

WIRELESS TRANSMISSION OF ELECTRICITY (WITRICITY)

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Abstract: This article gives you about the wireless transmission of electricity (generally called as witricity). This witricity may look futuristic but this will be new and innovative technology that is turning heads. One can imagine future free of chargers, wires (electric lines), cables etc., and this can be seen in a near future. Like WIFI zones, there will be witricity zones or electricity hotspots named as QI (originated from Chinese word 'CHI' which means virtual energy). This transmission of electricity can be take place by the resonance and mutual induction in the form of micro waves and hence electricity can reach any place without a wire spaghetti. This is the future and can be promised by witricity.

Keywords: Witricity, Mutual Induction, Resonance, Microwaves, Rectenna.

1. INTRODUCTION

According to the Law of Conservation of Energy, which is one of the fundamental principles of thermodynamics-Energy can neither be created nor be destroyed, it can only be transformed from one form to the other. One can find this principle reflected in the nature and it has been present throughout the evolution of the species on earth and in our everyday lives; so much so that we do not even consider its presence. But soon enough, man discovered the laws of nature and concluded upon the Law of Conservation of Energy. There have been many man-made applications which are nothing but an implementation of this law. For example

1. Charging cell phones, laptops, electrical gadgets, unmanned aircrafts, electrical cars etc.
2. The application of home appliances like television, mixers, grinders, irons, vacuum cleaners etc.
3. Medical implants like pacemakers, subcutaneous drug supplier, cochlear implants etc.

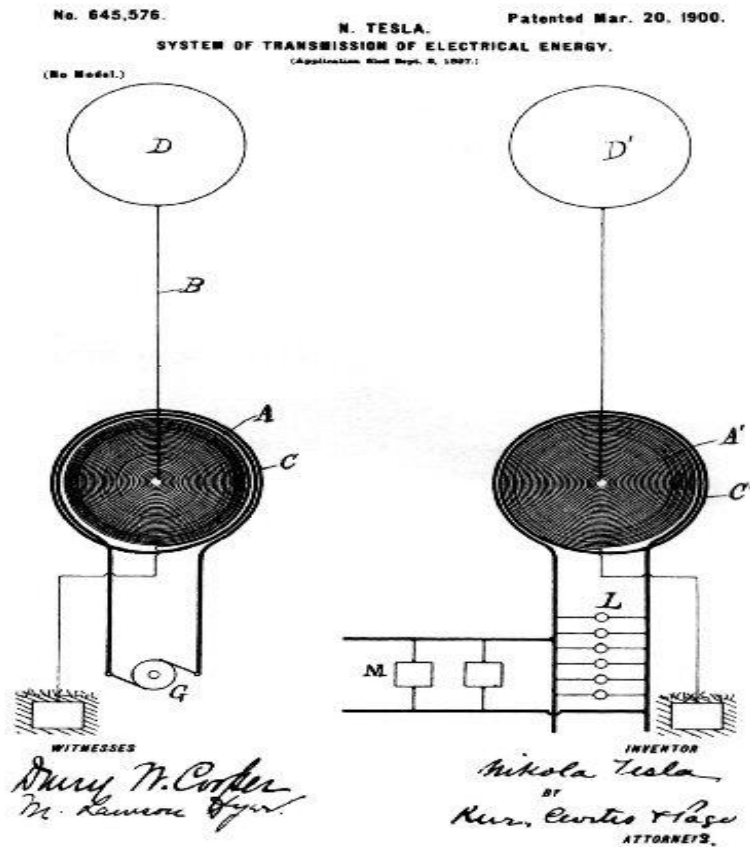
Such implementations of the law of thermodynamics promote an interest in the human mind to think about the usage of wireless energy transfer. One can find forms of 'wireless energy transfer' in the nature; solar energy being the biggest source of energy in the nature. Plants have long learnt to use 'wireless energy' by converting solar energy into the kind of energy that they can use through process photosynthesis. An example of wireless energy transfer that is man-made is the invention of the photo-voltaic cells.

However, the research pursued in the promotion of wireless transfer is varied and has a lot to it. In this paper, we shall try to understand the various types of wireless energy transfer and what can be done to promote the wireless transfer of electricity.

