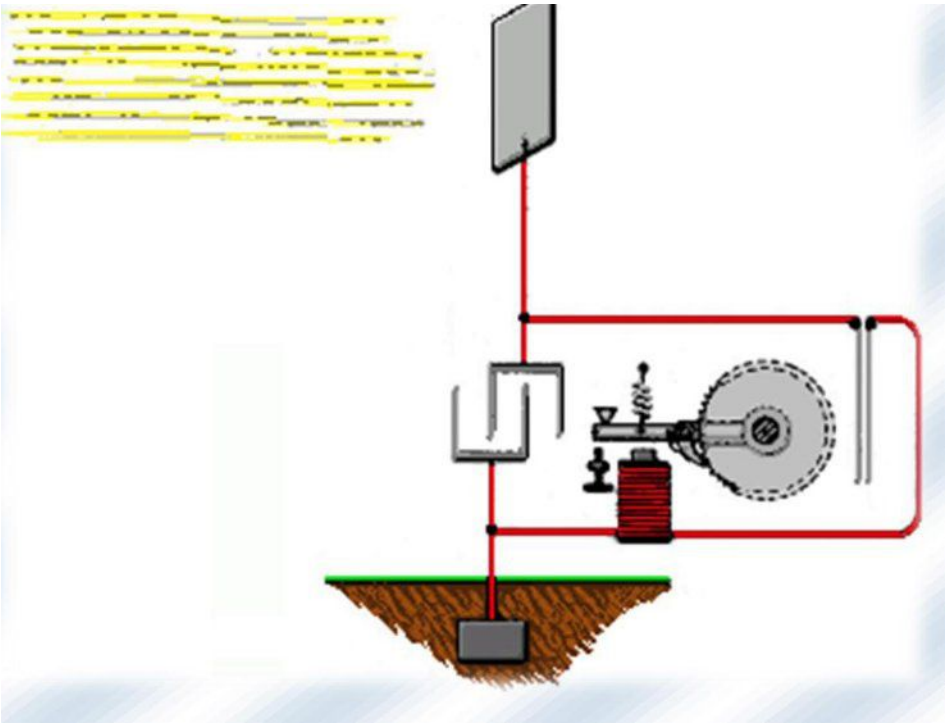
used it as a pathway for transmission. This unique discovery was the beginning of the inventor's most promising series of discoveries.



Chapter 4

Tesla's Radiant Energy Device

The key to free energy generation seems to be Tesla's radiant energy device. This system allows you to generate an electric charge from what the inventor called "cosmic rays."



While, today, we know that there are no cosmic rays that can produce such a charge, we do understand a bit more about how this specific device operates.

In fact, many people have been able to build their own radiant energy system.

This chapter will deal with radiant energy, how Tesla managed to harness it and how you can achieve the same results.

Defining the Term "Radiant Energy"

Much of the confusion surrounding Tesla's proposed system of energy generation stems from a misunderstanding of radiant energy. While Tesla called this type of energy "cosmic rays," this term is a bit inaccurate, especially in the light of modern scientific discoveries. However, this simple fact does not devalue Tesla's discovery. Rather, it underscores its value and veracity.

In modern parlance, radiant energy refers to the energy of electromagnetic waves. However, this can be a bit misleading, as well. This definition means the frequency of those waves, rather than the waves themselves. Tesla spoke of a definable, measurable source of energy, which would be the actual electromagnetic waves, rather than their frequency.

When these electromagnetic waves encounter an object, their energy is dissipated, transmitted to the object. Think of the way that sunlight falling on a stone will heat the stone. The energy of the sun's rays is transferred to the rock in the form of heat. In fact, the analogy of sunlight warming a rock is very apt, as the sun is responsible for creating the radiant energy harvested through Tesla's system.

While the great inventor himself might have mislabeled his discovery, thinking that free energy was flowing through the ether, modern science has shown that his discovery is real. The sun creates energy within the Earth's ionosphere, what Tesla might have referred to as the electrosphere of the planet.

How Is Radiant Energy Created?

Picture the planet earth from space. A black field of space is dotted by stars. Against this backdrop, the blue marble of planet Earth rests. The sun, 93 million miles distant, sends light and warmth to the planet. Now, take a closer look at that image of our planet. How often is the entire planet dark?

The answer, of course, is never. The sun always illuminates half of the planet. Therefore, the sun is constantly producing energy within Earth's ionosphere.

Because of this constant interaction, there is always an electric charge in the atmosphere. This energy can be harnessed with a simple method, and applied to a variety of different uses, just as Tesla suggested in his research notes.

As the sun irradiates Earth's ionosphere, the atmosphere collects a "net positive" charge. The earth itself, however, has a net negative charge. Therefore, with a radiant energy system to "harvest" this energy, you could direct kilowatts of energy from the ionosphere to power another device.

The Argument for and Against "Free" Energy

The world of science is full of controversy and disagreement, regardless of what is taught in schools. Even the area of alternative energy and energy preservation can be pocked with pitfalls.

One of these is the disagreement about the actuality of "free" energy. There are two schools of thought on this topic - one that says there is no such thing as "free" energy, and one that contends it does, indeed, exist.

The Argument Against

The argument against "free" energy is a bit surprising. This crowd does not contend that the energy does not exist. They take umbrage at the use of the word "free" being applied to it. The thought here is that this energy exists, has always existed and flows continuously throughout the entire world, powered by the furnace of the sun.

Therefore, it is not "free" if it is already present. Harnessing this energy is merely redirecting something that is already present, and there is no act of creation to it. For instance, energy with a cost might be exemplified best by the changing of mechanical energy into electrical energy through a traditional hydroelectric power plant.

The Argument For

Proponents of "free" energy cite the fact that the input power needed to create energy through this method is so low that it is negligible. Therefore, it produces more energy than what is required in input energy. In this equation, that equals "free," as in no or low cost to produce electricity.

While this may seem mere semantics, it is an important point, particularly if you will be studying other sources on the topic available to you. User forums, in particular, are rife with this sort of argument.

How Do You Harness Radiant Energy?

As you might surmise, in order to harness this free energy, you have to be able to interact with the ionosphere. To do this, you will certainly need an antenna. However, not just any antenna will suffice. You will need a specialized antenna to help you redirect the energy within the Earth's atmosphere.

In addition, if you live in a city or within a subdivision with a covenant governing what you can put outside your house or in your yard, you will need to check into the regulations that cover you. Below, you will find a brief outline of how to construct an antenna that will work for your needs.

Building the Antenna

Part of the process of building a working antenna is finding the right materials to construct the upper portion - the actual part that will collect the charge and direct it downward to the rest of the system. There are numerous materials that you might use here, but copper works the best.

Copper wire has a very long history in the world of electricity, due mostly to its high conductivity, but also to its relative low cost when compared to other good conductors.

Gold and silver are also both excellent conductors, but are far, far too expensive for such a task. Aluminum is also a good conductor, though it has only about 60% of copper's conductivity. However, what it lacks in conductivity, it makes up for in lightness. This allows you to create larger antenna arrays. However, for a basic antenna, copper is simply the best possible choice economically, and in terms of conductivity for the price.

Here are the materials needed for building the antenna. They can be found in most DIY centers, electrical supply stores and more. You might even be able to get them from salvage, which will save you some money.

- 50 feet of copper tubing with 3/4 of an inch in diameter
- 30 feet of fiberglass pipe
- 4 lengths of steel wires
- 1 steel plate about 4 feet square
- 2 lengths of 4-gauge insulated copper wire
- 600 Volt insulated fused single (or 3-phase) disconnect switch
- 4 x 500mfd capacitors
- 1 x 10 K Ohm 10-turn variable resistor
- 1 transformer

The top side of the antenna: once you have your tubing, you need to wind it in a right-hand spiral. Do not close the gaps between the windings, though - you want to leave about an inch of empty space between each spiral of the antenna. There are several ways of winding the copper tube: square, oval and circle. The square one is the most efficient, but the most difficult to shape. However, the others might be just as well. When you are finished winding your antenna, you need to mount it on the pole.

For that, use the 30 feet fiberglass pipe which places the top antenna above the ground, and it should be clear of any nearby obstructions. Remember that the higher your antenna pole is, the greater the diameter needs to be to support the antenna. In addition, the height of the antenna is directly proportional to the voltage we want to obtain. You might decide to install 4 guy-wires to ensure that the pole does not fall over in wind or adverse weather conditions.

Of course, the antenna is only part of the equation. You need a way to connect that wound copper tubing to the system at the bottom. Again, there are numerous options that you might choose to utilize here.

However, while other options offer benefits, 4-gauge, insulated copper wire is your best choice. Run a length of this wire from the antenna atop the fiberglass pole to one side of the carbon arc spark gap near the base of the system.

Definition of Spark Gap: A spark gap is nothing more than two conducting electrodes separated by a gap. The gap is filled with a gas, often only air. An electric spark jumps between the two conducting electrodes.

From the spark gap, you need to quadruple the 4-gauge, insulated wire down to the ground plate. The ground plate is another area of serious concern when building a radiant energy system.
You should use the 4-feet square steel plate, or a large coil of bare braided ground wire that needs to be buried at least three feet underground to ensure that your system is sufficiently grounded. Remember, the earth is the terminal of your conduit.

Your spark gap should be set at 1/2 of an inch. From the connection made with the antenna wire and the spark gap, use another length of 4-gauge insulated copper wire through a 600-volt, insulated fused single (or 3-phase) disconnect switch.

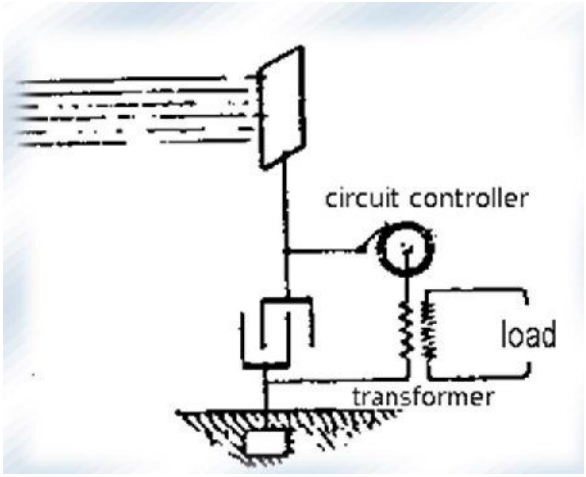
Definition of Tank Circuit: A "tank circuit" is also known as a resonated circuit, or a "tuned" circuit. These are created with an inductor and a capacitor connected together. The electric current alternates through the circuit at its resonant frequency.

You should then run the wire into the tank circuit. You will then need to parallel four 500mfd capacitors with a 10 K Ohm 10-turn variable resistor.

One side of the tank circuit should be terminated through an insulated disconnect switch. This switch must be connected to a ground rod, which has been driven at least 10 feet into the ground. You have just created a load circuit.

Your load should be attached to this circuit before the disconnect. You will also need to run the load through a matching transformer, as this will provide the correct amperage and voltage for the load.

Here is a very simple representation of what you should have created:



Safety Precautions

When operating a system such as this, it is important that you always open the disconnect to the ground circuit when you need to shut off the power. You should then open the disconnect before the tank circuit, in order to isolate the voltage control.

When the system is off, you will notice that the spark gap occasionally arcs, but this is nothing to fear. It is simply charge buildup in the system.

As a note, the closer you can tune the frequencies of the tank circuit and the antenna, the better. The closer the frequencies, the higher the attainable energy you are able to transfer from the antenna to the ground, supplying you with more electricity to power your load.

Designs

Here are some of Nikola Tesla's original designs for a radiant energy system. These were his actual illustrations for two of his patents filed with the US government.

No. 685,957. Patented Nov. 5, 1901.

N. TESLA.

APPARATUS FOR THE UTILIZATION OF RADIANT ENERGY.

(Application filed Mar. 21, 1901.)

(No Model.)

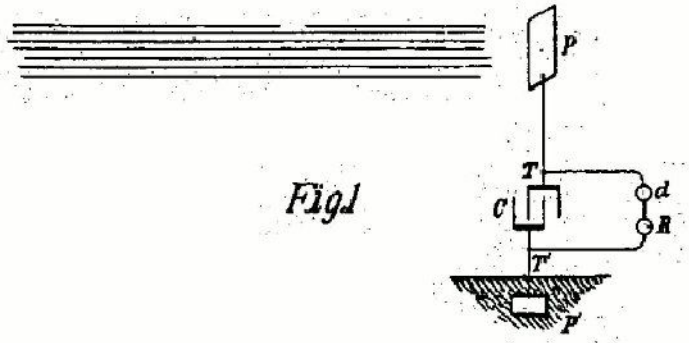


Fig. 1

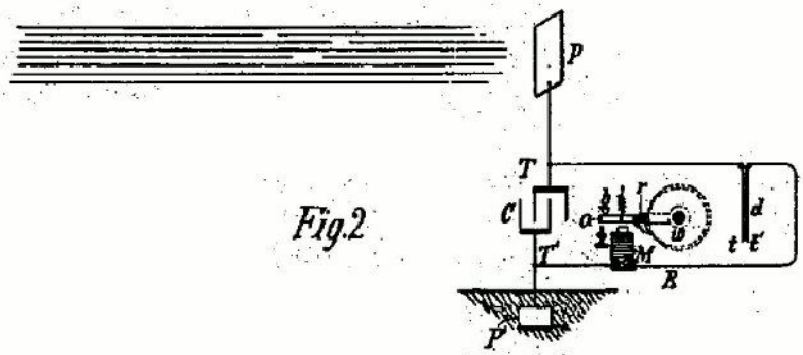


Fig. 2

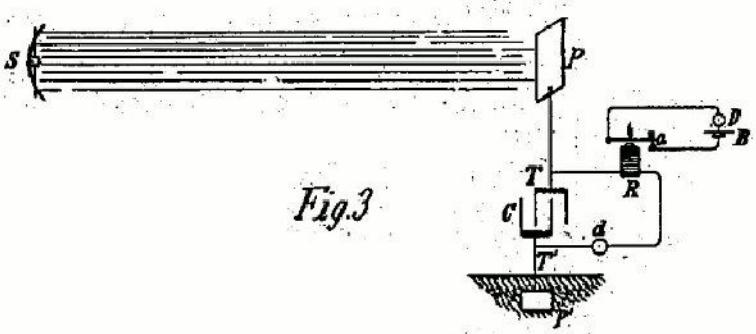


Fig. 3

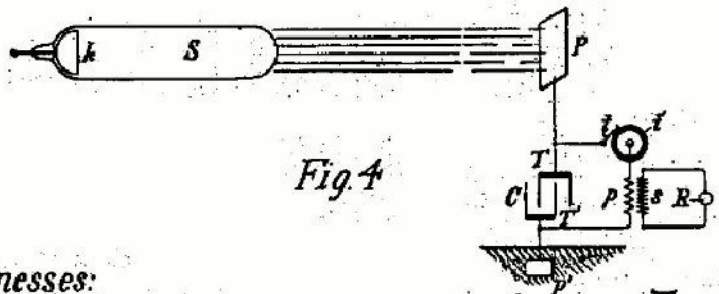


Fig. 4

Witnesses:
Raphael Netter
M. Lawrence Byron.

Inventor
Nikola Tesla
by Kerr, Page & Cooper Att'ys

No. 685,958. Patented Nov. 5, 1901.

N. TESLA.

METHOD OF UTILIZING RADIANT ENERGY.

(Application filed Mar. 21, 1901.)

(No Model.)

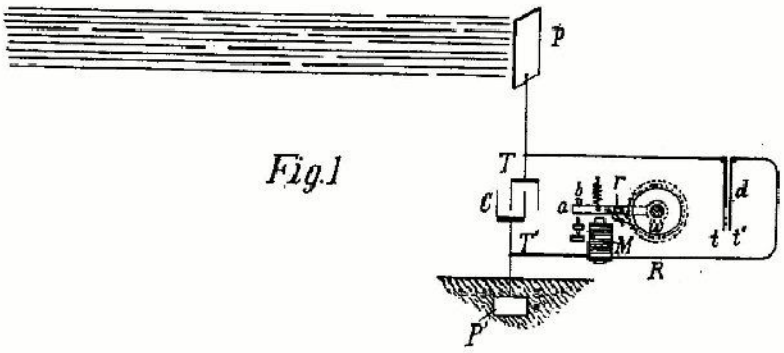


Fig. 1

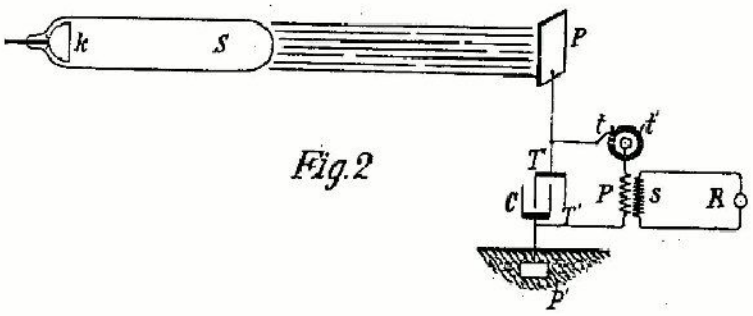


Fig. 2

Witnesses:
Raphael Netter
M. Lawson Byers

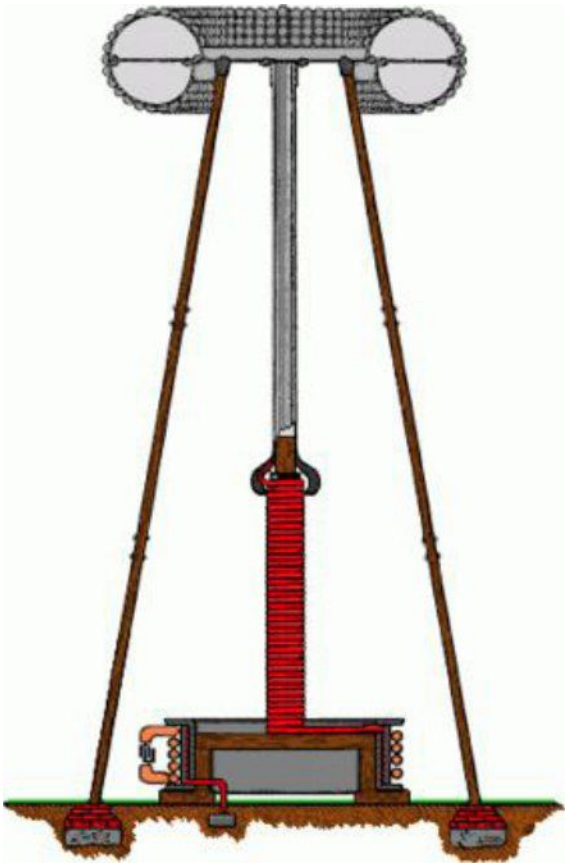
Nikola Tesla, Inventor
by Kerr, Page & Cooper
Attys

The inclusion of the external radiant energy device indicates that Tesla anticipated using this system with an external source of radiant energy. However, his surviving notes do not explain his ultimate choice, though there is considerable speculation from scientists and amateurs alike.

One of the strongest contenders for this is the dynamo/magnetic discharge device that Tesla used when experimenting with ambient energy, which eventually led to the development of his Tesla coil design for power storage and amplification. Of course, Tesla cited in his patent that the external source could be something like a Roentgen tube or an arc lamp, as well.

Chapter 5

The Tesla Coil



In addition to the radiant energy system listed in the previous chapter, you will need to include another device to get the most out of your setup. A Tesla coil offers numerous benefits here.

Many people have seen these coils in use before, and many other people have built them at home for entertainment purposes, or for education.

However, the coil was developed for neither of these - it was built to store and discharge electricity. Tesla used these devices in a very large number of his experiments.

What Is a Tesla Coil?

Nikola Tesla realized that there were several problems with his radiant energy system. One of them was the fact that, while it produces a steady supply of electricity, the voltage is usually very low. This means that in order for the system to be of real use, an amplifier of sorts needed to be developed. The answer to this was the Tesla coil. This

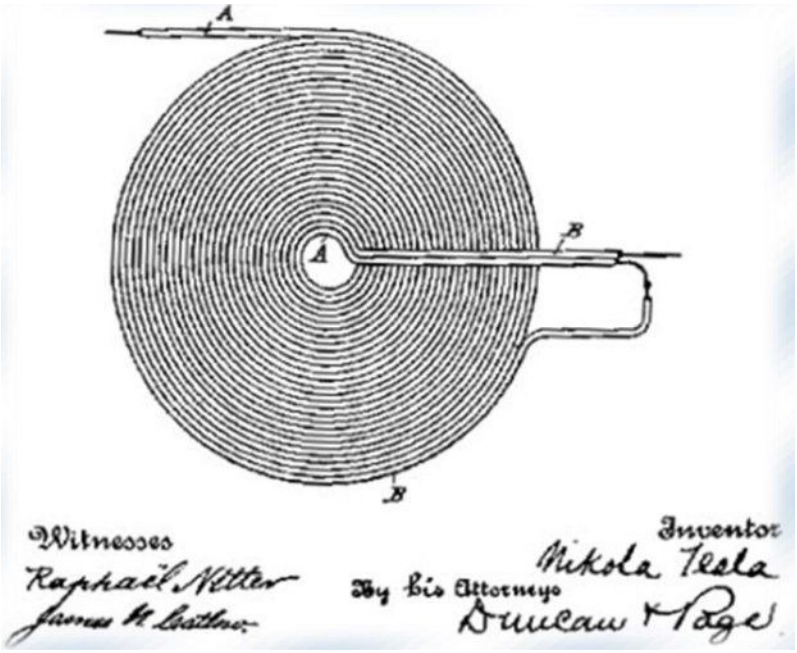
device is similar to other types of resonant transformers, but it has some significant differences.

Tesla patented this device as his "Coil for Electro-magnets," and it was different from other such coils from the outset. Rather than using a single coil of wire wrapped around a tube, Tesla's design made use of two wires. These were laid next to each other on the tube, but the end of the first wire connected to the beginning of the second wire.

What is the purpose of the second wire? Why did Tesla break from traditional coil design in such a fashion? According to the inventor, the addition of the second coil offers several key benefits. One of these is the fact that it allows the coil to store far more energy than a design that uses just a single wire.

Another benefit is that that ambient energy does not pass through such a coil. Ambient energy passes through almost any substance, including glass and metal. However, when it encounters a segmented obstacle, it uses it as a conduit, instead.

Today, the Tesla coil is used in a number of commercial products, and even in certain types of photography. Of course, they play a role in films and games, as well.

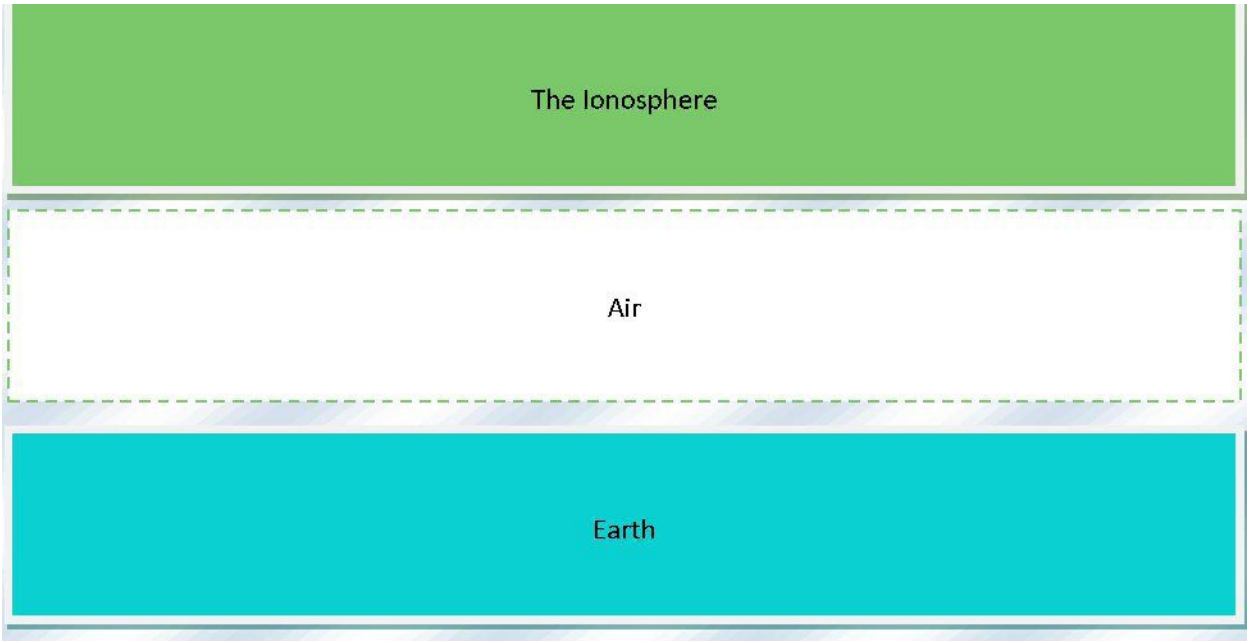


How Does the Coil Work In A Self-Sustaining Energy System?

In order to understand just how such a solution might work, we need to go back to Tesla's theory of how radiant energy was available throughout the world, at all times of the day or night. This is summed up quite well by the inventor's own statement:

"This new power for the driving of the world's machinery will be derived from the energy which operates the universe, the cosmic energy, whose central source for the earth is the sun and which is everywhere present in unlimited quantities."

Below, you will find an illustration that depicts this theory.



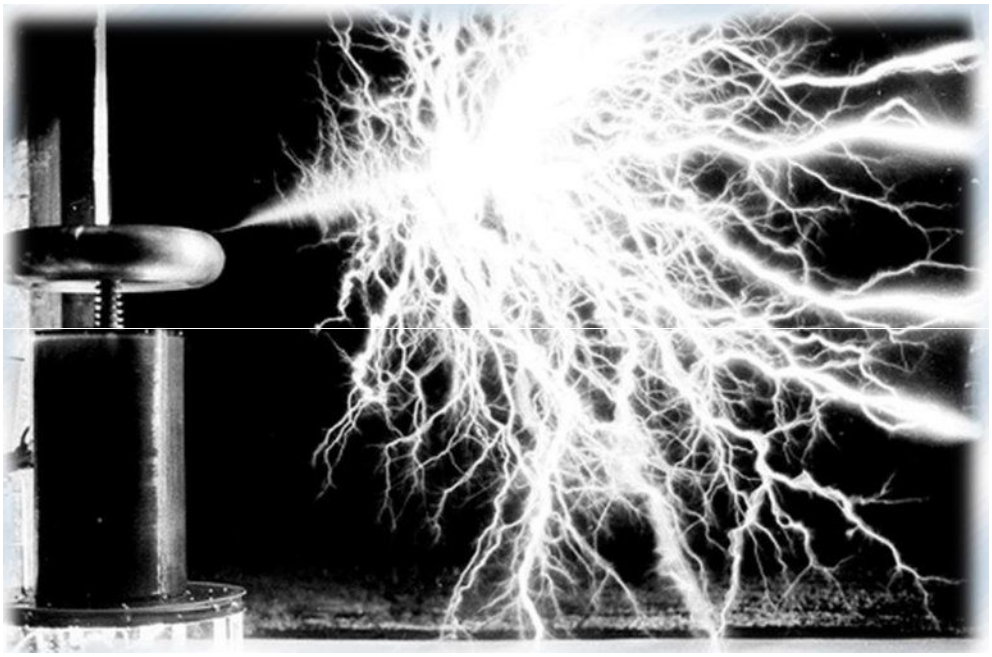
The ionosphere is where the irradiated energy of the sun stays. This area has a positive charge. The earth, at the bottom, has a negative charge. The air between the two other layers acts as an insulator, or buffer, keeping the "circuit" closed.

However, with a radiant energy system, you are able to connect to the energy circulating around the earth and redirect it. Through circuit loads, you are able to make this energy perform work for you, on its way to the ground.

Think of this energy the same way you would the energy created by Tesla's dynamo in his experiments mentioned previously. It is a definite charge, but not necessarily strong enough for all tasks. However, just like in his experiments, you can put a Tesla coil into the equation.

The way this works is that the coil is set in operation by an external force. This is always the case with Tesla coils, but in the application being discussed here, the external force is the energy generated by the antenna and copper lines mentioned previously.

This power source sets the coil in oscillation at its resonant frequency. Voltage readings across the coil will increase, and the amount of charge it can hold will also increase. The energy the coil takes in through its atomic structure is then reduced into positive and negative current. The load on the coil provides a "drain" on the current. It also creates a magnetic field that will eventually collapse and create the conditions necessary for the next pulse of electricity.



How to build a real Tesla Coil that can generate lightning

A Lightning Generator Capable of generating small miniature lightning bolts up to 24-in. long the device is unusually potent considering its overall simplicity and minimal power requirements.

In operation, the Lightning Generator spouts a continuous,crackling discharge of pulsating lightning bolts into the air. These waving fingers of electricity will strike any conducting object that comes within its range.

A piece of paper placed on top the discharge terminal will burst into flames after a few seconds of operation and a balloon tossed near the terminal will pop as though shot down by lightning.

WARNING: High voltage is dangerous! Use rubber gloves.
If you are not familiar with high voltage rules then do not attempt this project until you educate yourself in the use of HV Capacitors and high voltage safety. See your local library or get a beginners book on electronics.

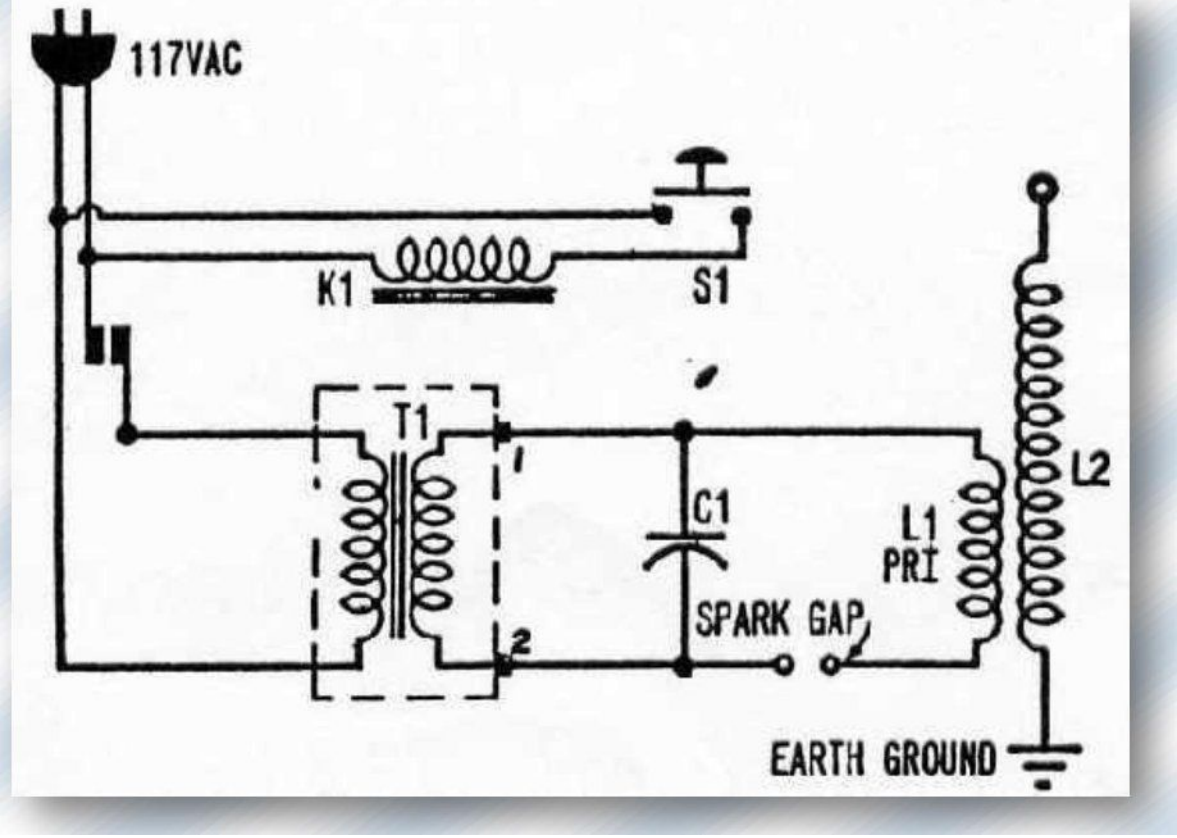
Building the Lightning Generator is relatively simple.

- Start with L2, the secondary coil, which consists of a 36 1/2-in.length of 17/8-in. OD cardboard tubing, wound with a single layer of AWG 30 enameled, copper wire. Choose as perfect a tube as possible and make sure that it is not contaminated with paint or other substances.
- Heat the tube in an oven to drive out moisture and paint it lightly with varnish or plastic spray. The coil can be wound by hand or chucked in a slow-turning lathe.
- Starting 1/4-in. from the end, begin winding clockwise, making all turns as tight and as close together as possible. Avoid kinks and overlapping. Total number of

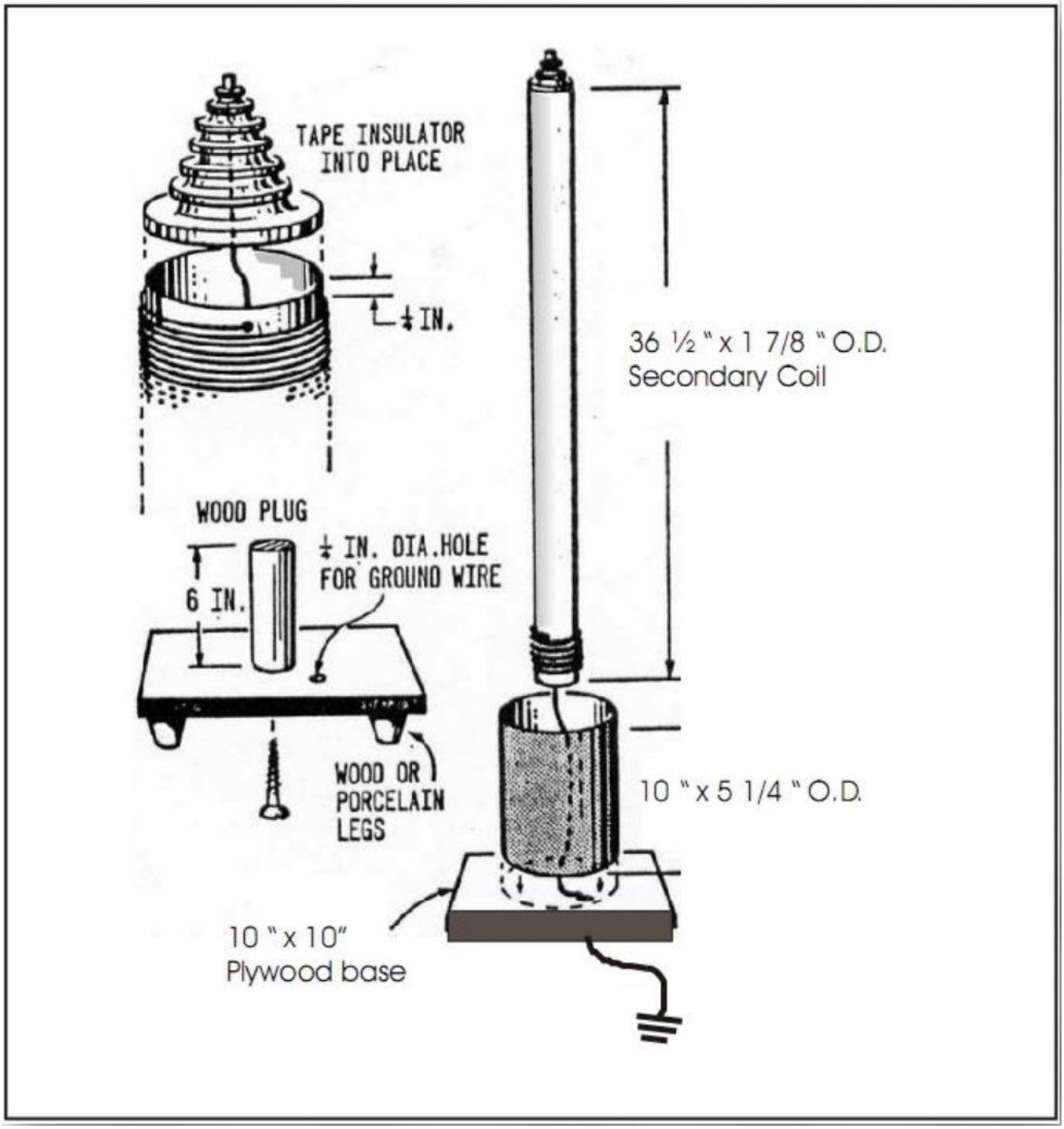
turns will be about 3350, but there is no need to keep count since the turns are closely spaced.

- Leave about two feet of wire free at the end. Stop winding 1/4 in. from the opposite end of the tube and run a 3-in. length of the wire through a small hole drilled in the exposed cardboard apparatus. This end will be the top of the secondary.
- Apply several coats of varnish to the windings for protection and insulation.
- To make the discharge electrode, fit the top of the secondary with a porcelain, center-fed insulator of any type (length should not exceed 3 in.).
- Insert a bolt through the center of the insulator and attach the 3-in. coil wire to the bottom end of the bolt. No more than 3/4 in. of the bolt should protrude from the insulator top. Fasten the insulator to the end of the secondary coil with electrical tape or other.
- Make a wood base for L2 by cutting a 10" square from 3/4 " plywood, and fastening a 6-in. long wooden dowel to the center. Use a 3-in. wood screw to attach the dowel, and, or glue it in place. The secondary should fit snugly over the dowel.
- The 2-ft. length of coil wire from L2 can be brought through a 1/4-in. hole drilled in the platform 1 in. from the dowel. Another option for the base L2 would be to use 1/2" to 3/4" clear plastic.
- Primary coil LI. which fits at the base of the secondary, consists of 28 closely-spaced turns of AWG 8 insulated copper wire on a 10 x 5 1/4 in. Quaker Oats box. or use a 4" PVC pipe. In a pinch, ordinary two-conductor line cord can be used, with the ends twisted together to form one conductor. The box should be varnished and it can be reinforced with a few layers of fiberglass cloth and epoxy resin.
- To wind LI, secure the first turn at the bottom of the box with a piece of string, then wind clockwise until 28 turns have been made. Do not wind the entire length of the box, but keep the turns as closely spaced as possible. Secure the last winding with electrical tape.

- Cut a hole in the bottom of the box and slip the completed LI over L2, keeping the secondary centered. The exposed cardboard of the primary can be painted with nonconducting enamel or wound with tape.



This is a Schematic of the entire lightning generator Tesla Coil


TAPE INSULATOR
INTO PLACE
¼ IN.
36 ½ " x 1 7/8 " O.D.
Secondary Coil
WOOD PLUG
¼ IN. DIA.HOLE
FOR GROUND WIRE
6 IN.
WOOD OR
PORCELAIN
LEGS
10 " x 5 1/4 " O.D.
10 " x 10"
Plywood base

The Low-Leakage Capacitor

You can build a larger capacitor or you can build the following.

You will need a box about 16 x 20 x 5 in. for capacitor Cl. A box can be made of 1/4- or 1/2-in. plywood and reinforced with fiberglass. Box size is not critical, though the box must be large enough to hold the capacitor about to be described.

Glass dielectric for the capacitor consists of eight sheets of 16 % x 12 1/4 x 1/4-in. window glass. Cost should run about $30.

Cut out seven sheets of 20- x 9-in. heavy-duty aluminum foil andassemble Cl as follows: lay a sheet of glass in the box and place asheet of 20- x 9-in. aluminum foil on the glass as shown in the drawings. Pour in just enough ASA 30 motor oil to cover the foil. On top of this lay another sheet of glass and aluminum foil, but be sure to reverse the tab or free end of foil to that it protrudes from the opposite side of the glass.

Press all air bubbles from between the glass. This done, pour in more oil and continue the process, always alternating each sheet of foil. Bend the foil tabs together on each side of the capacitor in order that wires from the rest of the circuit can be connected to them. About three quarts of oil will be needed for a 16- x 20-in. box. Wooden blocks can be wedged around the plates as a means of keeping them from shifting.

There are a number of ways to make the spark gap , but the best arrangement consists of two 1/2-in. diameter conductors adjustable from 1/4- to 1-in. separation or try a spark plug.

A simple gap can be made by mounting two 1/2-in. diameter bolts through nuts brazed on 1- x 2-in. metal plates. The plates are mounted on a varnished wood block at least 1 3/4-in. thick to prevent arcing around the gap.

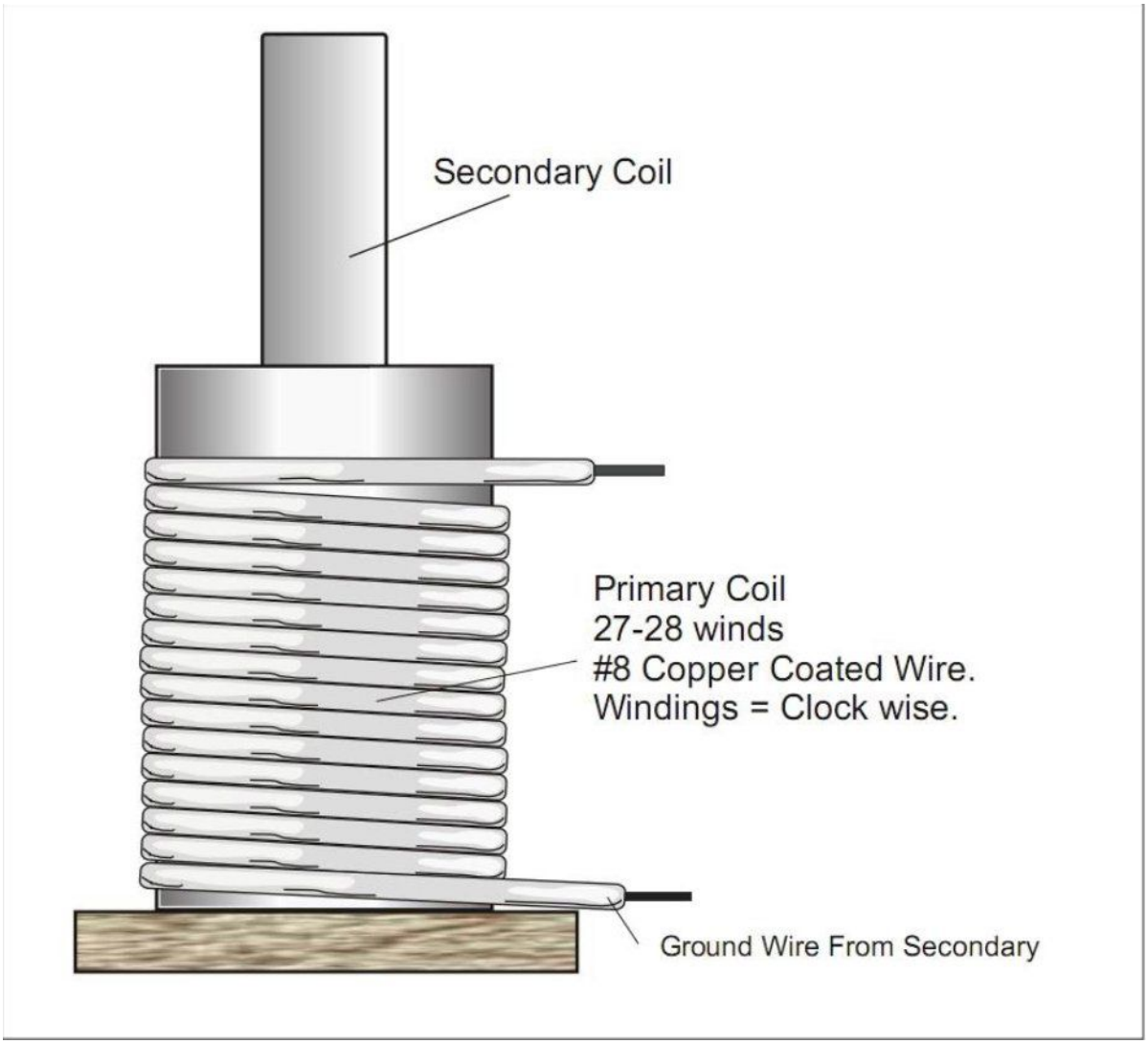
Power for the circuit is supplied by a 15,000-volt, 30 mA neonsign transformer. New transformers cost about $120 or more-used ones are considerably less.

Wire the circuit with AWG 12 or 14 single-conductor copper wire, as it is stiff enough to be self-supporting. Route all wires separate from each other and other objects, keeping

in mind that high voltages will be present throughout most of the circuit. Capacitor Cl is wired into the circuit by atta ching wires directly to the aluminum foil tabs. Place components according to drawings.

Operating the Generator

When the circuit is ready for testing, connect the ground wire from the bottom of the secondary to a water pipe or telephone ground.



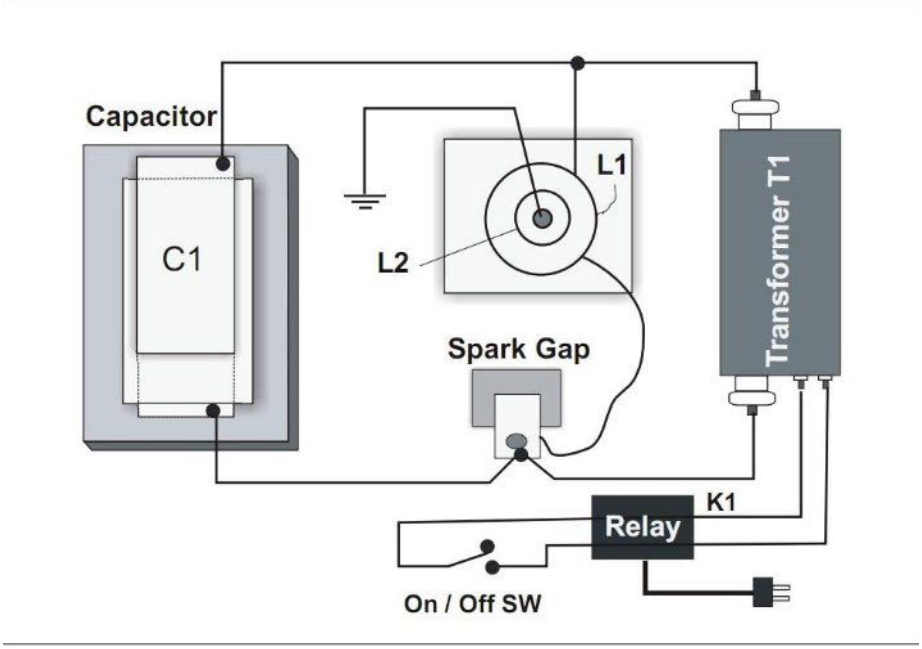
Tuning

If the spark-gap is operating, but either a weak discharge or none at all appears at the top of L2, the coil will have to be tuned. This is accomplished by varying the number or size of the aluminum foil sheets in Cl and by varying the effective turns on LI. It's easier to begin tuning by varying the exposed area of the top sheet of aluminum foil and by "tapping in" a few turns down from the top of the primary.

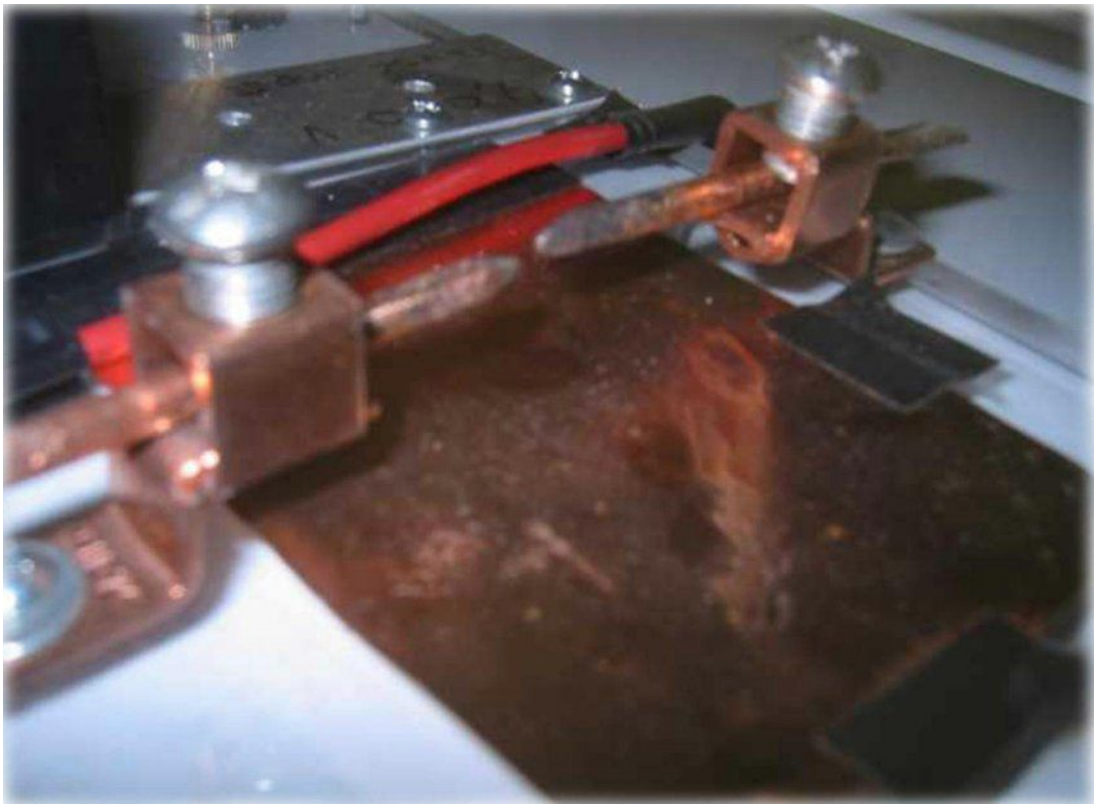
Maximum discharge generally will be reached with a total variation of no more than two or three turns on coil LI and one full sheet of aluminum foil in Cl. If reducing the number of turns in LI and changing the number of plates in Cl doesn't help, try adding several turns to LI by splicing in additional wire.

An additional sheet of foil can be added to the capacitor, but another sheet of glass will be needed also. It is best not to operate the Generator for more than 15 to 20 seconds continuously without an equal time off, as the oil in the capacitor will start to break down, allowing arcing to occur. But if you build our home made HV capacitors or use an old microwave AC or DC capacitor you will get better results.

Remember to be careful. High voltage can kill and is much more powerful after it enters a large capacitor, wear rubber gloves.



Spark Gap using 2 large copper wires and Electrical box fasteners



You can also use a spark plug or make your own out of wood and 2 separate metals, attach one on top of wood block and one on bottom. Drill 2 holes in each of the metal pieces and place nuts and bolts in them so they can adjust. These are your electrodes.

Experiments

Hold a fluorescent light a few feet from the Generator and throw the switch. The light will glow even though not connected to any electrical source. This is because the high voltage is traveling through the air. also large, clear light bulbs held near the coil will glow with weird, flowing colors.

Bring a grounded, metal rod within range of the discharge point atop L2 and notice the "bunching" effect as the sparks leave their random pattern and arc to the rod. The discharge will not travel as far to reach a grounded conductor as it will in open air, since the atmosphere itself acts as the opposite electrical pole. A pinwheel rotor about 6 to 8 in. in diameter can be made from AWG 18 or 20 solid wire and fitted atop the discharge terminal so that it can rotate freely. When the Generator is operating, the rotor will turn from the force of the discharge leaving the ends of the wire. Place a piece of paper on the terminal and close the switch. In a few seconds, the paper will burst into flames.

Despite the extremely high voltages, the Lightning Generator develops very little current, making a shock from the coil relatively harmless. However, the currents in the rest of the circuit are very dangerous, so they must be treated with respect.

The discharge is virtually impossible to contain. Try inverting a glass tumbler over the discharge electrode; the discharge will pass right through, leaving the glass full of ozone. A heavy, waving arc will easily crackle across a distance of a foot or more to reach a metal rod. To capture the lightning on film, use a camera capable of at least l/250th sec. shutter speed and try a variety off-stops. Balloons can be shot down simply by tossing them at the terminal, and sometimes the effective range of the lightning "anti-aircraft" is surprising.

With reasonable maintenance, the Generator will last indefinitely. Research it and you will discover new experiments and gain insight into the fundamentals of tuned circuits, transmit radio waves to any AM radio etc.

So How Does it Work?

The primary coil LI and capacitor CI together form a tuned circuit designed to oscillate at a frequency four times the natural resonant frequency of the secondary coil L2. By inducing current at the base of the secondary L2 equal to a quarter of its natural wavelength, the induced voltage will reach a peak, every half-cycle, at the discharge terminal at the top of L2.

The voltage generated is determined by the inductance of LI and how accurately LI is tuned. The spark gap, allows the capacitor to charge to maximum. The spark gap ionizes and the charge stored in the capacitor discharges across the spark gap and most of the charge stored in the electrostatic field of the capacitor becomes energy in the magnetic field that builds up around LI as the discharge current flows through LI.

When CI has discharged to a point where the voltage across CI will no longer sustain an arc across the spark gap, current stops flowing through LI and the magnetic field therefore starts to collapse. When the magnetic field around LI collapses, it generates a counter EMF (electromotive force) (which also is free energy from a collapsing magnetic field) or voltage that is almost as great as the voltage from TI that originally charged CI. This voltage breaks down the already partially ionized spark gap and CI begins to charge all over again.

Because of the high inductance and low natural resonant frequency of the secondary winding of TI, this portion of the circuit is effectively nonexistent. Most of the energy pumped into the circuit formed by LI, CI, and the spark gap remains in that portion of the circuit. The secondary of TI just adds energy every 1/120th of a second.

For best results, the oscillation frequency should about 120 kHz. As Cl recharges from the magnetic field around LI, a point is again reached where the spark gap cannot be sustained because all the energy is gone from the winding of LI. This means that the magnetic field has collapsed completely. Once more Cl discharges, and current flow again reverses through the spark gap and a magnetic field builds up around the coil LI.

With each cycle of charge and discharge the energy transferred is reduced and would soon die out if energy weren't added by the secondary of Tl. This free energy from a collapsing magnetic field can be used to recharge a battery or capcitor bank. Each buildup and breakdown of the magnetic field induces a voltage in coil L2 which discharges from the tip of L2 in the form of lightning-like flashes and streaks.

Construction Of The Capacitor

Aluminum Foil must be taped to the glass, Foil side up. With tabs protruding from the opposite ends. In fig. 1-19 use 8 shts of window glass and seven shts of heavy duty Aluminum foil or roofing foil. Cover each layer with oil. Baby oil, or without.

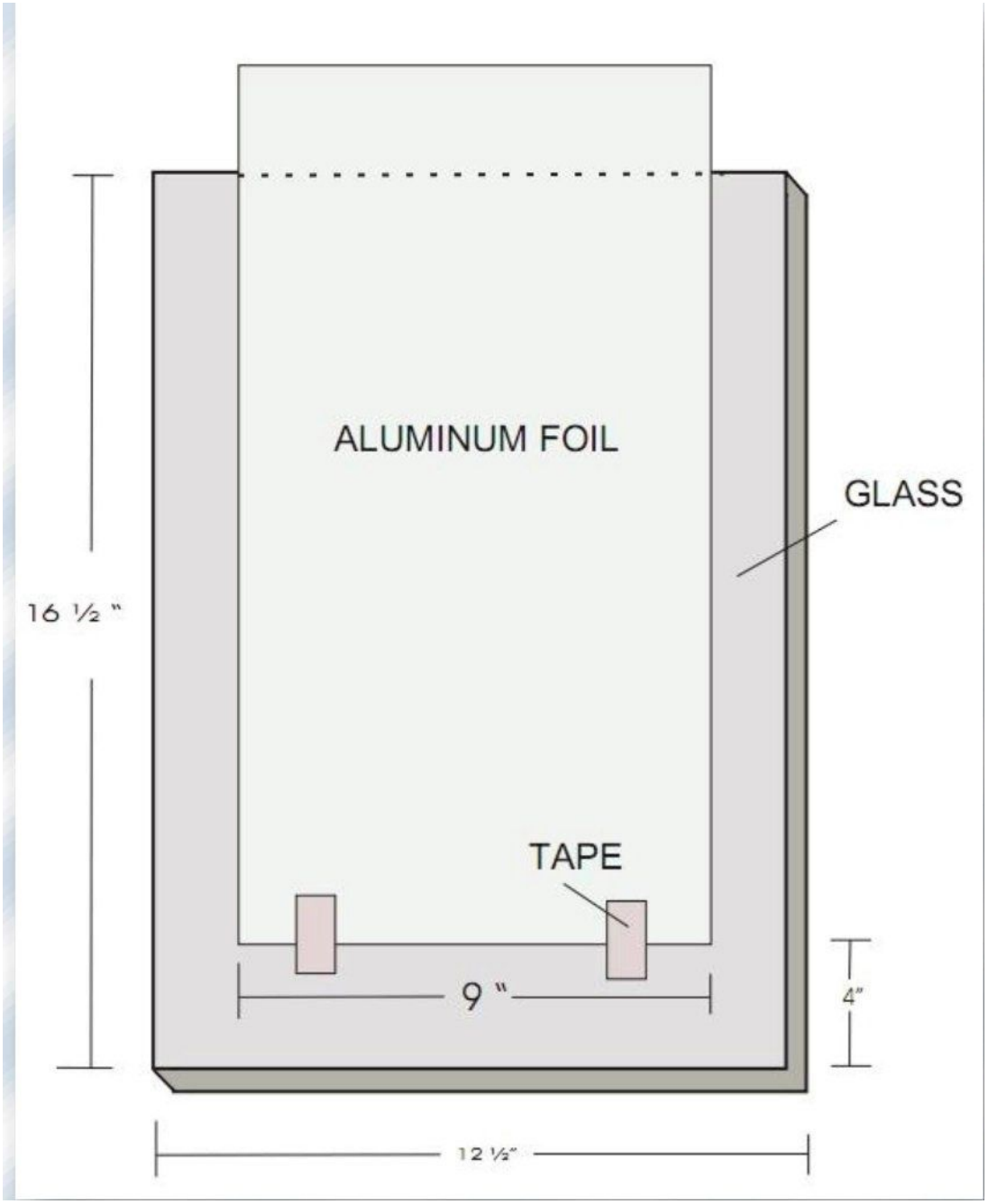
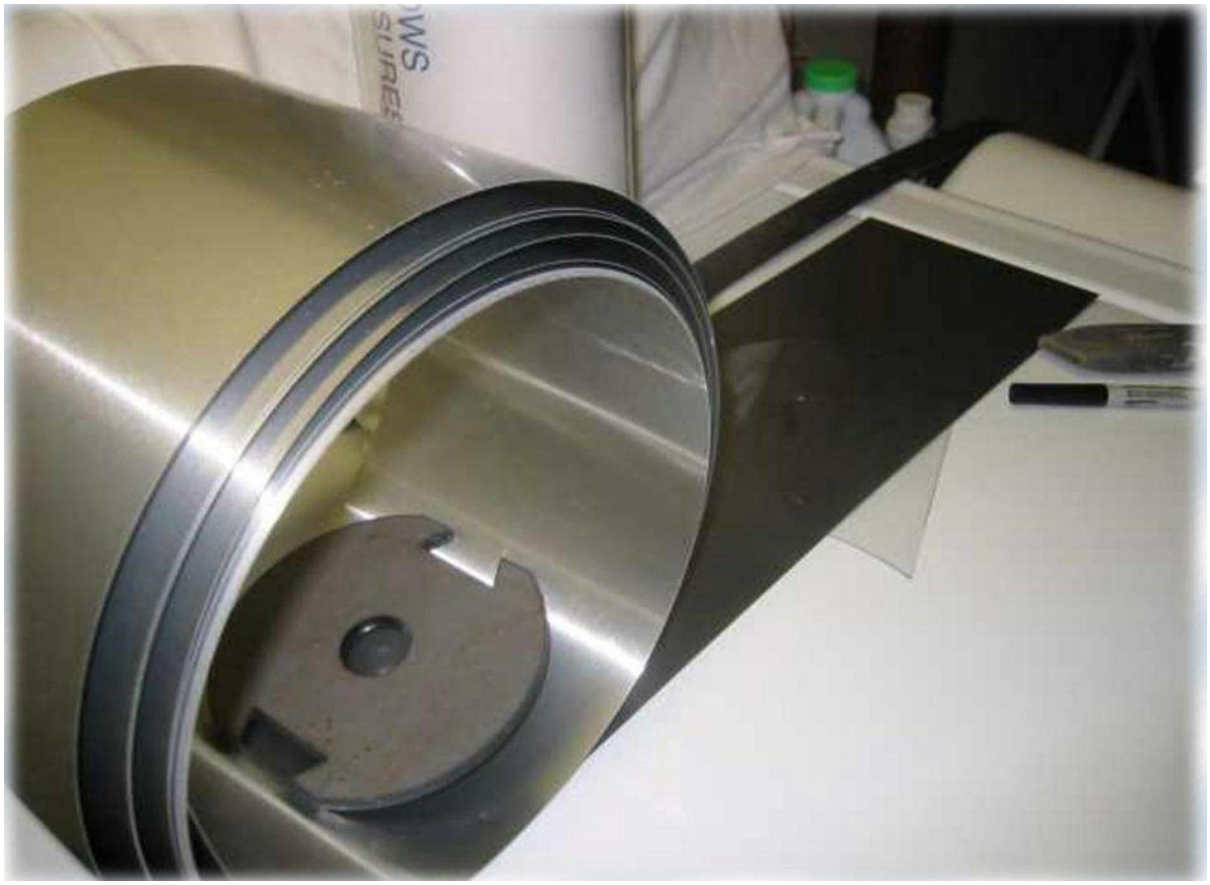
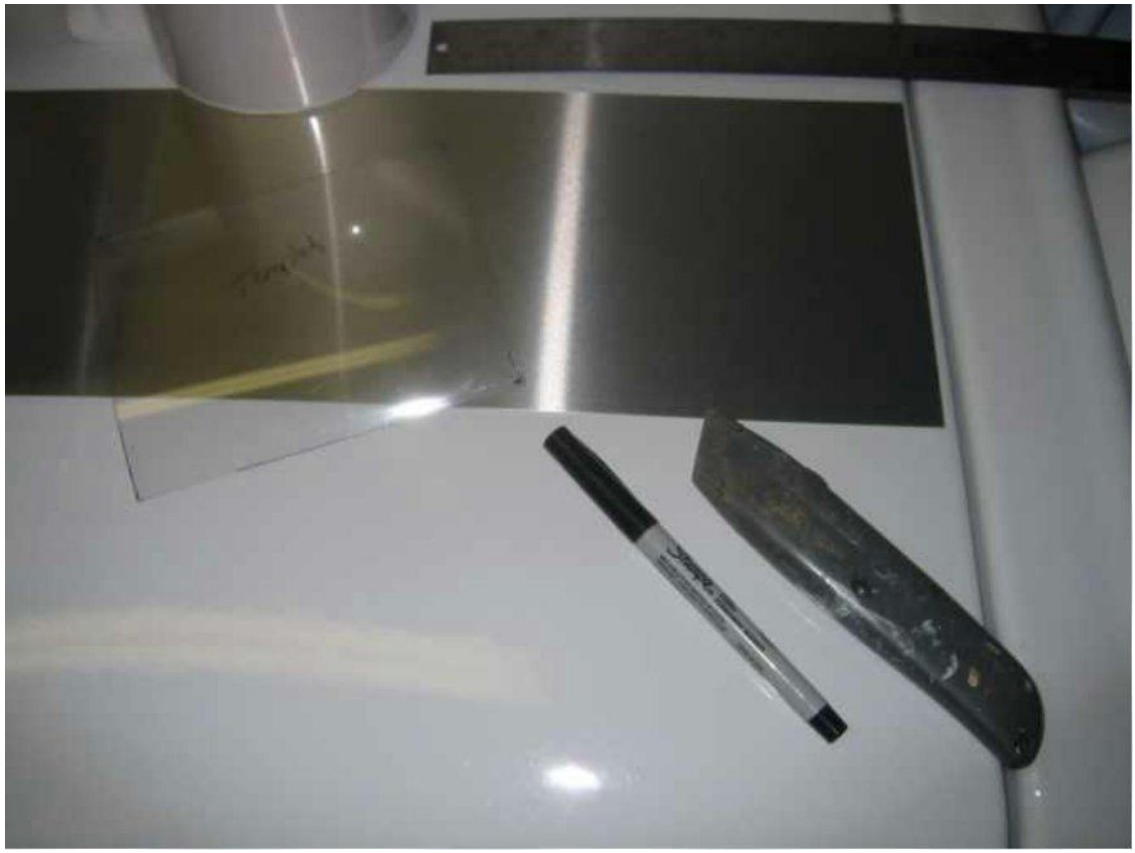

ALUMINUM FOIL
GLASS
16 ½ "
TAPE
9 "
4"
12 ½"

Fig. 1-19 Side View

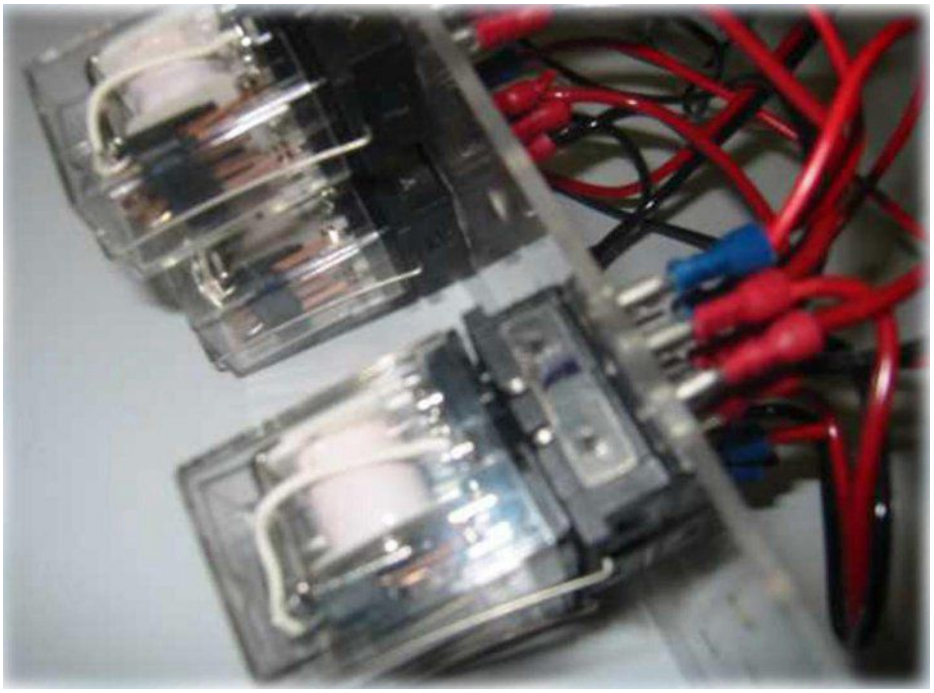




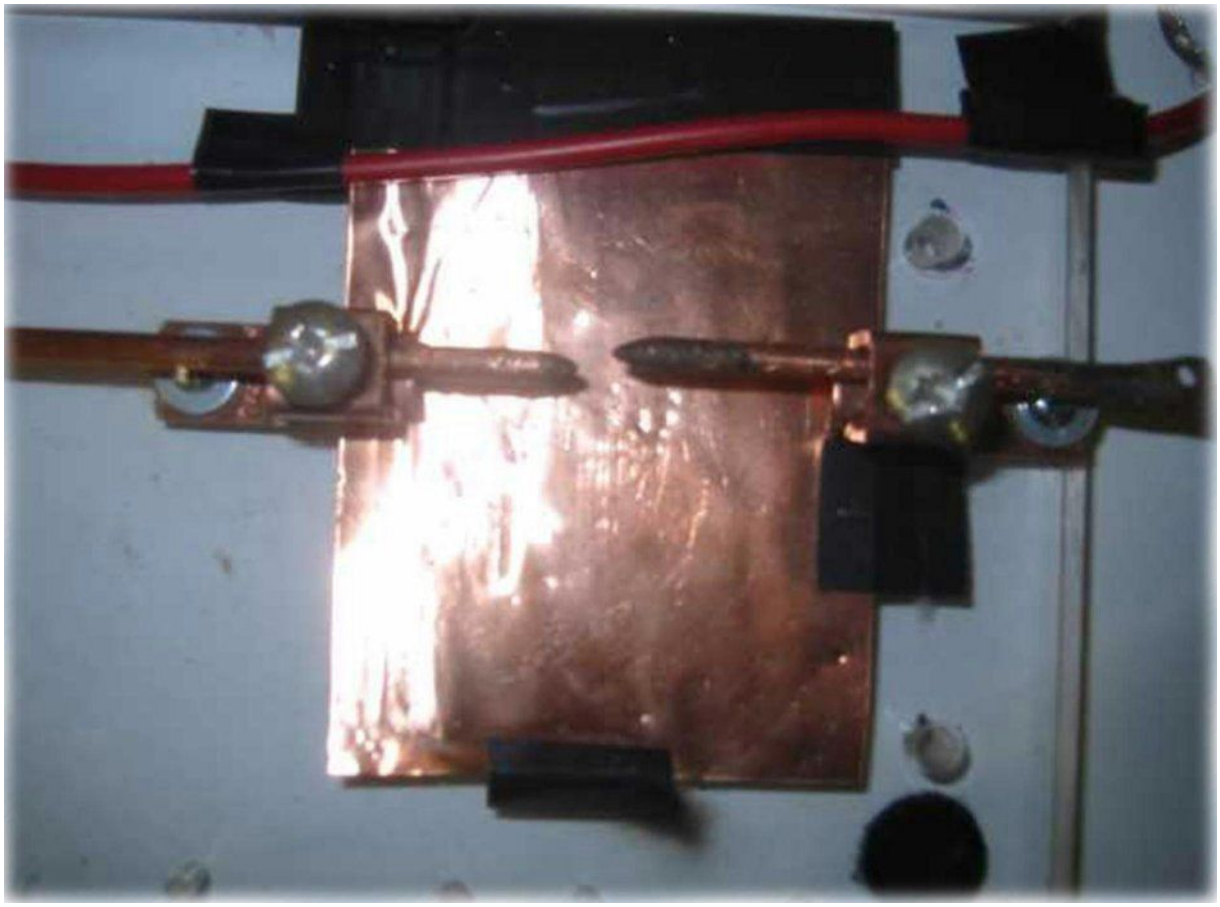
A multi-stack HV Capacitor using clear 4 mil mylar

Tesla Coil using a 4" PVC Pipe

15,000 volt Neon sign transformer



Relay Switches



Copper wire Spark Gap

Chapter 6

The Dynamo-Electric Machine

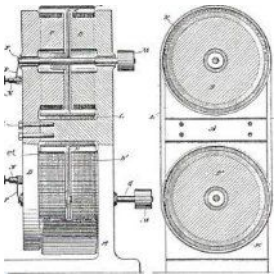
One of the most famous of Tesla's inventions was his turbine design. In fact, his bladeless turbine is still used in the modern world for many different things. It offers significant advantages, particularly where fluid and semi-fluid substances need to be pumped.

The lack of blades on the turbine means that it operates much more effectively than bladed pumps. However, the design for this turbine was not unique to this device - it also turns up in Tesla's design for his Dynamo-Electric Machine.

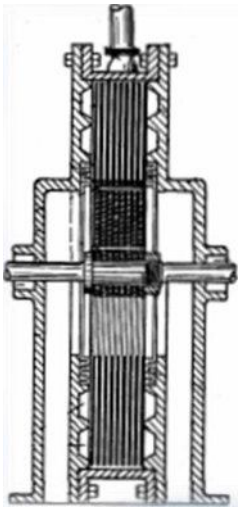
What Is the Dynamo-Electric Machine?

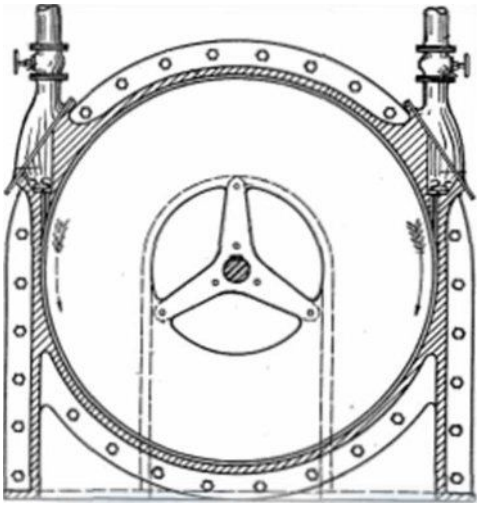
The dynamo device designed by Tesla was much like his bladeless turbine. In fact, the key element that set his turbine apart from others also defined his dynamo. This was the general structure of the two devices - metal disks turning inside a box.

Strangely, the dynamo designed by Tesla was somewhat less advanced in design than his alternating current generator design, for which he had become famous. However, he took great pains to explain to the world why he had gone back to such a simple device. The design that Tesla eventually created was based in large part on the original Faraday dynamo.



Tesla's Dynamo Design





Tesla's Turbine Design

However, the inventor goes into detail concerning the changes that he made to the device to improve its efficiency and power generating capabilities. In fact, he claims that his uni-polar dynamo design was capable of creating a self-sustaining current, once activated by an outside source. Below, you will find an image of Tesla's turbine, contrasted with an image of his dynamo design.

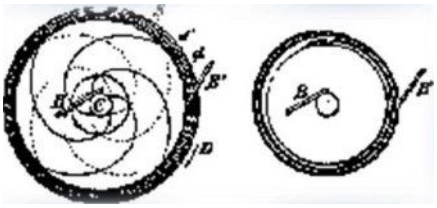
Variations on the Faraday Design

There were several key ways in which Tesla's design varied from the one developed by Faraday.

- Larger Magnet

  In Faraday's original design, the magnet used was relatively small when compared to the size of the copper disk. Tesia decided to use a much larger magnet. In fact, it was larger than the copper disk itself, covering the entire structure.

By using a magnet that completely covered the copper disk, Tesia was able to achieve better results than Faraday. In Faraday's original design, only a small portion of the disk's surface was used for current generation.



However, in Tesla's design, the entire surface produced current, which boosted the total output of the device by a considerable amount. However, there was another important advantage here.

- Spiral Sections

The second way in which Tesla's design differed is that he segmented his disk with spiraling curves. These started in the center of the disk and radiated outward to the edges.

The reason that Tesia used spirals radiating from the center of the disk to the outer edges is that it encouraged the flow of current outward, which enabled him to harness that current much more easily.

- Attached Flange

In Faraday's device, there was no simple way to utilize the current generated by the dynamo. However, Tesia made an important innovation here. He attached a flange on the outside edge of the dynamo. This allowed him to tap into the current generated by the spinning magnet/copper disk combination quite easily.

Below, you will find an actual illustration of Tesla's Dynamo-Electric Machine, from his patent, No. 359, 748.

(No Model.) 3 Sheets—Sheet 1.

N. TESLA.

DYNAMO ELECTRIC MACHINE.

No. 359,748. Patented Mar. 22, 1887.

Fig. 1.

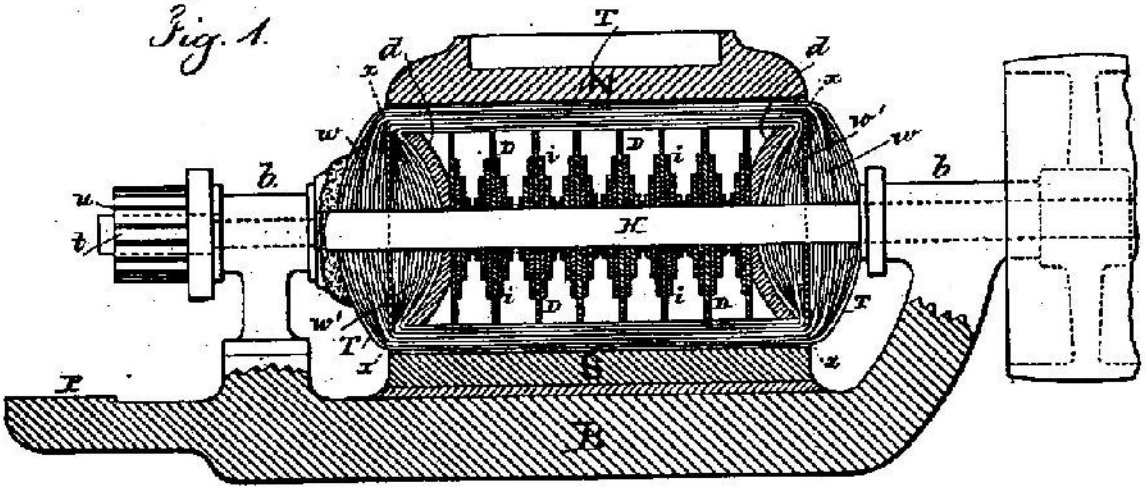
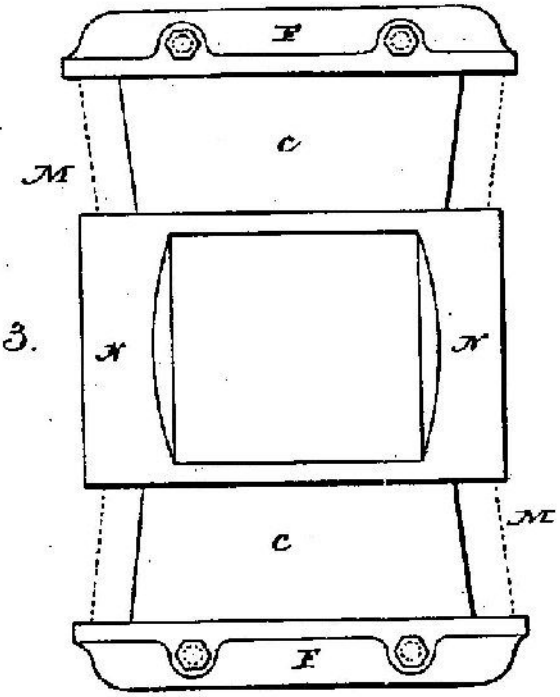


Fig. 3.



Witnesses

Chas. N. Smith

J. Stahl

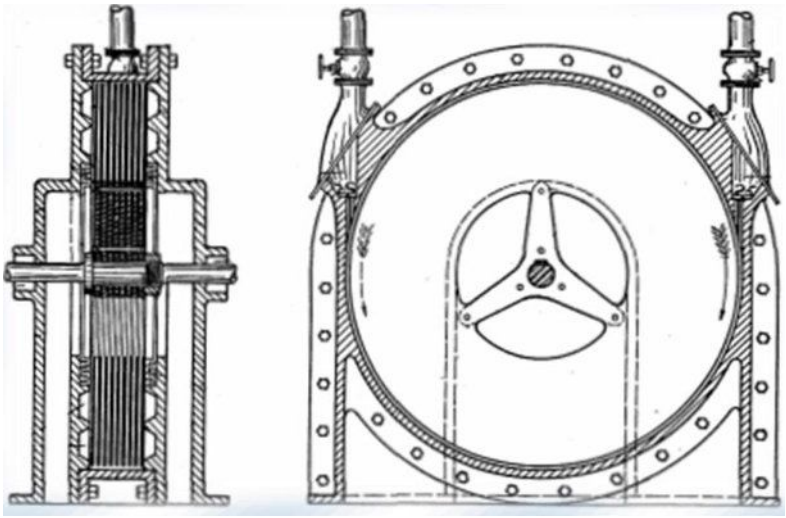
Inventor

Nikola Tesla

by Lemuel W. Serrell

Chapter 7

The Tesla Turbine



While the Tesla turbine is not a necessary addition to the radiant energy generator described throughout this book, it can be a valuable addition depending on your needs.

This chapter will explore the turbine, what makes it different from other designs and highlight some of the benefits offered by this technology.

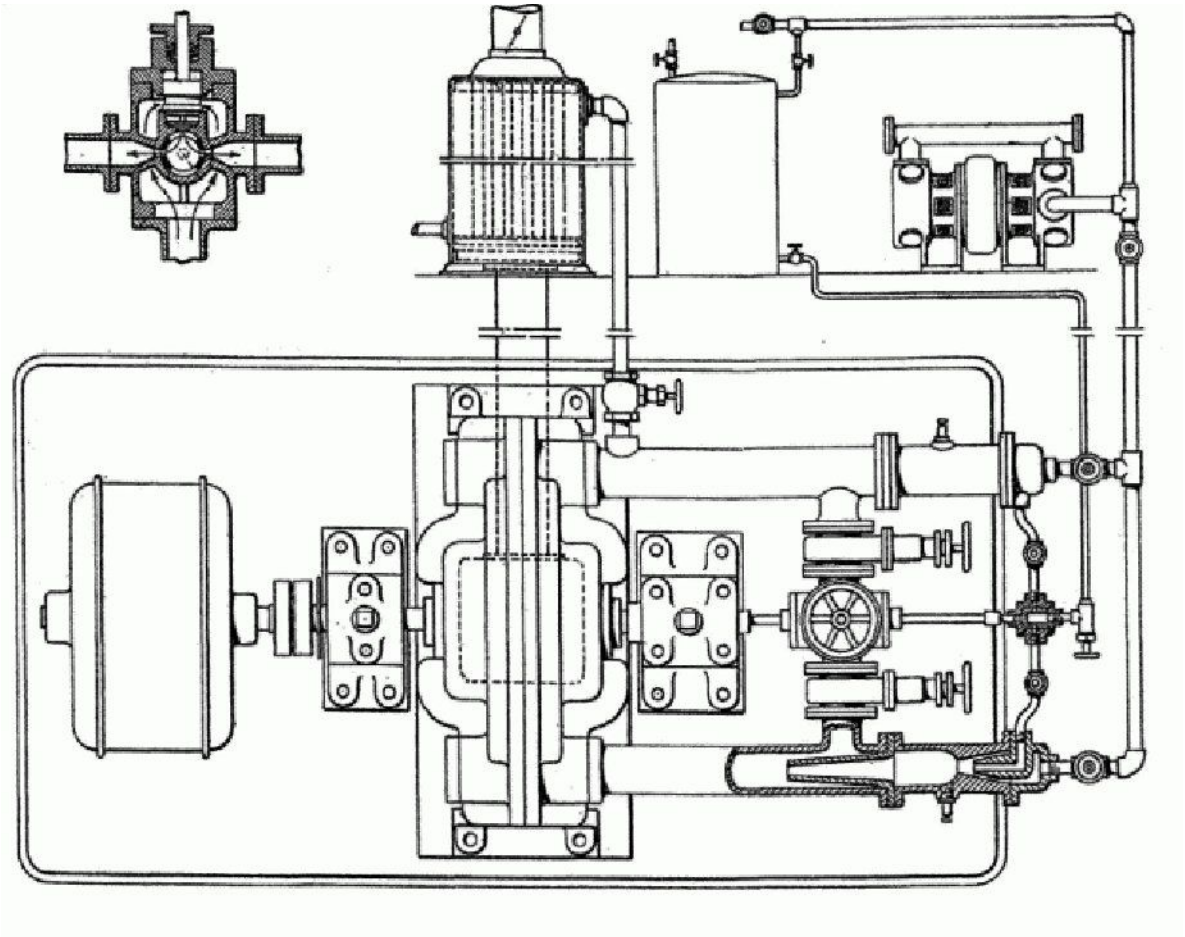
Understanding the Differences in Turbine Designs

Turbines are used all around the world, in myriad different capacities. The Tesla turbine is one of the most innovative designs, and has lasted longer than many of his other inventions in terms of regular usage.

The most important difference between Tesla's design and other turbines is the fact that Tesla's did not use any blades. Instead, it uses a set of smooth disks. This type of design is also known as a boundary layer turbine, or a multiple disk centrifugal pump. Tesla expressly designed this turbine for use in geothermal power applications, where it can be operated by steam quite easily.

According to Tesla, "This turbine is an efficient self-starting prime mover which may be operated as a steam or mixed fluid turbine at will, without changes in construction and is on this account very convenient. Minor departures from the turbine, as may be dictated by the circumstances in each case, will obviously suggest themselves but if it is carried out on these general lines, it will be found highly profitable to the owners of the steam plant while permitting the use of their old installation. However, the best economic results in the development of power from steam by the Tesla turbine will be obtained in plants especially adapted for the purpose."

Below, you will find an image of a typical system.



There are several key advantages to this type of setup. These include the following:

- It is able to start with no other power than the application of steam

  This is an important consideration, as most other turbines and pumps require the application of another type of motive force, usually electricity. This type of turbine can be installed with an ambient power generator, combined with a source of water to create steam. The steam created will then power the turbine at no cost to the owner of the system.

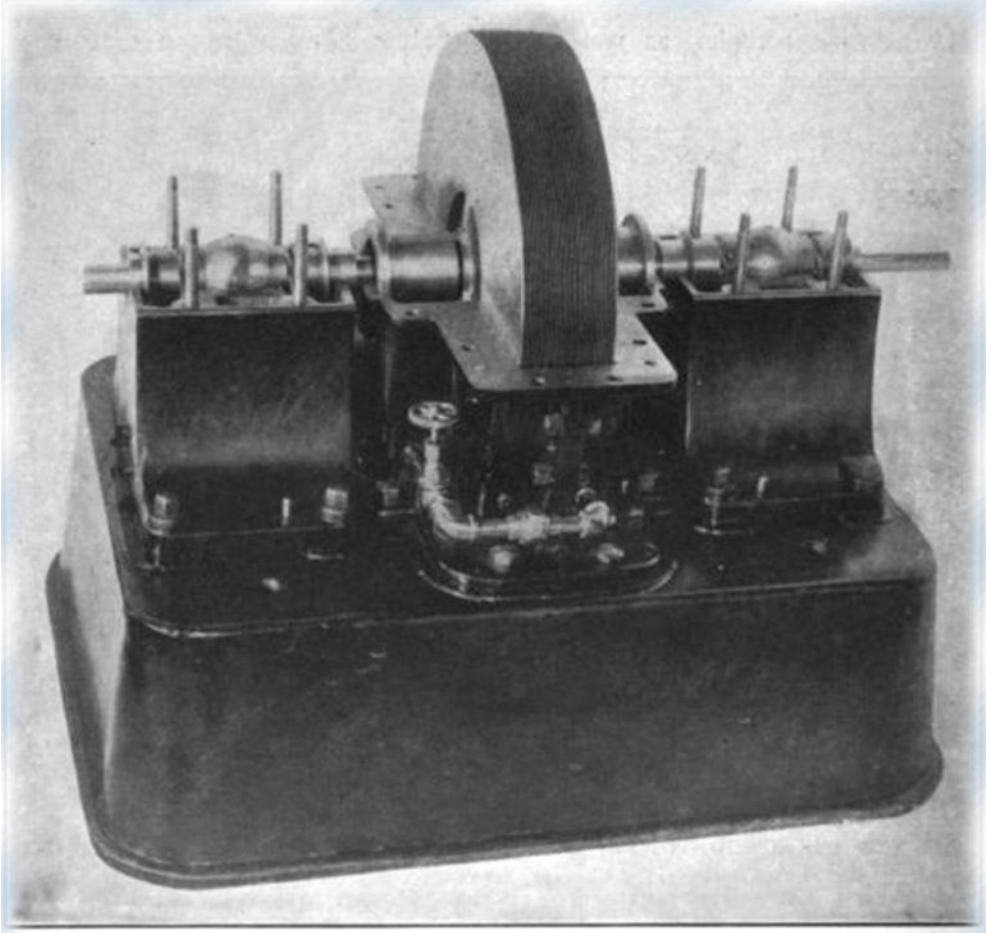
- The disks are adapted to work specially with high-temperature fluids

  This is an important note, as steam is certainly a high-temperature fluid. However, other types of fluids can also be used with this system. Any fluid that has a very high temperature can be used here, though the spacing between the disks needs to be adapted for different fluid types. For example, if the turbine were designed to work with steam, the gap between the disks would need to be no more or less than 0.4 millimeters apart.

- The exhaust heat from the turbine can be used to augment or even create the steam that powers it

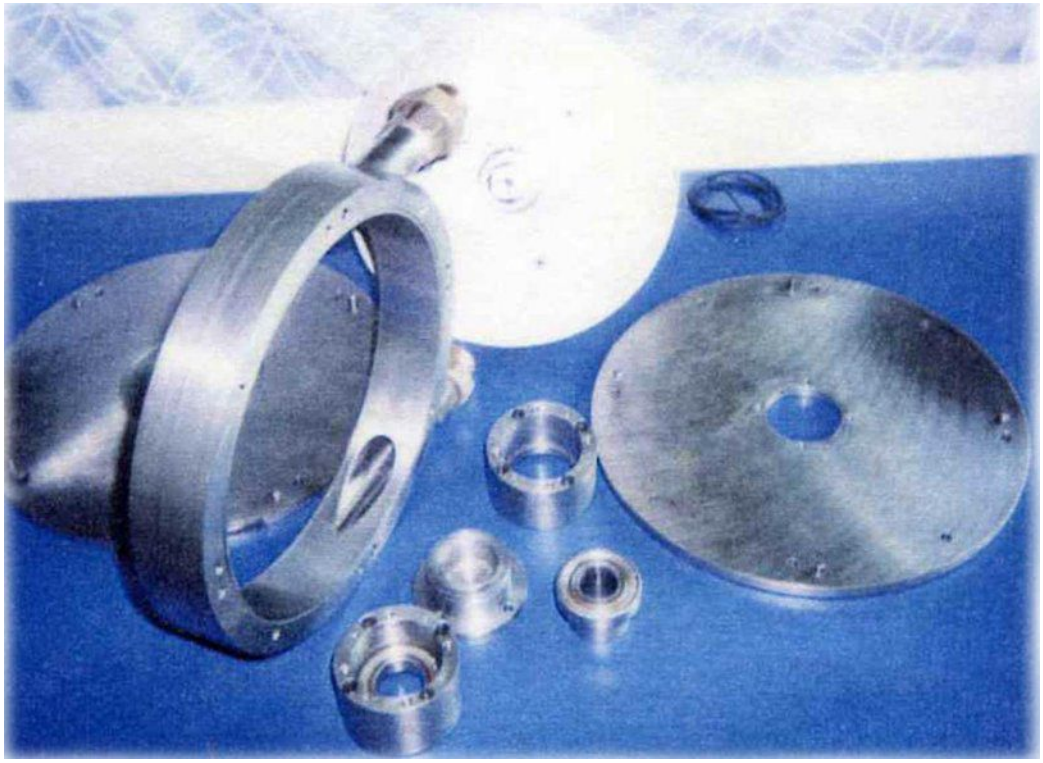
  In a system such as this, once the initial steam power has been generated, the exhaust from the turbine itself can be used to create more steam. This ensures that the turbine has a constant stream of motive force, without the need to use additional energy to boil water and create steam.

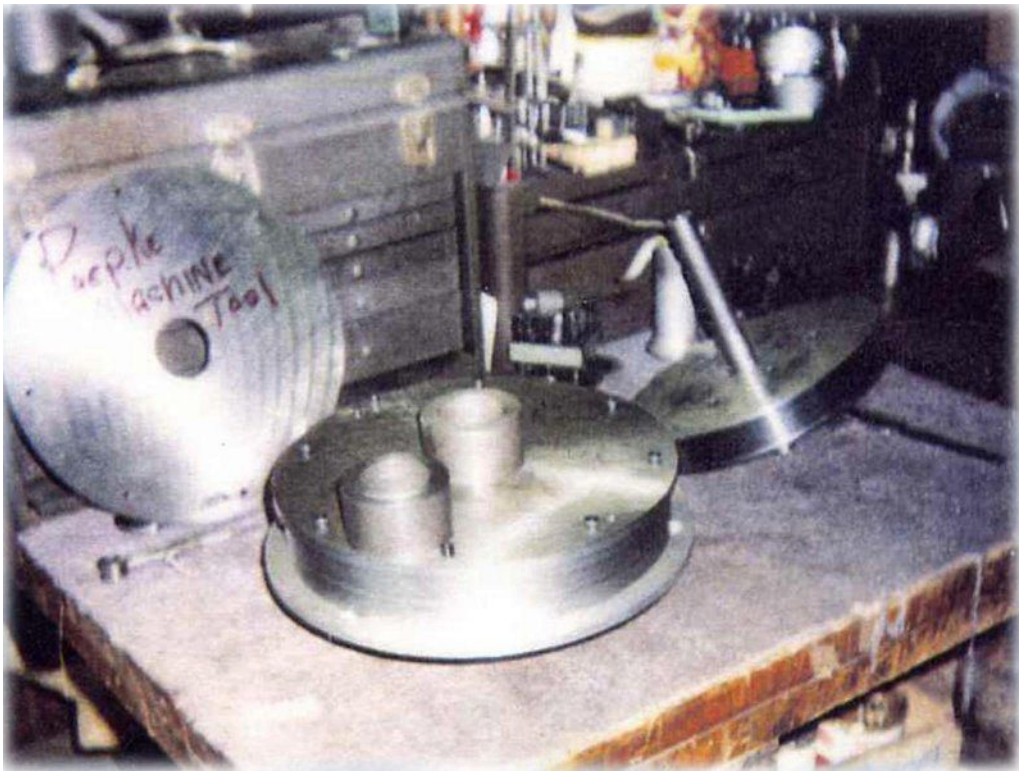
Below, you will find another picture of a Tesia turbine. This one clearly shows the disk separation, and was actually built to use steam as a motive force.



A TESLA TURBINE WITH THE TOP OFF

SHOWING THE SERIES OF THIN DISKS BETWEEN WHICH THE STEAM PASSES AND WHICH, BY THE POWERS OF ADHESION AND VISCOSITY, THE STEAM DRAGS WITH IT IN ITS REVOLVING COURSE





A homemade Tesla Turbine

Example of how to build a Tesla Disc Turbine

The model described is approximately one half the size of the original Tesla unit, but uses present-day materials and techniques, and is devised so as to be made by the average model engineer, using tools and equipment generally available. Some metal-working experience is assumed, and a basic understanding of drawings. Required machine tools are a lathe, with a 3.5" centre height, ideally with a milling attachment, and circular table, a bench drill, micrometer or vernier, and conventional hand tools.

While the drawings define specific dimensions and tolerances, these can be amended to suit the tools available; for example, the threads may be to B.A. or U.N.F. and the toleranced dimensions adjusted, providing that the specified relative clearances are maintained. An air pressure source is required to drive the turbine, capable of supplying 2 bar and 1.5 cu. ft. per minute free air. A propellant may be adapted as an alternative, or a model stationary steam engine boiler could possibly be utilised.

Materials required are:

-aluminium bar, 85 mm. diameter;
-steel bar 12 mm. diameter;
-aluminium sheet, ideally Duralumin, hard temper, of 1.25 mm. thickness
-and 270 mm. x 360 mm. cut into 90 mm. squares;
-a small piece of bronze, 12 mm. diameter;
-a 50 mm.length of 100mm. diameter tube;
-a small piece of steel or brass plate 4 mm. thick.

Some materials may also be needed for jigs and templates, such as:

-a square piece of aluminium 80 mm. x 80 mm., and 12 mm. thick;
-a piece of silver steel;
-a piece of steel plate 1.5 mm. thick for a template.

These latter items are at the discretion of the model maker, to suit his method of making the discs.

Stock items required are:

-9 off M4 x 35 bolts;
-2 off M3 x 10 screws;
-an M8 stiffnut;
-9 off M4 hexagon stiffnuts;
-3 off aluminium rivets, with countersunk heads and 15mm. long; -
Loctite Studlock;
-a piece of 0.075 mm. thick Mylar film, 180 mm. x 180 mm. for the gaskets, as required.

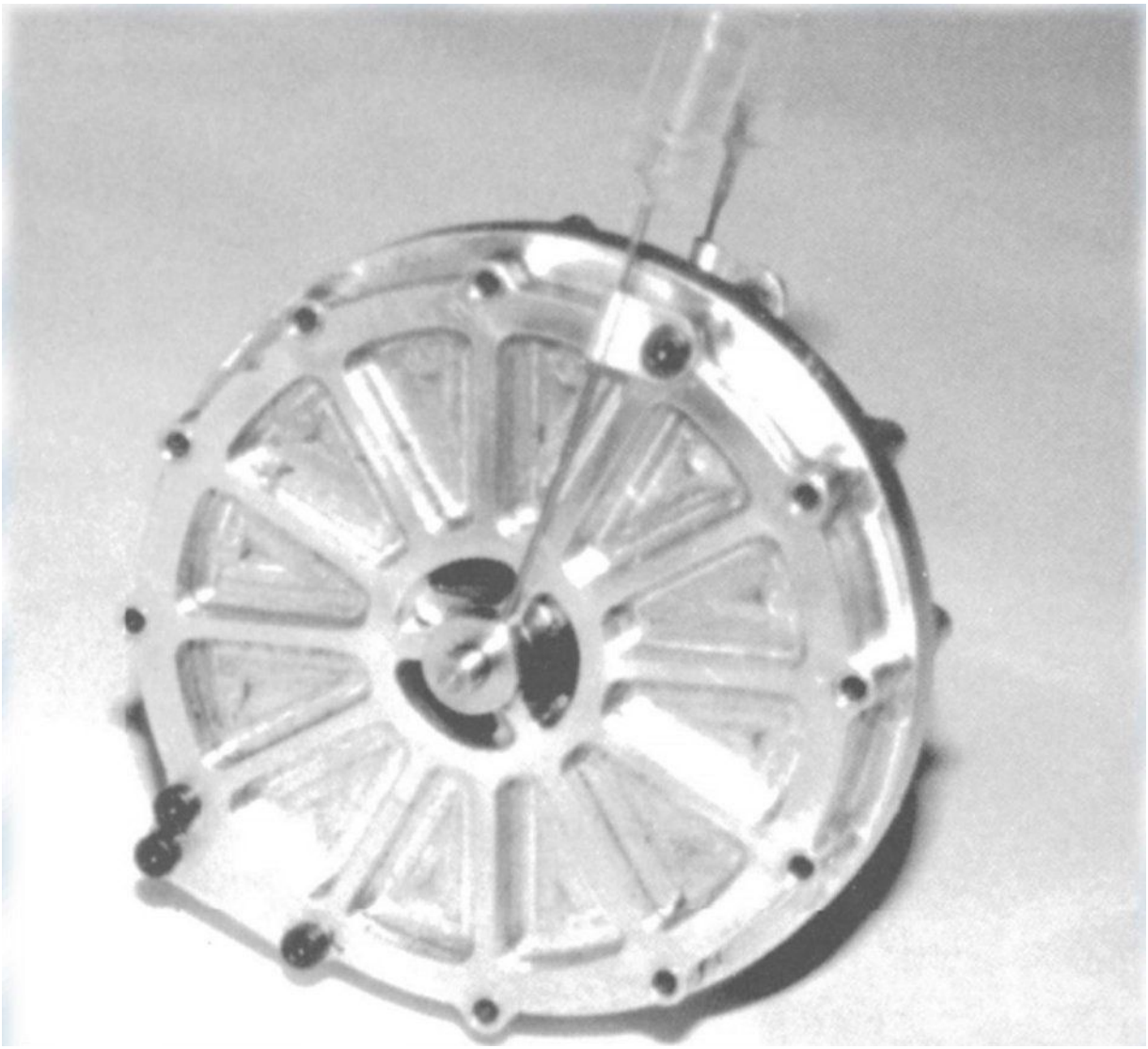
Making the parts

The methods described are intended as a guide, and are similar to those used to make the prototype. Individuals may prefer to use different methods, to suit their own particular skills, and the equipment available.

The stator and end covers, items 1, 2 and 3, are turned from aluminum bar, boring and facing the ends, maintaining the concentricities and squareness as shown. The bearing bush, item 6, can be fitted to the end covers while in the lathe; note that the bush has a lead-in chamber. Use a suitable peg to align squarely, and finish, ream or bore to size.

The stator has a slot which cuts through the bore. This is cut with an end mill, and may be sized as shown, or left with material on, if experimentation with inlet sizes is required. As the part is cut through, it may be advisable to make a support ring to prevent spring-back, taking care when sizing to use only a light cut due to the presence of the slot. Finally, drill the flange fixing holes, and tap the inlet adaptor holes.

The shaft, item 5, is a conventional lathe turning task; note that a trimming allowance is left on, as shown. Cut the keyway using a 2 mm. dia. end mill, keeping central, and in line with the shaft axis.



Complete model disc turbine engine

Bearing surfaces are polished. Concentricity of the identified dimensions is important, and if possible, these features should be ground.

The ten discs, item 4, are probably the most difficult part to make. Ideally, they would be produced by electrochemical machining, but this requires specialised equipment which is not readily available to model engineers.

The method described is the process by which the prototypes were made, and is based on the practice used to make P.c. boards. It requires a milling head, and a rotary table, but the item can be made by careful drilling and filing.

Hard aluminium is the material used, cut into 90 mm. squares, and a template will be required, as will a template for the spacing portion, and a suitable location peg. More experienced modellers may not need the template. The disc blanks are attached to a similar sized piece of alloy, using suitable screws.

The unit is mounted onto a rotary table, and using a 6 mm. diameter end mill, the profile of the spacer and the ports are milled out, with holes drilled for the rivets, as shown. Use a sharp, preferably new, cutter, with fine feed and high speed. Cut the key slot, filing carefully, or slot on the miller. The disc is now rotated, using the same cutter, and the outer diameter cut, leaving four equally spaced nibs to retain the disc in the sheet, with an allowance left on the outer diameter for final finishing to size, as an assembly.

The discs may be cut by hand, with the spacer formed separately, leaving a finishing allowance on the outer diameter. The milling head may be traversed axially and longitudinally, thus not requiring a rotary table, the final shapes being made by hand finishing. When completed, the disc can be removed from the support and the nibs cut off. Finally, trim the disc to remove all burrs, noting the remarks regarding square edges.

The two bearing bushes, item 6, are turned from a suitable material; bronze is specified as this is probably the easiest to obtain, but for sustained use, a steel or bronze backed lead-tin bearing is preferred. The bore in the housings will require amendment to suit whichever is the chosen type. Refer to the housings for the fitting of the bearings. Ensure the oil holes are aligned before installing.

The inlet manifold assembly, item 7, is fabricated from copper tube and a brass or mild steel plate, brazed together. The plate is formed over a mandrel, 84 mm. in diameter, and holes drilled as shown. The connecting pipe is bent up from copper tube; both parts may require annealing to aid forming. Braze the two parts together, using a suitable flux and brazing rod. In the absence of brazing equipment, soft solder may be substituted: a fairly large iron will be needed. Finally, clean up, using emery or an acid dip.

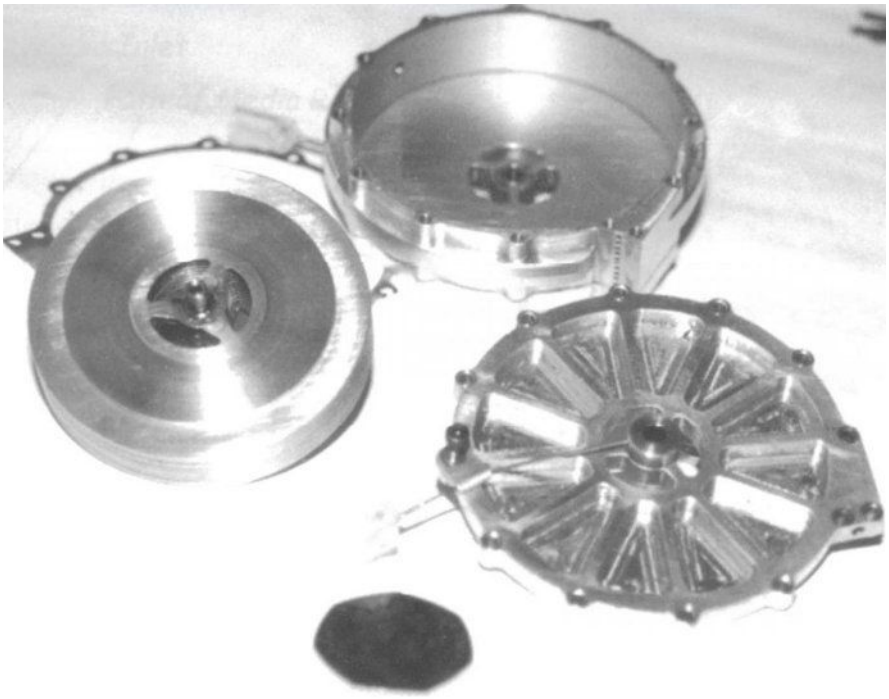


FIG. 16 COMPLETED MODEL DISC TURBINE ENGINE MAIN COMPONENTS

The rotor assembly comprises of the discs, shaft, nut, rivet and a drive key. Assemble the discs to the shaft, using a plain nut to retain, and ensure that the rivet holes are in line, and the rivets enter satisfactorily.

Check the overall dimension of the stack, and compare to the relevant dimensions on the stator. Check the clearances between the end cover faces, and the shaft on the bearing bushes. A running clearance is required between the shaft and end of the bushes, with the rotor centralised in the stator. Use a shim between the end covers and stator, to obtain a clearance.Mount the assembly between centers, and at a slow speed rotate the assembly. With a sharp tool, and a very low feed, trim the discs to size, to give a clearance in the bore of between 0.250 and 0.350 mm. on radius. Remove burr, and

check for run-out. If more than 0.05 mm, adjust the side clearance to accommodate. A large slide clearance will not be detrimental to running, but will affect the output performance. Close the rivets, making sure they are flush to under flush. Remove the nut, and replace with a stiff nut.

Check for static balance, drilling countersunk holes partially into the end discs until satisfactory. Balance is important as the turbine rotates at high speed. Assemble into the stator and end covers, tightening the fastenings as specified, and build on the intake manifold. Lubricate the bearings copiously, and rotate by hand, checking carefully for any tight spots or apparent foul points.

Place between centres and with the housing supported by the cross-slide and at a slow speed, rotate the turbine, gradually increasing speed up to about 1000 RP.M. Watch for any tightness or increase in temperature. Run for 5 minutes, ensuring the bearings are kept well lubricated. Finally, when satisfied, remove from the lathe.

Testing

When satisfied that the unit is turning freely, with no tightness or temperature rise, the unit can be tested using compressed air. This should be done initially, regardless of the medium to be used eventually.

Using a flexible hose, connect to an air source, attaching the hose to the turbine with a hose clip. Between the turbine and the air supply, close to the turbine, provide an onloff valve, preferably of the ball type; for temporary use only, the hose may be squeezed in a vice, or by clamps.

Place a guard over the turbine, and ensure that the exhaust ports are clear of obstruction. Check the air pressure, which must not exceed 2 bar, and slowly open the valve. The turbine will begin to rotate, and as the flow is increased, the speed will build up.

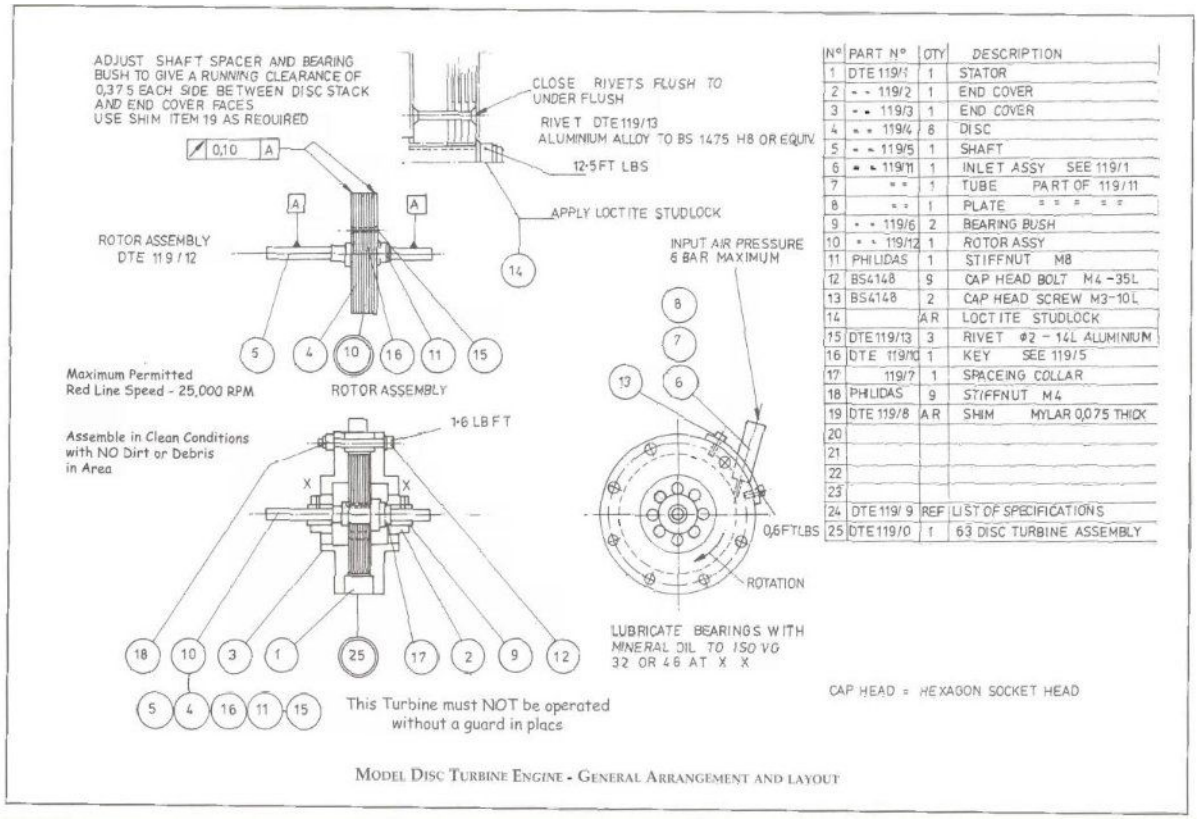
Run for no more than two minutes, stop, check the housing temperature. If cool to slightly warm, re-open the valve and continue running. At around 1.75 bar and 1.5 dm, the turbine will attain a shaft speed of 20,000 RP.M. At all times ensure a supply of oil to the bearings, and continually monitor the housing temperature. It should be noted that the prototype attained a speed of approximately 50,000 RP.M. under no-load conditions; hence it is advised that a brake or dynometer be provided on the shaft.

Upon conclusion of a satisfactory operation on air, an alternative medium can be used to operate the turbine, such as steam from a model boiler. This model is not suitable for use with hot gas, such as is obtained by burning fuel in a suitable combustor.

At all times, ensure a suitable guard is in place, and observe sensible precautions when operating in the presence of other people.

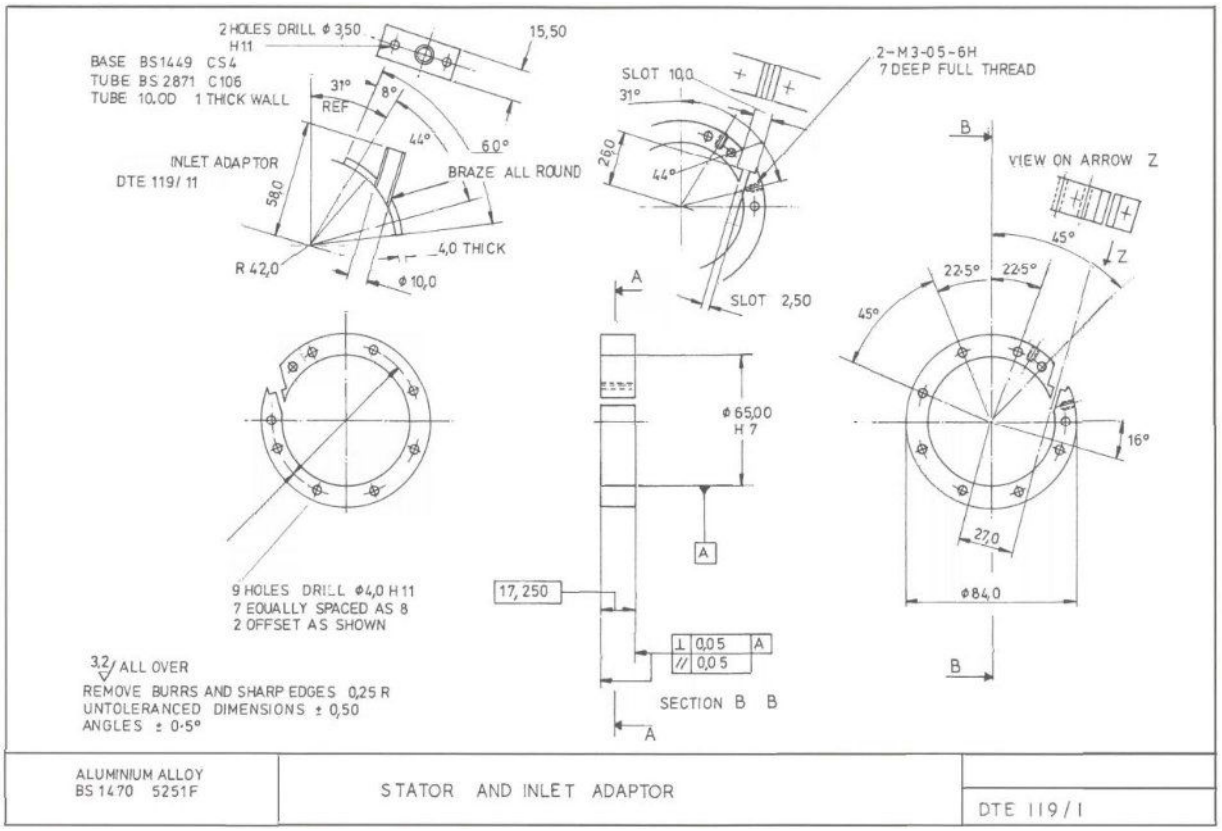
This is a unique machine, and will provide plenty of scope for experimentation and development by the maker.

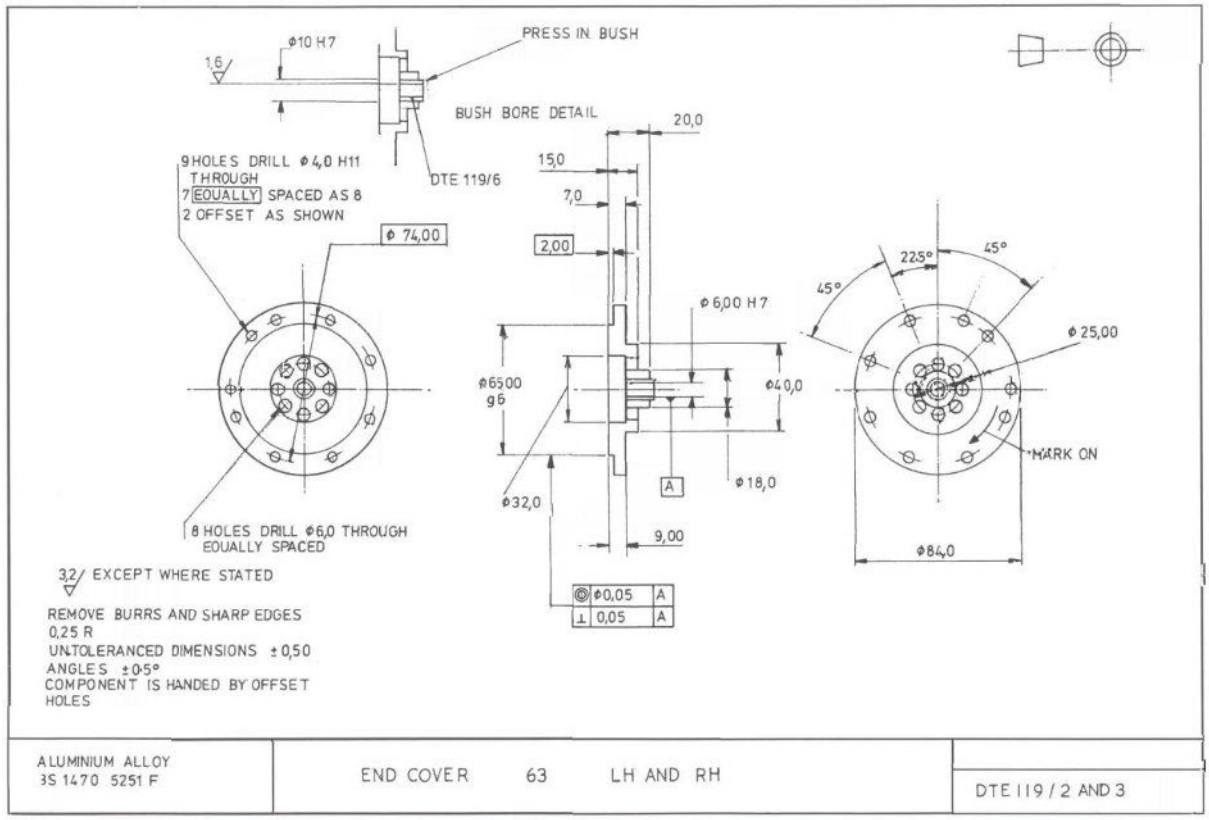
Below you will find some drawings (reduced from full size originals) to help you better understand the process.

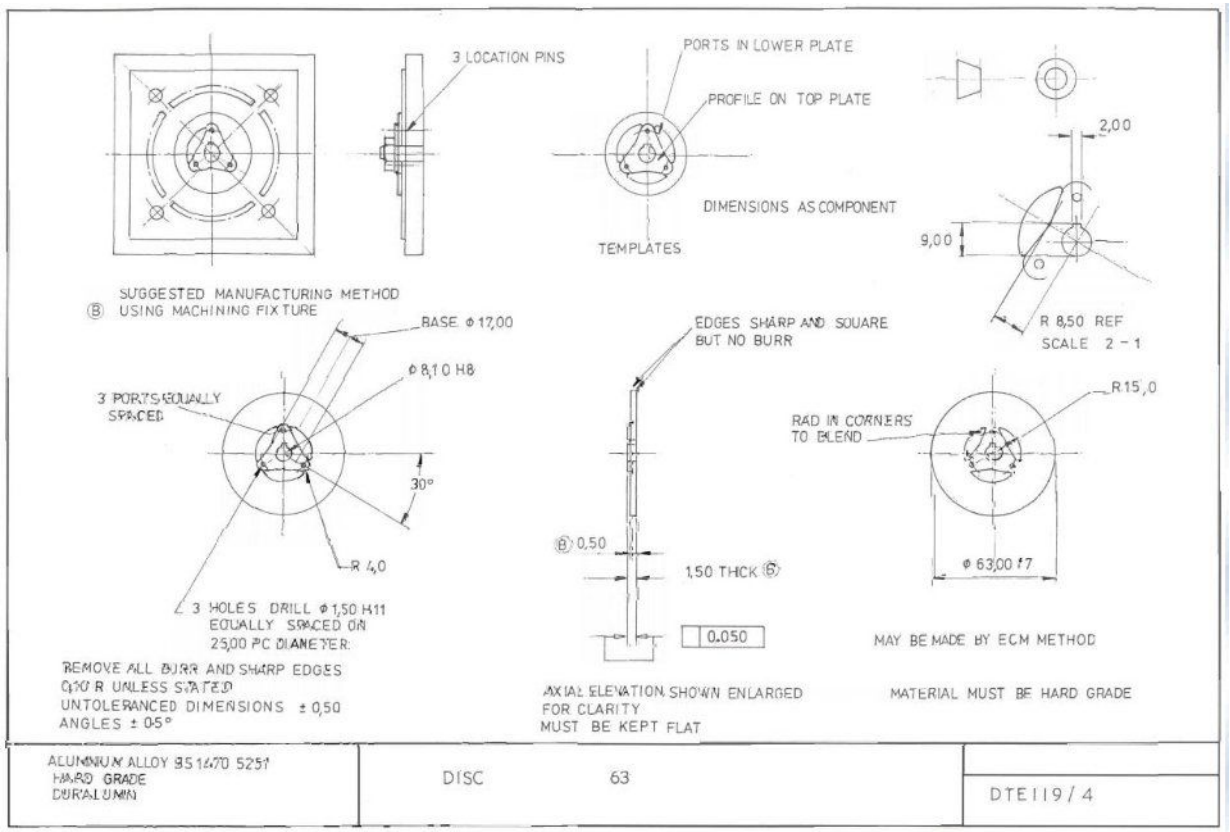


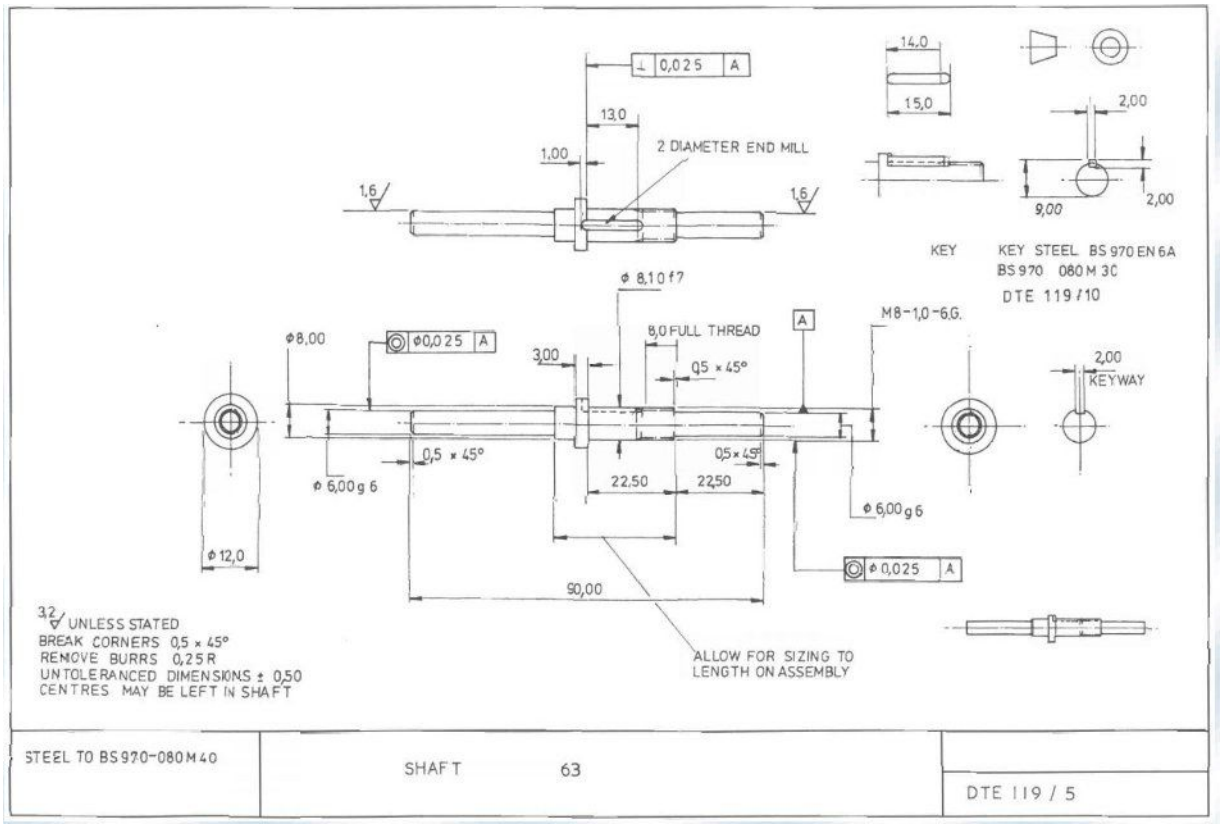
N°	PART N°	QTY	DESCRIPTION
1	DTE 119/1	1	STATOR
2	" " 119/2	1	END COVER
3	" " 119/3	1	END COVER
4	" " 119/4	8	DISC
5	" " 119/5	1	SHAFT
6	" " 119/11	1	INLET ASSY SEE 119/1
7	" "	1	TUBE PART OF 119/11
8	" "	1	PLATE " " " "
9	" " 119/6	2	BEARING BUSH
10	" " 119/12	1	ROTOR ASSY
11	PHILIDAS	1	STIFFNUT M8
12	BS4168	9	CAP HEAD BOLT M4 -35L
13	BS4168	2	CAP HEAD SCREW M3-10L
14		AR	LOCTITE STUDLOCK
15	DTE 119/13	3	RIVET Ø2 - 14L ALUMINIUM
16	DTE 119/10	1	KEY SEE 119/5
17	119/7	1	SPACEING COLLAR
18	PHILIDAS	9	STIFFNUT M4
19	DTE 119/8	AR	SHIM MYLAR 0,075 THICK
20			
21			
22			
23			
24	DTE 119/9	REF	LIST OF SPECIFICATIONS
25	DTE 119/0	1	63 DISC TURBINE ASSEMBLY

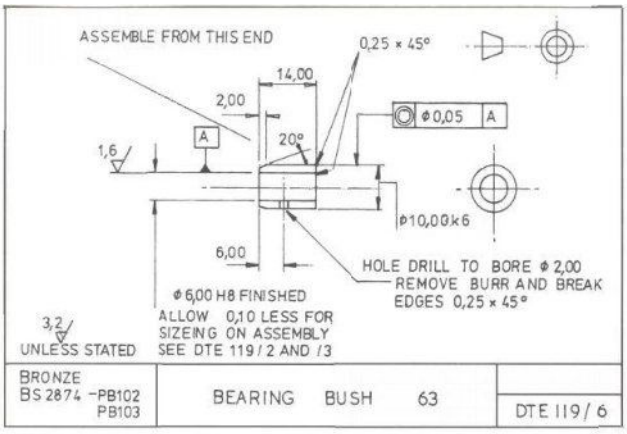
MODEL DISC TURBINE ENGINE - GENERAL ARRANGEMENT AND LAYOUT

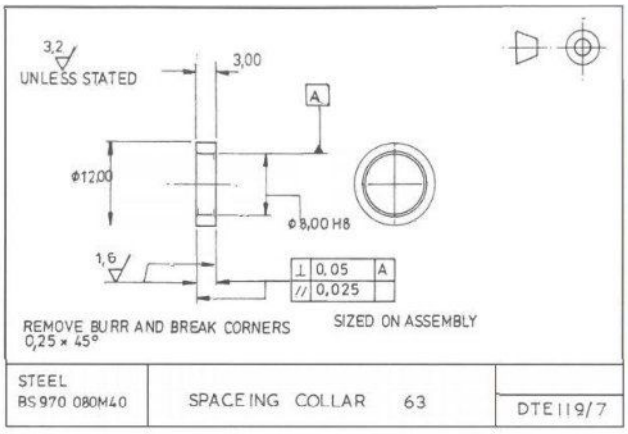


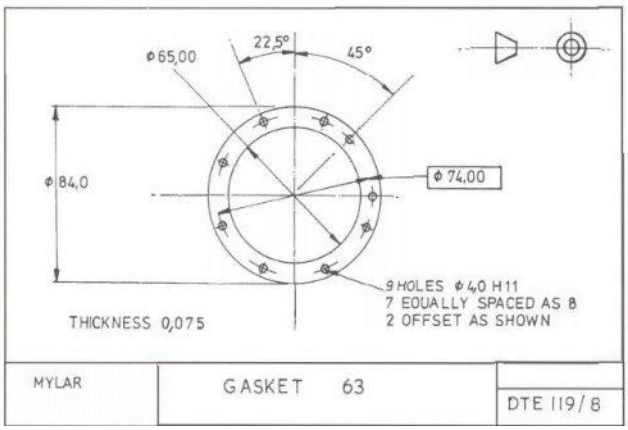

PRESS IN BUSH
Φ10 H7
1,6
BUSH BORE DETAIL
DTE 119/6
20,0
15,0
7,0
2,00
9 HOLES DRILL Φ4,0 H11
THROUGH
7 EQUALLY SPACED AS 8
2 OFFSET AS SHOWN
Φ 74,00
Φ6,00 H7
Φ6500
g6
Φ40,0
Φ18,0
A
Φ32,0
9,00
8 HOLES DRILL Φ6,0 THROUGH
EQUALLY SPACED
225°
45°
45°
Φ25,00
MARK ON
Φ84,0
3,2
EXCEPT WHERE STATED
REMOVE BURRS AND SHARP EDGES
0,25 R
UNTOLERANCED DIMENSIONS ±0,50
ANGLES ±0·5°
COMPONENT IS HANDED BY OFFSET
HOLES
© Φ0,05 A
⊥ 0,05 A
ALUMINIUM ALLOY
3S 1470 5251 F
END COVER 63 LH AND RH
DTE 119 / 2 AND 3


3 LOCATION PINS
PORTS IN LOWER PLATE
PROFILE ON TOP PLATE
DIMENSIONS AS COMPONENT
TEMPLATES
2,00
9,00
R 8,50 REF
SCALE 2 - 1
SUGGESTED MANUFACTURING METHOD
Ⓑ USING MACHINING FIXTURE
BASE Φ17,00
Φ8,10 H8
3 PORTS EQUALLY SPACED
30°
R 4,0
3 HOLES DRILL Φ1,50 H11
EQUALLY SPACED ON
25,00 PC DIAMETER
EDGES SHARP AND SQUARE
BUT NO BURR
Ⓑ 0,50
1,50 THICK Ⓑ
0,050
R15,0
RAD IN CORNERS
TO BLEND
Φ 63,00 f7
MAY BE MADE BY ECM METHOD
REMOVE ALL BURR AND SHARP EDGES
0,10 R UNLESS STATED
UNTOLERANCED DIMENSIONS ± 0,50
ANGLES ± 0·5°
AXIAL ELEVATION SHOWN ENLARGED
FOR CLARITY
MUST BE KEPT FLAT
MATERIAL MUST BE HARD GRADE
ALUMINIUM ALLOY BS 1470 5251
HARD GRADE
DURALUMIN
DISC 63
DTE 119 / 4









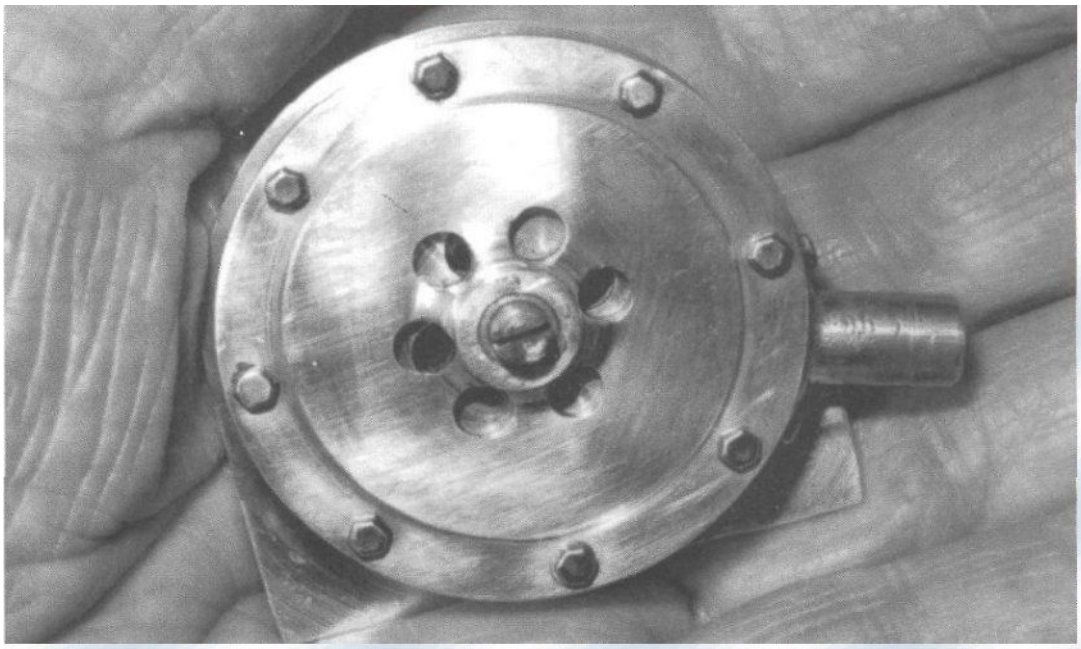
DIA	H11	H8	H7	f7	g6	k6
6 – 10	+ 90	+ 22	+ 15	- 13	- 5	+ 10
	0	0	0	- 28	- 14	+ 1
50 – 65		+ 46	- 30	- 30	- 10	
		0	0	- 60	- 29	

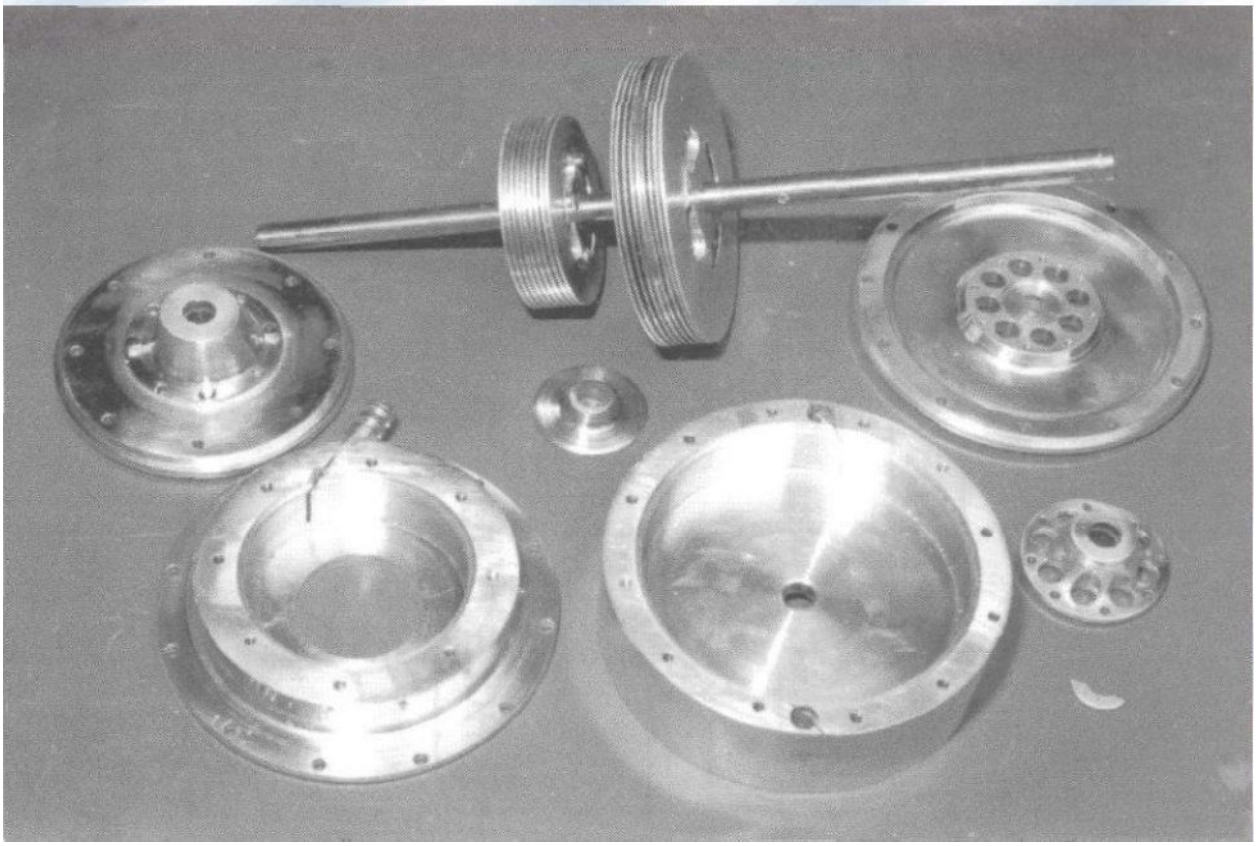
ALL VALUES ARE 0,001 mm REFER TO BS 4500A

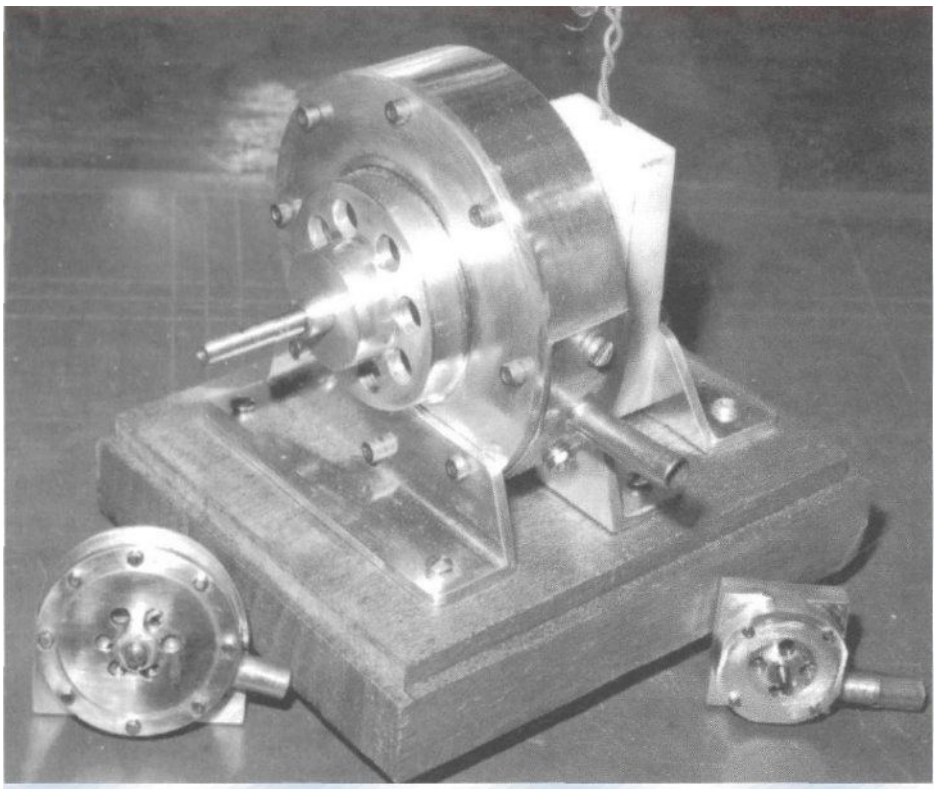
TAP DRILL SIZE FOR M3 – DRILL .ϕ 2,50
SOCKET HEAD SCREWS AND BOLTS TO BS 4168 GRADE 8,8 OR BETTER
TORQUE TIGHTENING VALUES ARE NOMINAL FOR OILED THREAD AND
MAY VARY BY 30 %
DRILLED HOLE POSITIONS WITHIN ⊕ ϕ 0,10 OF TRUE POSITION
DRAWINGS AND GEOMETRIC TOLERANCES SEE BS 308-1984
STIFFNUTS ARE PHILIDAS OR AERO SPLIT NUTS
USE NUTS TO BS 3692-12 OR -8 AND APPLY LOCTITE IF NOT AVAILABLE
RIVETS ITEM 119/13 CUT FROM ALLOY BAR OR STANDARD CSK ITEM

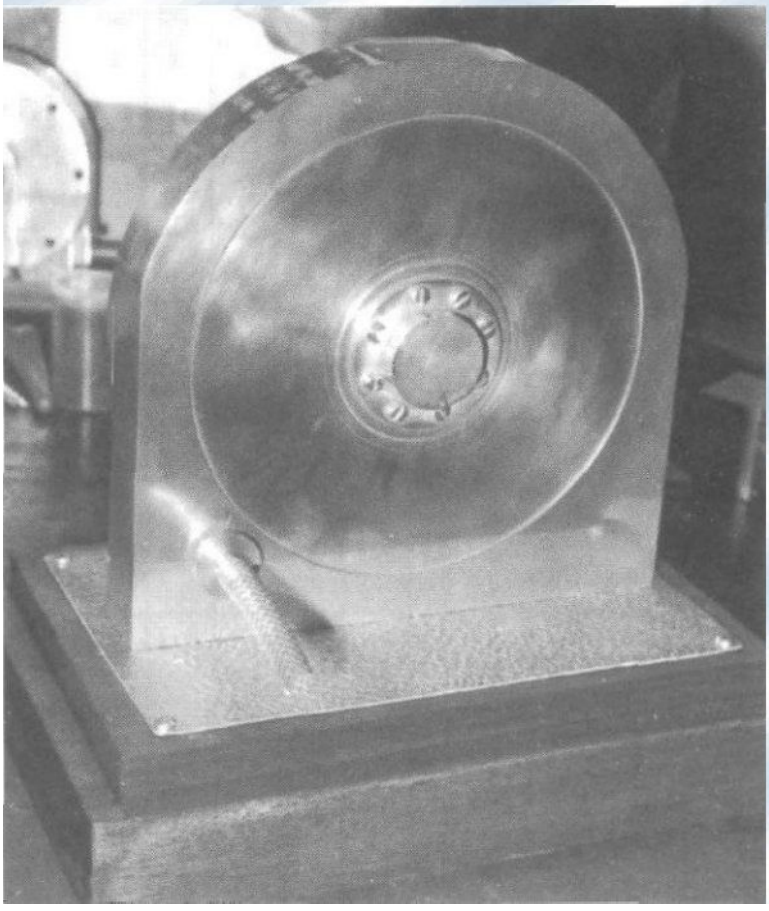
SPECIFICATIONS 63
DTE 119/9

Here are some other examples of Tesia Disk Turbines









Conclusion

The need for proper energy conservation and alternative energy sources is greater today than at any point in history. Nikola Tesia, a man certainly far before his time, foresaw the need for these changes, and called for a massive restructuring in the way the world generated energy. However, except for only a few instances, many of his most innovative designs were buried by financiers and governments, eager to maintain the status quo.

Nevertheless, thanks to this inventor's brilliance, anyone can build their own radiant energy generator. These systems can be as simple or complex as you care to make them. Whether you choose to implement only the radiant energy harvesting system highlighted herein or choose to add other devices invented by Tesia to the system, such as his turbine or a Tesia coil, you can achieve a considerable amount of energy independence.

Appendix

On the following pages, you will find reproductions of Tesla's patents for the devices listed within this book. These can be excellent sources of further information, but they will also give you a glimpse into the mind of the man, himself.

UNITED STATES PATENT OFFICE.

NIKOLA TESLA, OF SMILJAN LIKA, AUSTRIA-HUNGARY, ASSIGNOR TO THE TESLA ELECTRIC LIGHT AND MANUFACTURING COMPANY, OF RAHWAY, NEW JERSEY.

DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 359,748, dated March 22, 1887.

Application filed January 14, 1886. Renewed December 1, 1886. Serial No. 220,370. (No model.)

To all whom it may concern:

Be it known that I, NIKOLA TESLA, of Smiljan Lika, border country of Austria-Hungary, have invented certain Improvements in Dynamo-Electric Machines, of which the following is a specification.

The main objects of my invention are to increase the efficiency of the machine and to facilitate and cheapen the construction of the same; and to this end my invention relates to the magnetic frame and the armature, and to other features of construction, hereinafter more fully explained.

My invention is illustrated in the accompanying drawings, in which Figure 1 is a longitudinal section, and Fig. 2 a cross-section, of the machine. Fig. 3 is a top view, and Fig. 4 a side view, of the magnetic frame. Fig. 5 is an end view of the commutator-bars, and Fig. 6 is a section of the shaft and commutator-bars. Fig. 7 is a diagram illustrating the coils of the armature and the connections to the commutator-plates.

The cores *c c c c* of the field-magnets may be tapering in both directions, as shown, for the purposes of concentrating the magnetism upon the middle of the pole-pieces.

The connecting-frame F F of the field-magnets is in the form indicated in the side view, Fig. 4, the lower part being provided with the spreading curved cast legs *e e*, so that the machine will rest firmly upon two base-bars, *r r*.

To the lower pole, S, of the field-magnet M is fastened, preferably by means of Babbitt or other fusible diamagnetic material, the base B, which is provided with bearings *b* for the armature-shaft H. The base B has a projection, P, which supports the brush-holders and the regulating devices, which may be of any ordinary character, or may be such as shown in an application of like date herewith.

The armature is constructed with the view to reduce to a minimum the loss of power due to the transversal or Foucault currents and to the change of polarity, and also to shorten as much as possible the length of the inactive wire wound upon the armature-core.

It is well known that when the armature is revolved between the poles of the field-magnets currents are generated in the iron body of the armature which develop heat, and consequently cause a waste of power. Owing to the mutual action of the lines of force, the magnetic properties of iron, and the speed of the different portions of the armature-core, these currents are generated principally on and near the surface of the armature-core, diminishing in strength gradually toward the center of the core. Their quantity is under same conditions proportional to the length of the iron body in the direction in which these currents are generated. By subdividing the iron core electrically in this direction the generation of these currents can be reduced to a great extent. For instance, if the length of the armature-core is twelve inches, and by a suitable construction the same is subdivided electrically, so that there are in the generating direction six inches of iron and six inches of intervening air-spaces or insulating material, the currents will be reduced to fifty per cent.

As shown in the drawings, the armature is constructed of thin iron disks D D D, of various diameters, fastened upon the armature-shaft in a suitable manner and arranged according to their sizes, so that a series of iron bodies, *i i i*, is formed, each of which diminishes in thickness from the center toward the periphery. At both ends of the armature the inwardly-curved disks *d d*, preferably of cast-iron, are fastened to the armature-shaft.

The armature-core being constructed as shown, it will be easily seen that on those portions of the armature that are the most remote from the axis, and where the currents are principally developed, the length of iron in the generating direction is only a small fraction of the total length of the armature-core, and besides this the iron body is subdivided in the generating direction, and therefore the Foucault currents are greatly reduced. Another cause of heating is the shifting of the poles of the armature-core. In consequence of the subdivision of the iron in the armature and the increased surface for radiation the risk of heating is lessened.

The iron disks D D D may be insulated or coated with some insulating-paint, a very care-

ful insulation being unnecessary, as an electrical contact between several disks can only occur on places where the generated currents are comparatively weak. An armature-core constructed in the manner described may be revolved between the poles of the field-magnets without showing the slightest increase of temperature.

The end disks, *d d*, which are of sufficient thickness and, for the sake of cheapness, preferably of cast-iron, are curved inwardly, as indicated in the drawings. The extent of the curve is dependent on the amount of wire to be wound upon the armatures. In my present invention the wire is wound upon the armature in two superimposed parts, and the curve of the end disks, *d d*, is so calculated that the first part—that is, practically half of the wire—just fills up the hollow space to the line *x x*; or, if the wire is wound in any other manner, the curve is such that when the whole of the wire is wound the outside mass of wires, *w*, and the inside mass of wires, *w'*, are equal at each side of the plane *x x*. In this case it will be seen the passive or electrically-inactive wires are of the smallest length practicable. The arrangement has further the advantage that the total lengths of the crossing wires at the two sides of the plane *x x* are practically equal.

To further equalize the armature-coils at both sides of the plates that are in contact with the brushes, the winding and connecting up is effected in the following manner: The whole wire is wound upon the armature-core in two superimposed parts, which are thoroughly insulated from each other. Each of these two parts is composed of three separated groups of coils. The first group of coils of the first part of wire being wound and connected to the commutator-bars in the usual manner, this group is insulated and the second group wound; but the coils of this second group instead of being connected to the next following commutator-bars, are connected to the directly-opposite bars of the commutator. The second group is then insulated and the third group wound, the coils of this group being connected to those bars to which they would be connected in the usual way. The wires are then thoroughly insulated and the second part of wire wound and connected in the same manner. Suppose, for instance, that there are twenty-four coils—that is, twelve in each part—and consequently twenty-four commutator-plates. There will be in each part three groups, each containing four coils, and the coils will be connected as follows:

	Groups.	*Commutator-bars.*
First part of wire	First	1—5
	Second	17—21
	Third	9—13
Second part of wire	First	13—17
	Second	5—9
	Third	21—1

In constructing the armature-core and winding and connecting the coils in the manner indicated, the passive or electrically-inactive wire is reduced to a minimum, and the coils at each side of the plates that are in contact with the brushes are practically equal, and in this way the electrical efficiency of the machine is increased.

The commutator-plates *t* are shown as outside the bearing *b* of the armature-shaft. The shaft H is tubular and split at the end portion, and the wires are carried through the same in any usual manner and connected to the respective commutator-plates. The commutator-plates are upon a cylinder, *u*, and insulated, and this cylinder is to be properly placed and secured by expanding the split end of the shaft by a tapering screw-plug, *v*.

I do not claim herein the cores of the field-magnets converging toward the pole-pieces; nor do I claim the method of fastening the base to the lower field-magnet, as this has been claimed in my former application on dynamo-electric machines.

What I claim is—

1. In a dynamo-electric machine, the armature constructed of iron disks of various diameters arranged upon the shaft in such a manner that a series of iron bodies is formed, each diminishing in thickness from the center to the periphery, substantially as and for the purposes set forth.

2. In a dynamo-electric machine, the armature-core having iron disks of various diameters, in combination with inwardly-curved end disks, for the purposes and substantially as set forth.

3. In a dynamo-electric machine, an armature-core having inwardly-curved ends, in combination with the armature-coils, the crossing wires of which coils pass into the concave heads and project equally, substantially as set forth.

4. In a dynamo-electric machine, an armature having separate coils superimposed and connected to the commutator-plates in alternating groups, substantially as set forth.

5. An armature for dynamo-electric machines, having a core composed of disks of various diameters, in combination with separate superimposed coils connected to the commutator-plates in alternate groups, substantially as set forth.

6. In a dynamo-electric machine, the magnetic frame composed of the cores *c c c c*, the curved pole-pieces N S, and the connecting-frame with the curved and outwardly-projecting legs *e e*, substantially as described.

Signed by me this 12th day of January, A. D. 1886.

NIKOLA TESLA.

Witnesses:
GEO. T. PINCKNEY,
WALLACE L. SERRELL.

(No Model.) 3 Sheets—Sheet 1.

N. TESLA.

DYNAMO ELECTRIC MACHINE.

No. 359,748. Patented Mar. 22, 1887.

Fig. 1.

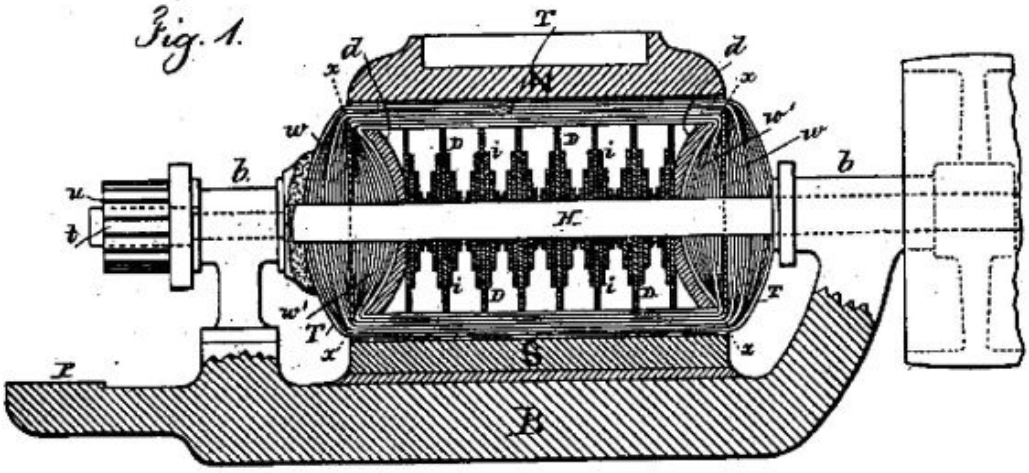
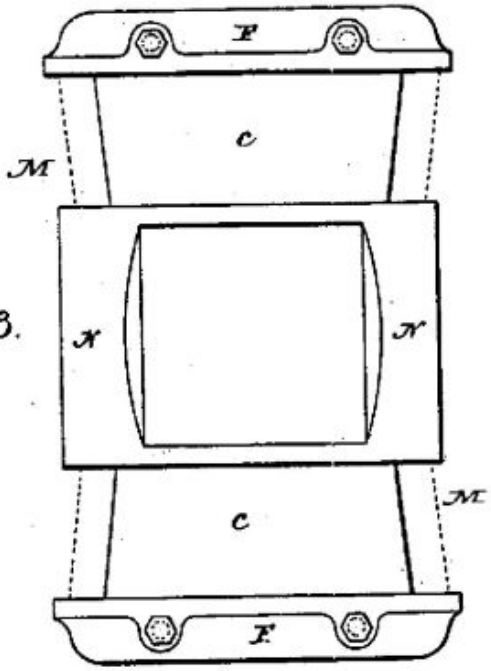


Fig. 3.



Witnesses

Chas. H. Smith

J. Stahl

Inventor

Nikola Tesla

per Lemuel W. Serrell

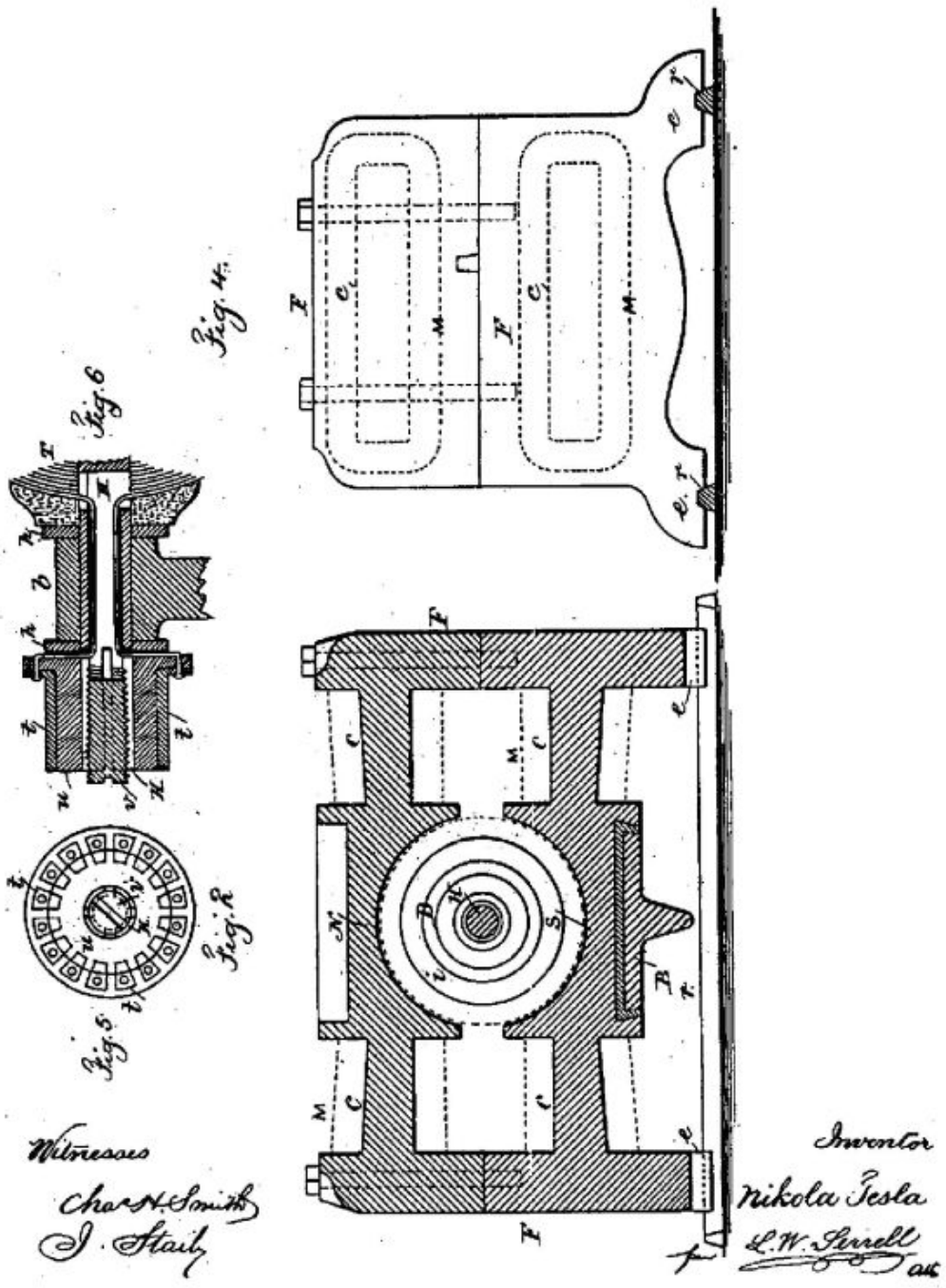
atty

(No Model.) 3 Sheets—Sheet 2.

N. TESLA.

DYNAMO ELECTRIC MACHINE.

No. 359,748. Patented Mar. 22, 1887.



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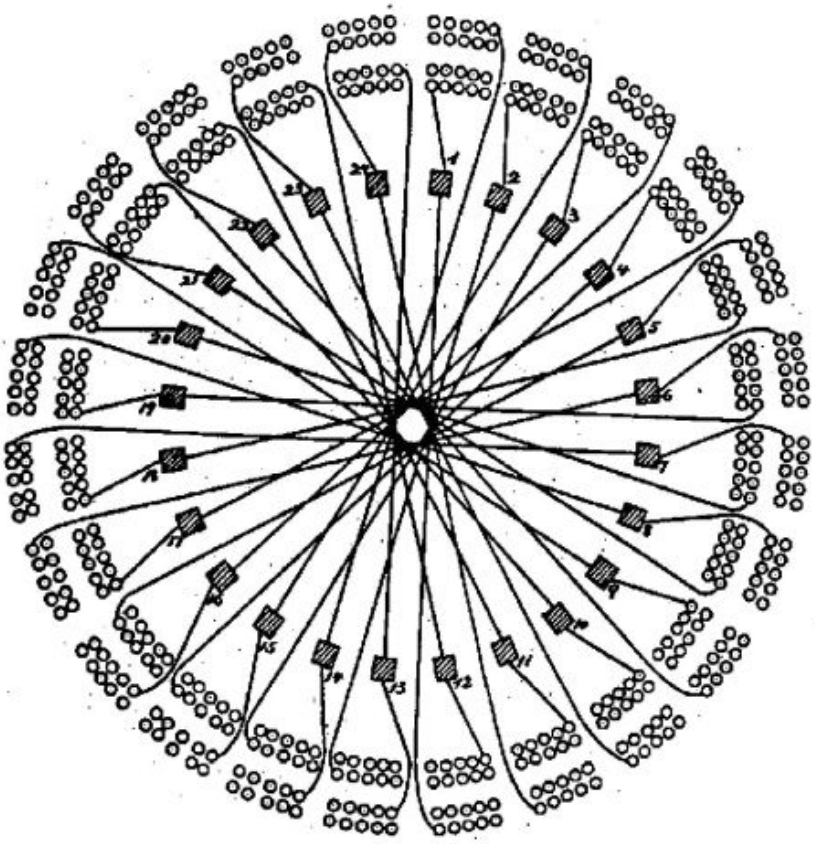
N. TESLA.

DYNAMO ELECTRIC MACHINE.

No. 359,748. Patented Mar. 22, 1887.

Fig. 7.



Witnesses
Chas. H. Smith
Geo. T. Pinckney

Inventor
Nikola Tesla
for Lemuel W. Serrell
atty

UNITED STATES PATENT OFFICE.

NIKOLA TESLA, OF NEW YORK, N. Y.

METHOD OF UTILIZING RADIANT ENERGY.

SPECIFICATION forming part of Letters Patent No. 685,958, dated November 5, 1901.

Application filed March 21, 1901. Serial No. 52,154. (No model.)

To all whom it may concern:

Be it known that I, NIKOLA TESLA, a citizen of the United States, residing at the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Methods of Utilizing Radiant Energy, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

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

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

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

ed to the plate or conductor above mentioned, I usually connect the second terminal of the condenser to the ground, this being the most convenient way of obtaining negative electricity, dispensing with the necessity of providing an artificial source. In order to utilize for any useful purpose the energy accumulated in the condenser, I furthermore connect to the terminals of the same a circuit including an instrument or apparatus which it is desired to operate and another instrument or device for alternately closing and opening the circuit. This latter may be any form of circuit-controller, with fixed or movable parts or electrodes, which may be actuated either by the stored energy or by independent means.

The rays or radiations which are to be utilized for the operation of the apparatus above described in general terms may be derived from a natural source, as the sun, or may be artificially produced by such means, for example, as an arc-lamp, a Roentgen tube, and the like, and they may be employed for a great variety of useful purposes.

My discovery will be more fully understood from the following detailed description and annexed drawings, to which reference is now made, and in which—

Figure 1 is a diagram showing typical forms of the devices or elements as arranged and connected in applying the method for the operation of a mechanical contrivance or instrument solely by the energy stored; and Fig. 2 is a diagrammatical representation of a modified arrangement suitable for special purposes, with a circuit-controller actuated by independent means.

Referring to Fig. 1, C is the condenser, P the insulated plate or conducting body, which is exposed to the rays, and P' another plate or conductor, all being joined in series, as shown. The terminals T T' of the condenser are also connected to a circuit including a receiver R, which is to be operated, and a circuit-controlling device *d*, which in this case is composed of two very thin conducting-plates *t t'*, placed in close proximity and very mobile, either by reason of extreme flexibility or owing to the charater of their support. To improve their action, they should be inclosed in a receptacle from which the air may be exhausted. The receiver R is shown as consisting of an electromagnet M, a movable armature *a*, a retractile spring *b*, and a ratchet-wheel *w*, provided with a spring-pawl *r*, which is pivoted to armature *a*, as illustrated. The apparatus being arranged as shown, it will be found that when the radiations of the sun or of any other source capable of producing the effects before described fall upon the plate P an accumulation of electrical energy in the condenser C will result. This phenomenon, I believe, is best explained as follows: The sun as well as other sources of radiant energy throw off minute particles of matter positively electrified, which, impinging upon the plate P, communicate an electrical charge to the same. The opposite terminal of the condenser being connected to the ground, which may be considered as a vast reservoir of negative electricity, a feeble current flows continuously into the condenser, and inasmuch as these supposed particles are of an inconceivably small radius or curvature, and consequently charged to a relatively very high potential, this charging of the condenser may continue, as I have found in practice, almost indefinitely, even to the point of rupturing the dielectric. Obviously whatever circuit-controller be employed it should operate to close the circuit in which it is included when the potential in the condenser has reached the desired magnitude. Thus in Fig. 2 when the electrical pressure at the terminals T T' rises to a certain predetermined value the plates *t t'*, attracting each other, close the circuit connected to the terminals. This permits a flow of current which energizes the magnet M, causing it to draw down the armature *a* and impart a partial rotation to the ratchet-wheel *w*. As the current ceases the armature is retracted by the spring *b* without, however, moving the wheel *w*. With the stoppage of the current the plates *t t'* cease to be attracted and separate, thus restoring the circuit to its original condition.

Many useful applications of this method of utilizing the radiations emanating from the sun or other source and many ways of carrying out the same will at once suggest themselves from the above description. By way of illustration a modified arrangement is shown in Fig. 2, in which the source S of radiant energy is a special form of Roentgen tube devised by me having but one terminal *k*, generally of aluminium, in the form of half a sphere with a plain polished surface on the front side, from which the streams are thrown off. It may be excited by attaching it to one of the terminals of any generator of sufficiently-high electromotive force; but whatever apparatus be used it is important that the tube be exhausted to a high degree, as otherwise it might prove entirely ineffective. The working or discharge circuit connected to the terminals T T' of the condenser includes in this case the primary *p* of a transformer and a circuit-controller comprising a fixed terminal or brush *t* and a movable terminal *t'* in the shape of a wheel with conducting and insulating segments which may be rotated at an arbitrary speed by any suitable means. In inductive relation to the primary wire or coil *p* is a secondary *s*, usually of a much greater number of turns, to the ends of which is connected a receiver R. The terminals of the condenser being connected as indicated, one to an insulated plate P and the other to a grounded plate P', when the tube S is excited rays or streams of matter are emitted from the same, which convey a positive charge to the plate P and condenser-terminal T, while terminal T' is continuously receiving negative electricity from the plate

P'. This, as before explained, results in an accumulation of electrical energy in the condenser, which goes on as long as the circuit including the primary p is interrupted. Whenever the circuit is closed, owing to the rotation of the terminal t', the stored energy is discharged through the primary p, this giving rise in the secondary s to induced currents which operate the receiver R.

It is clear from what has been stated above that if the terminal T' is connected to a plate supplying positive instead of negative electricity the rays should convey negative electricity to plate P. The source S may be any form of Roentgen or Lenard tube; but it is obvious from the theory of action that in order to be very effective the electrical impulses exciting it should be wholly or at least preponderatingly of one sign. If ordinary symmetrical alternating currents are employed, provision should be made for allowing the rays to fall upon the plate P only during those periods when they are productive of the desired result. Evidently if the radiations of the source be stopped or intercepted or their intensity varied in any manner, as by periodically interrupting or rythmically varying the current exciting the source, there will be corresponding changes in the action upon the receiver R, and thus signals may be transmitted and many other useful effects produced. Furthermore, it will be understood that any form of circuit-closer which will respond to or be set in operation when a predetermined amount of energy is stored in the condenser may be used in lieu of the device specifically described with reference to Fig. 1, and also that the special details of construction and arrangement of the several parts of the apparatus may be very greatly varied without departure from the invention.

Having described my invention, what I claim is—

1. The method of utilizing radiant energy, which consists in charging one of the armatures of a condenser by rays or radiations, and the other armature by independent means, and discharging the condenser through a suitable receiver, as set forth.

2. The method of utilizing radiant energy, which consists in simultaneously charging a condenser by means of rays or radiations and an independent source of electrical energy, and discharging the condenser through a suitable receiver, as set forth.

3. The method of utilizing radiant energy, which consists in charging one of the armatures of a condenser by rays or radiations, and the other by independent means, controlling the action or effect of said rays or radiations and discharging the condenser through a suitable receiver, as set forth.

4. The method of utilizing radiant energy, which consists in charging one of the armatures of a condenser by rays or radiations and the other by independent means, varying the intensity of the said rays or radiations and periodically discharging the condenser through a suitable receiver, as set forth.

5. The method of utilizing radiant energy, which consists in directing upon an elevated conductor, connected to one of the armatures of a condenser, rays or radiations capable of positively electrifying the same, carrying off electricity from the other armature by connecting the same with the ground, and discharging the accumulated energy through a suitable receiver, as set forth.

6. The method of utilizing radiant energy, which consists in charging one of the armatures of a condenser by rays or radiations, and the other by independent means, and effecting by the automatic discharge of the accumulated energy the operation or control of a suitable receiver, as set forth.

NIKOLA TESLA.

Witnesses:
M. LAWSON DYER,
RICHARD DONOVAN.

No. 685,958. Patented Nov. 5, 1901.

N. TESLA.

METHOD OF UTILIZING RADIANT ENERGY.

(Application filed Mar. 21, 1901.)

(No Model.)

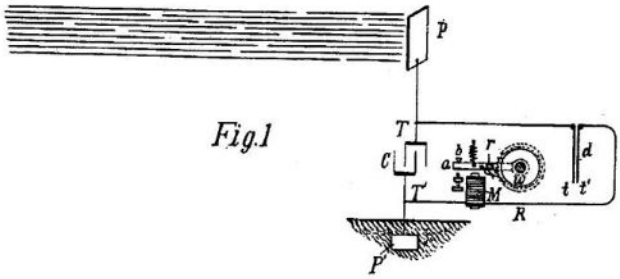


Fig.1

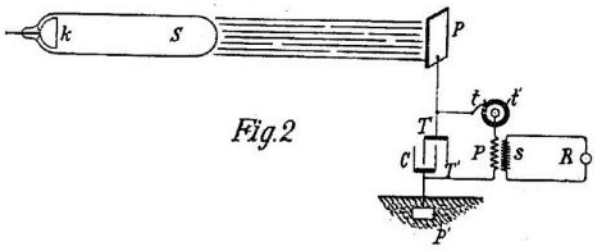


Fig.2

Witnesses:
Raphael Netter
M. Lawson Dyer

Nikola Tesla, Inventor
by Kerr, Page & Cooper
Attys

UNITED STATES PATENT OFFICE.

NIKOLA TESLA, OF NEW YORK, N. Y.

TURBINE.

1,061,206. Specification of Letters Patent. Patented May 6, 1913.

Original application filed October 21, 1909, Serial No. 523,832. Divided and this application filed January 17, 1911. Serial No. 603,049.

To all whom it may concern:

Be it known that I, NIKOLA TESLA, a citizen of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Rotary Engines and Turbines, of which the following is a full, clear, and exact description.

In the practical application of mechanical power, based on the use of fluid as the vehicle of energy, it has been demonstrated that, in order to attain the highest economy, the changes in the velocity and direction of movement of the fluid should be as gradual as possible. In the forms of apparatus heretofore devised or proposed, more or less sudden changes, shocks and vibrations are unavoidable. Besides, the employment of the usual devices for imparting to, or deriving energy from a fluid, such as pistons, paddles, vanes and blades, necessarily introduces numerous defects and limitations and adds to the complication, cost of production and maintenance of the machines.

The object of my invention is to overcome these deficiencies and to effect the transmission and transformation of mechanical energy through the agency of fluids in a more perfect manner and by means simpler and more economical than those heretofore employed. I accomplish this by causing the propelling fluid to move in natural paths or stream lines of least resistance, free from constraint and disturbance such as occasioned by vanes or kindred devices, and to change its velocity and direction of movement by imperceptible degrees, thus avoiding the losses due to sudden variations while the fluid is imparting energy.

It is well known that a fluid possesses, among others, two salient properties, adhesion and viscosity. Owing to these a solid body propelled through such a medium encounters a peculiar impediment known as "lateral" or "skin resistance," which is twofold, one arising from the shock of the fluid against the asperities of the solid substance, the other from internal forces opposing molecular separation. As an inevitable consequence a certain amount of the fluid is dragged along by the moving body. Conversely, if the body be placed in a fluid in motion, for the same reasons, it is impelled in the direction of movement. These effects, in themselves, are of daily observation, but I believe that I am the first to apply them in a practical and economical manner in the propulsion of fluids or in their use as motive agents.

In an application filed by me October 21st, 1909, Serial Number 523,832 of which this case is a division, I have illustrated the principles underlying my discovery as embodied in apparatus designed for the propulsion of fluids. The same principles, however, are capable of embodiment also in that field of mechanical engineering which is concerned in the use of fluids as motive agents, for while in certain respects the operations in the latter case are directly opposite to those met with in the propulsion of fluids, and the means employed may differ in some features, the fundamental laws applicable in the two cases are the same. In other words, the operation is reversible, for if water or air under pressure be admitted to the opening constituting the outlet of a pump or blower as described, the runner is set in rotation by reason of the peculiar properties of the fluid which, in its movement through the device, imparts its energy thereto.

The present application, which is a division of that referred to, is specially intended to describe and claim my discovery above set forth, so far as it bears on the use of fluids as motive agents, as distinguished from the applications of the same to the propulsion or compression of fluids.

In the drawings, therefore, I have illustrated only the form of apparatus designed for the thermo-dynamic conversion of energy, a field in which the applications of the principle have the greatest practical value.

Figure 1 is a partial end view, and Fig. 2 a vertical cross-section of a rotary engine or turbine, constructed and adapted to be operated in accordance with the principles of my invention.

The apparatus comprises a runner composed of a plurality of flat rigid disks 13 of suitable diameter, keyed to a shaft 16, and held in position thereon by a threaded nut 11, a shoulder 12, and intermediate washers 17. The disks have openings 14 adjacent to the shaft and spokes 15, which

may be substantially straight. For the sake of clearness, but a few disks, with comparatively wide intervening spaces, are illustrated.

The runner is mounted in a casing comprising two end castings 19, which contain the bearings for the shaft 16, indicated but not shown in detail; stuffing boxes 21 and outlets 20. The end castings are united by a central ring 22, which is bored out to a circle of a slightly larger diameter than that of the disks, and has flanged extensions 23, and inlets 24, into which finished ports or nozzles 25 are inserted. Circular grooves 26 and labyrinth packing 27 are provided on the sides of the runner. Supply pipes 28, with valves 29, are connected to the flanged extensions of the central ring, one of the valves being normally closed.

For a more ready and complete understanding of the principle of operation it is of advantage to consider first the actions that take place when the device is used for the propulsion of fluids for which purpose let it be assumed that power is applied to the shaft and the runner set in rotation say in a clockwise direction. Neglecting, for the moment, those features of construction that make for or against the efficiency of the device as a pump, as distinguished from a motor, a fluid, by reason of its properties of adherence and viscosity, upon entering through the inlets 20, and coming in contact with the disks 13, is taken hold of by the latter and subjected to two forces, one acting tangentially in the direction of rotation, and the other radially outward. The combined effect of these tangential and centrifugal forces is to propel the fluid with continuously increasing velocity in a spiral path until it reaches a suitable peripheral outlet from which it is ejected. This spiral movement, free and undisturbed and essentially dependent on the properties of the fluid, permitting it to adjust itself to natural paths or stream lines and to change its velocity and direction by insensible degrees, is a characteristic and essential feature of this principle of operation.

While traversing the chamber inclosing the runner, the particles of the fluid may complete one or more turns, or but a part of one turn, the path followed being capable of close calculation and graphic representation, but fairly accurate estimates of turns can be obtained simply by determining the number of revolutions required to renew the fluid passing through the chamber and multiplying it by the ratio between the mean speed of the fluid and that of the disks. I have found that the quantity of fluid propelled in this manner, is, other conditions being equal, approximately proportionate to the active surface of the runner and to its effective speed. For this reason, the performance of such machines augments at an exceedingly high rate with the increase of their size and speed of revolution.

The dimensions of the device as a whole, and the spacing of the disks in any given machine will be determined by the conditions and requirements of special cases. It may be stated that the intervening distance should should be the greater, the larger the diameter of the disks, the longer the spiral path of the fluid and the greater its viscosity. In general, the spacing should be such that the entire mass of the fluid, before leaving the runner, is accelerated to a nearly uniform velocity, not much below that of the periphery of the disks under normal working conditions, and almost equal to it when the outlet is closed and the particles move in concentric circles.

Considering now the converse of the above described operation and assuming that fluid under pressure be allowed to pass through the valve at the side of the solid arrow, the runner will be set in rotation in a clockwise direction, the fluid traveling in a spiral path and with continuously diminishing velocity until it reaches the orifices 14 and 20, through which it is discharged. If the runner be allowed to turn freely, in nearly frictionless bearings, its rim will attain a speed closely approximating the maximum of that of the adjacent fluid and the spiral path of the particles will be comparatively long, consisting of many almost circular turns. If load is put on and the runner slowed down, the motion of the fluid is retarded, the turns are reduced, and the path is shortened.

Owing to a number of causes affecting the performance, it is difficult to frame a precise rule which would be generally applicable, but it may be stated that within certain limits, and other conditions being the same, the torque is directly proportionate to the square of the velocity of the fluid relatively to the runner and to the effective area of the disks and, inversely, to the distance separating them. The machine will, generally, perform its maximum work when the effective speed of the runner is one-half of that of the fluid; but to attain the highest economy, the relative speed or slip, for any given performance, should be as small as possible. This condition may be to any desired degree approximated by increasing the active area of and reducing the space between the disks.

When apparatus of the kind described is employed for the transmission of power certain departures from similarity between transmitter and receiver are necessary for securing the best results. It is evident that, when transmitting power from one shaft to another by such machines, any desired ratio between the speeds of rotation may be obtained by a proper selection of the diameters of the disks, or by suitably staging the

transmitter, the receiver or both. But it may be pointed out that in one respect, at least, the two machines are essentially different. In the pump, the radial or static pressure, due to centrifugal force, is added to the tangential or dynamic, thus increasing the effective head and assisting in the expulsion of the fluid. In the motor, on the contrary, the first named pressure, being opposed to that of supply, reduces the effective head and the velocity of radial flow toward the center. Again, in the propelled machine a great torque is always desirable, this calling for an increased number of disks and smaller distance of separation, while in the propelling machine, for numerous economic reasons, the rotary effort should be the smallest and the speed the greatest practicable. Many other considerations, which will naturally suggest themselves, may affect the design and construction, but the preceding is thought to contain all necessary information in this regard.

In order to bring out a distinctive feature, assume, in the first place, that the motive medium is admitted to the disk chamber through a port, that is a channel which it traverses with nearly uniform velocity. In this case, the machine will operate as a rotary engine, the fluid continuously expanding on its tortuous path to the central outlet. The expansion takes place chiefly along the spiral path, for the spread inward is opposed by the centrifugal force due to the velocity of whirl and by the great resistance to radial exhaust. It is to be observed that the resistance to the passage of the fluid between the plates is, approximately, proportionate to the square of the relative speed, which is maximum in the direction toward the center and equal to the full tangential velocity of the fluid. The path of least resistance, necessarily taken in obedience to a universal law of motion is, virtually, also that of least relative velocity. Next, assume that the fluid is admitted to the disk chamber not through a port, but a diverging nozzle, a device converting wholly or in part, the expansive into velocity-energy. The machine will then work rather like a turbine, absorbing the energy of kinetic momentum of the particles as they whirl, with continuously decreasing speed, to the exhaust.

The above description of the operation, I may add, is suggested by experience and observation, and is advanced merely for the purpose of explanation. The undeniable fact is that the machine does operate, both expansively and impulsively. When the expansion, in the nozzles is complete, or nearly so, the fluid pressure in the peripheral clearance space is small; as the nozzle is made less divergent and its section enlarged, the pressure rises, finally approximating that of the supply. But the transition from purely impulsive to expansive action may not be continuous throughout, on account of critical states and conditions and comparatively great variations of pressure may be caused by small changes of nozzle velocity.

In the preceding it has been assumed that the pressure of supply is constant or continuous, but it will be understood that the operation will be, essentially the same if the pressure be fluctuating or intermittent, as that due to explosions occurring in more or less rapid succession.

A very desirable feature, characteristic of machines constructed and operated in accordance with this invention, is their capability of reversal of rotation. Fig. 1, while illustrative of a special case, may be regarded as typical in this respect. If the right hand valve be shut off and the fluid supplied through the second pipe, the runner is rotated in the direction of the dotted arrow, the operation, and also the performance remaining the same as before, the central ring being bored to a circle with this purpose in view. The same result may be obtained in many other ways by specially designed valves, ports or nozzles for reversing the flow, the description of which is omitted here in the interest of simplicity and clearness. For the same reasons but one operative port or nozzle is illustrated which might be adapted to a volute but does not fit best a circular bore. It will be understood that a number of suitable inlets may be provided around the periphery of the runner to improve the action and that the construction of the machine may be modified in many ways.

Still another valuable and probably unique quality of such motors or prime movers may be described. By proper construction and observance of working conditions the centrifugal pressure, opposing the passage of the fluid, may, as already indicated, be made nearly equal to the pressure of supply when the machine is running idle. If the inlet section be large, small changes in the speed of revolution will produce great differences in flow which are further enhanced by the concomitant variations in the length of the spiral path. A self-regulating machine is thus obtained bearing a striking resemblance to a direct-current electric motor in this respect that, with great differences of impressed pressure in a wide open channel the flow of the fluid through the same is prevented by virture of rotation. Since the centrifugal head increases as the square of the revolutions, or even more rapidly, and with modern high grade steel great peripheral velocities are practicable, it is possible to attain that condition in a single stage machine, more readily if the runner be of large diameter. Obviously this problem is

facilitated by compounding, as will be understood by those skilled in the art. Irrespective of its bearing on economy, this tendency which is, to a degree, common to motors of the above description, is of special advantage in the operation of large units, as it affords a safeguard against running away and destruction. Besides these, such a prime mover possesses many other advantages, both constructive and operative. It is simple, light and compact, subject to but little wear, cheap and exceptionally easy to manufacture as small clearances and accurate milling work are not essential to good performance. In operation it is reliable, there being no valves, sliding contacts or troublesome vanes. It is almost free of windage, largely independent of nozzle efficiency and suitable for high as well as for low fluid velocities and speeds of revolution.

It will be understood that the principles of construction and operation above generally set forth, are capable of embodiment in machines of the most widely different forms, and adapted for the greatest variety of purposes. In my present specification I have sought to describe and explain only the general and typical applications of the principle which I believe I am the first to realize and turn to useful account.

What I claim is:

1. A machine adapted to be propelled by a fluid consisting in the combination with a casing having inlet and outlet ports at the peripheral and central portions, respectively, of a rotor having plane spaced surfaces between which the fluid may flow in natural spirals and by adhesive and viscous action impart its energy of movement to the rotor, as described.

2. A machine adapted to be propelled by a fluid, comprising a rotor composed of a plurality of plane spaced disks mounted on a shaft and open at or near the same, an inclosing casing with a peripheral inlet or inlets, in the plane of the disks, and an outlet or outlets in its central portion, as described.

3. A rotary engine adapted to be propelled by adhesive and viscous action of a continuously expanding fluid comprising in combination a casing forming a chamber, an inlet or inlets tangential to the periphery of the same, and an outlet or outlets in its central portion, with a rotor composed of spaced disks mounted on a shaft, and open at or near the same, as described.

4. A machine adapted to be propelled by fluid, consisting in the combination of a plurality of disks mounted on a shaft and open at or near the same, and an inclosing casing with ports or passages of inlet and outlet at the peripheral and central portions, respectively, the disks being spaced to form passages through which the fluid may flow, under the combined influence of radial and tangential forces, in a natural spiral path from the periphery toward the axis of the disks, and impart its energy of movement to the same by its adhesive and viscous action thereon, as set forth.

5. A machine adapted to be propelled by a fluid comprising in combination a plurality of spaced disks rotatably mounted and having plane surfaces, an inclosing casing and ports or passages of inlet and outlet adjacent to the periphery and center of the disks, respectively, as set forth.

6. A machine adapted to be propelled by a fluid comprising in combination a runner composed of a plurality of disks having plane surfaces and mounted at intervals on a central shaft, and formed with openings near their centers, and means for admitting the propelling fluid into the spaces between the disks at the periphery and discharging it at the center of the same, as set forth.

7. A thermo-dynamic converter, comprising in combination a series of rotatably mounted spaced disks with plane surfaces, an inclosing casing, inlet ports at the peripheral portion and outlet ports leading from the central portion of the same, as set forth.

8. A thermo-dynamic converter, comprising in combination a series of rotatably mounted spaced disks with plane surfaces and having openings adjacent to their central portions, an inclosing casing, inlet ports in the peripheral portion, and outlet ports leading from the central portion of the same, as set forth.

In testimony whereof I affix my signature in the presence of two subscribing witnesses.

NIKOLA TESLA.

Witnesses:
M. LAWSON DYER,
WM. BOHLEBER.

N. TESLA.

TURBINE.

APPLICATION FILED JAN. 17, 1911.

1,061,206. **Patented May 6, 1913.**

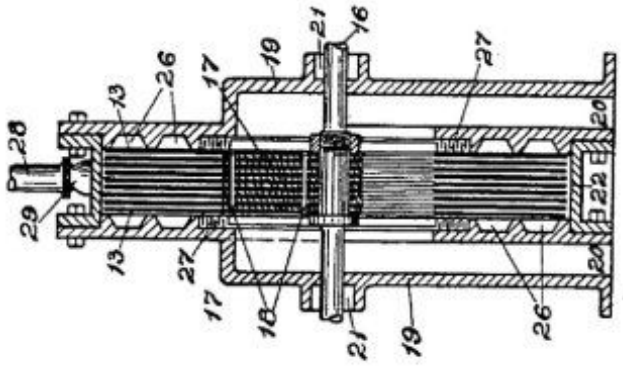


Fig. 2.

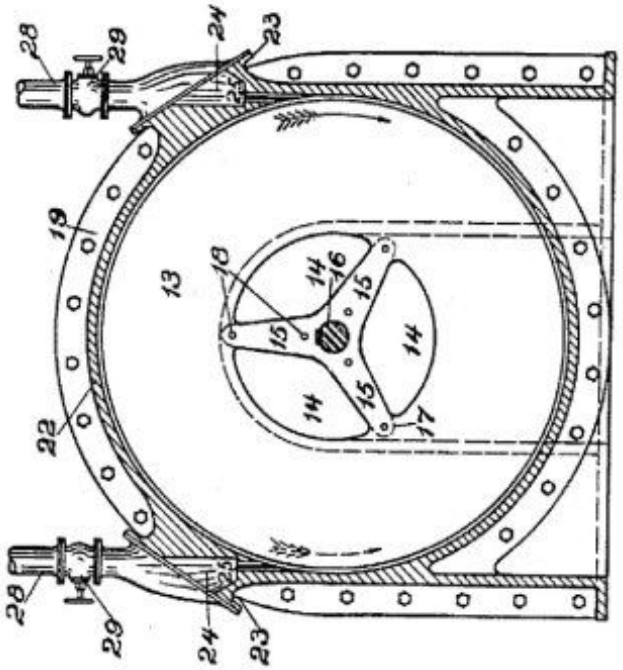


Fig. 1.

Witnesses:
A. Diaz Benitez
Wm. Bohleber

Nikola Tesla, Inventor

By his Attorneys
Kerr Page Cooper & Hayward

UNITED STATES PATENT OFFICE.

NIKOLA TESLA, OF NEW YORK, N. Y.

COIL FOR ELECTRO-MAGNETS.

SPECIFICATION forming part of Letters Patent No. 512,340, dated January 9, 1894.

Application filed July 7, 1893. Serial No. 479,804. (No model.)

To all whom it may concern:

Be it known that I, NIKOLA TESLA, a citizen of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Coils for Electro-Magnets and other Apparatus, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

In electric apparatus or systems in which alternating currents are employed the self-induction of the coils or conductors may, and, in fact, in many cases does operate disadvantageously by giving rise to false currents which often reduce what is known as the commercial efficiency of the apparatus composing the system or operate detrimentally in other respects. The effects of self-induction, above referred to, are known to be neutralized by proportioning to a proper degree the capacity of the circuit with relation to the self-induction and frequency of the currents. This has been accomplished heretofore by the use of condensers constructed and applied as separate instruments.

My present invention has for its object to avoid the employment of condensers which are expensive, cumbersome and difficult to maintain in perfect condition, and to so construct the coils themselves as to accomplish the same ultimate object.

I would here state that by the term coils I desire to include generally helices, solenoids, or, in fact, any conductor the different parts of which by the requirements of its application or use are brought into such relations with each other as to materially increase the self-induction.

I have found that in every coil there exists a certain relation between its self-induction and capacity that permits a current of given frequency and potential to pass through it with no other opposition than that of ohmic resistance, or, in other words, as though it possessed no self-induction. This is due to the mutual relations existing between the special character of the current and the self-induction and capacity of the coil, the latter quantity being just capable of neutralizing the self-induction for that frequency. It is well-known that the higher the frequency or potential difference of the current the smaller the capacity required to counteract the self-induction; hence, in any coil, however small the capacity, it may be sufficient for the purpose stated if the proper conditions in other respects be secured. In the ordinary coils the difference of potential between adjacent turns or spires is very small, so that while they are in a sense condensers, they possess but very small capacity and the relations between the two quantities, self-induction and capacity, are not such as under any ordinary conditions satisfy the requirements herein contemplated, because the capacity relatively to the self-induction is very small.

In order to attain my object and to properly increase the capacity of any given coil, I wind it in such way as to secure a greater difference of potential between its adjacent turns or convolutions, and since the energy stored in the coil—considering the latter as a condenser, is proportionate to the square of the potential difference between its adjacent convolutions, it is evident that I may in this way secure by a proper disposition of these convolutions a greatly increased capacity for a given increase in potential difference between the turns.

I have illustrated diagrammatically in the accompanying drawings the general nature of the plan which I adopt for carrying out this invention.

Figure 1 is a diagram of a coil wound in the ordinary manner. Fig. 2 is a diagram of a winding designed to secure the objects of my invention.

Let A, Fig. 1, designate any given coil the spires or convolutions of which are wound upon and insulated from each other. Let it be assumed that the terminals of this coil show a potential difference of one hundred volts, and that there are one thousand convolutions; then considering any two contiguous points on adjacent convolutions let it be assumed that there will exist between them a potential difference of one-tenth of a volt. If now, as shown in Fig. 2, a conductor B be wound parallel with the conductor A and insulated from it, and the end of A be connected with the starting point of B, the aggregate length of the two conductors being such that the assumed number of convolutions or turns is the same, viz., one thousand, then the po-

tential difference between any two adjacent points in A and B will be fifty volts, and as the capacity effect is proportionate to the square of this difference, the energy stored in the coil as a whole will now be two hundred and fifty thousand as great. Following out this principle, I may wind any given coil either in whole or in part, not only in the specific manner herein illustrated, but in a great variety of ways, well-known in the art, so as to secure between adjacent convolutions such potential difference as will give the proper capacity to neutralize the self-induction for any given current that may be employed. Capacity secured in this particular way possesses an additional advantage in that it is evenly distributed, a consideration of the greatest importance in many cases, and the results, both as to efficiency and economy, are the more readily and easily obtained as the size of the coils, the potential difference, or frequency of the currents are increased.

Coils composed of independent strands or conductors wound side by side and connected in series are not in themselves new, and I do not regard a more detailed description of the same as necessary. But heretofore, so far as I am aware, the objects in view have been essentially different from mine, and the results which I obtain even if an incident to such forms of winding have not been appreciated or taken advantage of.

In carrying out my invention it is to be observed that certain facts are well understood by those skilled in the art, viz: the relations of capacity, self-induction, and the frequency and potential difference of the current. What capacity, therefore, in any given case it is desirable to obtain and what special winding will secure it, are readily determinable from the other factors which are known.

What I claim as my invention is—

1. A coil for electric apparatus the adjacent convolutions of which form parts of the circuit between which there exists a potential difference sufficient to secure in the coil a capacity capable of neutralizing its self-induction, as hereinbefore described.

2. A coil composed of contiguous or adjacent insulated conductors electrically connected in series and having a potential difference of such value as to give to the coil as a whole, a capacity sufficient to neutralize its self-induction, as set forth.

NIKOLA TESLA.

Witnesses:
ROBT. F. GAYLORD,
PARKER W. PAGE.

(No Model.)

N. TESLA.

COIL FOR ELECTRO MAGNETS.

No. 512,340. Patented Jan. 9, 1894.

Fig. 1

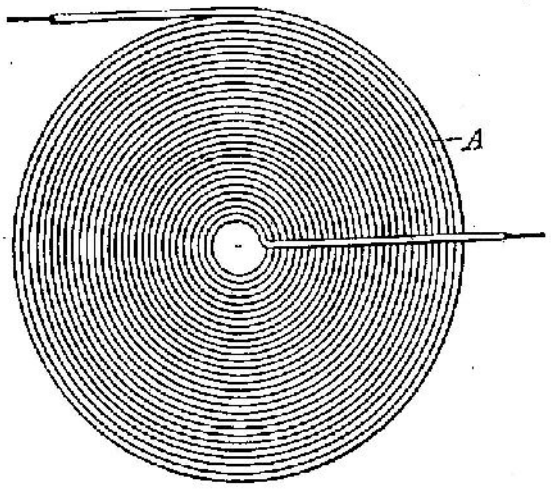
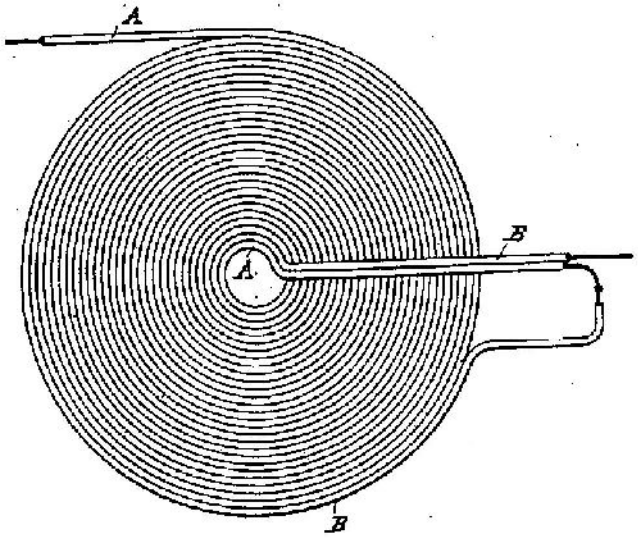


Fig. 2



Witnesses
Raphael Netter
James M. Crothers

Inventor
Nikola Tesla
By his Attorneys
Duncan & Page.

The Tesla Legacy

Free energy for everyone! Nicola Tesla dreamt about it. Do the scientists and electrical engineers have the technical know-how to make Nicola Tesla's dream a realization? The principle of free energy was already given to us by Tesla more than a century ago. It is just a matter of improving it and developing a new electrical distribution system designed for free energy program.

Free radiant energy system is a device and technique that could make us harness energy from the sky or from the ground. This free energy could be transformed into usable electricity so that we do not have to pay electricity anymore.

The light of human progress is not a dim glow that gradually becomes more luminous with time. The panorama of human evolution is illumined by sudden bursts of dazzling brilliance in intellectual accomplishments that throw their beams far ahead to give us a glimpse of the distant future, that we may more correctly guide our wavering steps today.

Tesla, by virtue of the amazing discoveries and inventions which he showered on the world, becomes one of the most resplendent flashes that has ever brightened the scroll of human advancement.

Tesla created the modern era; he was unquestionably one of the world's greatest geniuses.

At a time when electricity was considered almost an occult force, and was looked upon with terror-stricken awe and respect, Tesla penetrated deeply into its mysteries and performed so many marvelous feats with it that, to the world, he became a master magician with an unlimited repertoire of scientific legerdemain so spectacular that it made the accomplishments of most of the inventors of his day seem like the work of toy-tinkers.

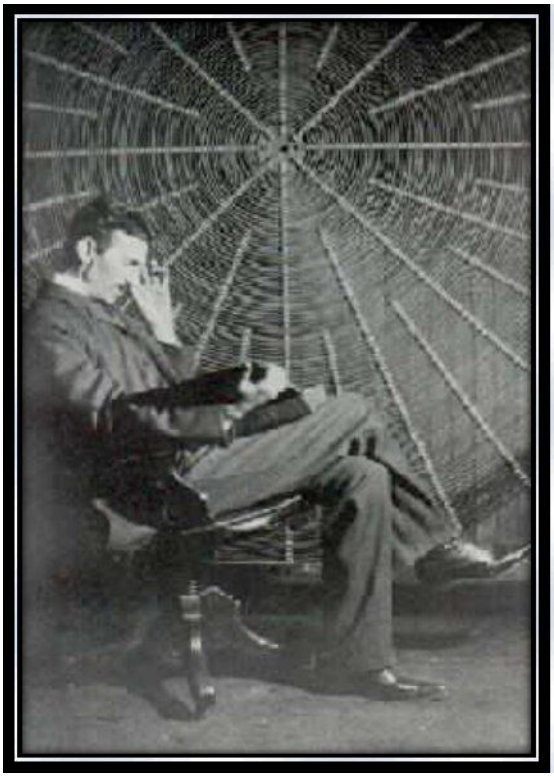
Tesla was an inventor, but he was much more than a producer of new devices: he was a discoverer of new principles, opening many new empires of knowledge which even

today have been only partly explored. In a single mighty burst of invention he created the world of power of today.

He brought into being our electrical power era, the rock bottom foundation on which the industrial system of the entire world is built; he gave us our mass-production system, for without his motors and currents it could not exist; he created the race of robots, the electrical mechanical men that are replacing human labor; he gave us every essential of modern radio; he invented the radar forty years before its use in World War II; he gave us our modern neon and other forms of gaseous-tube lighting; he gave us our fluorescent lighting; he gave us the high frequency currents which are performing their electronic wonders throughout the industrial and medical worlds; he gave us remote control by wireless etc. And these discoveries are merely the inventions made by the master mind of Tesla which have thus far been utilized - scores of others remain still unused.

Free energy technology is here, now. It offers the world pollution-free, energy abundance for everyone, everywhere. It is up to us to benefit from the rivers of energy that Nikola Tesla was talking about.

Accept the challenge to be among the ones who try!



"Invention is the most important product of man's creative Brain. The ultimate purpose is the complete mastery of mind over the material world, the harnessing of human nature to human needs."

Nikola Tesla