2. MAN BEHIND THE WITRICITY

Nikola tesla is the man who is behind the idea of wireless transmission of electricity. In late 1800s or in early 1900s Nikola proposed many theories on witricity and his main aim was to transmit the electricity without using any wire. At that time his ideas are not considered but however he was given patent rights for wireless technology. Tesla realised that electrical energy from one source can be delivered outward into space and that can be detected by a receiving instrument

in the surrounding area of the source without the need of any interconnecting wires. His ideas or his research work are showing a path to the development for the world. The figure below is the Tesla's apparatus for transmission of electricity



which was patented on Mar 20, 1900.

3. TYPES OF WIRELESS TRANSMISSION

A. SHORT DISTANCE INDUCTION

The promotion of these methods can be up to a few centimetres. The function of an electrical transformer is the simplest example of the wireless transfer of electricity. The primary and secondary circuits of a transformer are isolated from each other electrically. The transfer of energy takes place by a process called mutual induction via electromagnetic coupling. This principle can be used to charge multiple devices at the same time. For example, the Splash-power recharging mat and the Edison Electric's Power Desk have coils that create magnetic field. The electronic devices use plug-in or built-in receivers to recharge when placed on the recharging mat. This is an example of a short-distance induction method that uses wireless energy transfer.

B. MODERATE DISTANCE INDUCTION

When it comes to household devices, the magnetic field generated by those is relatively small. Because of this, the devices to be charged need to be kept/hold within a certain distance so the devices can be charged. A stronger and much larger magnetic field can induce current over a much larger distance, but the device inducing it has to be extremely efficient. There is an efficient way to transfer energy/electricity over a comparatively larger distance. This can be done by adding resonance to the equation, which will extend the distance between the two coils. It is easy to make electrical devices vibrate at their resonant frequency only and not vibrate at other frequencies.

Induction can occur a little differently if the electromagnetic fields around the coils resonate at a certain frequency only. This principle uses a curved piece of wire as an inductor. A capacitance plate is attached to each end of the coil. This plate

can hold the charge. As electricity begins to flow through the coil of wire, the wire begins to resonate. Its resonant frequency is the product of the capacitance of the plates and the inductance of the coil. This is an example of a moderate-distance induction method that uses wireless energy transfer.

C. LONG DISTANCE INDUCTION

Irrespective of resonance, induction usually transmits power over short distances. But for long distances, the research and experiments have proven that wireless transfer of electricity over a few miles. For example, during the 1980s, the Communications Research Centre of Canada manufactured an airplane that had the capacity to run from power that was beamed from the surface of earth. The plane was called SHARP or the Stationary High Altitude Relay Platform, and it was designed to perform as communications relay. One striking feature of the plane was that it could fly at a height of thirteen miles circling two kilometres in diameter. Also, the airplane had the capacity to fly for many weeks at a single time.

The science behind it was the huge, ground-oriented microwave transmitter and the circular flight of the airplane ensured that it was always in the range of the microwave transmitter. Another thing that kept the technology intact was the rectifying antenna, also known as the *rectenna* attached to the wings of the plane. The microwave transmitter and the rectenna's proximity was what had the plane going and constantly draw power. What really happens in the process is:

1. Step 1: Microwaves reach the dipole antennae, which are a part of the electronic spectrum.
2. Step 2: The rectennas then collect the energy and transfer it to the diodes.
3. Step 3: The diodes behave like switches and let the electrons pass in one direction only. The electrons are directed to the circuit of the rectenna.
4. Step 4: The circuit transfers the electrons to the parts which require those.

4. EFFICIENCY

Wireless power transmission has an efficiency which is the ratio between the power that reaches the receiver to the power supplied to the transmitter.

Efficiency = Power that reaches the receiver / Power supplied to the transmitter

The efficiency of the medium used also matters a lot, since radio waves have proven to be much more directional than microwaves, which covers a much larger distance. So radio waves can be used for wireless power transmission in the future, and research in the same has proven a 95% conservation rate of energy, which proves that it is a really efficient means of transfer.

5. ADVANTAGES

1. Convenience
2. Automatic Wireless charging
3. Transmitted to any place
4. No risk of electric shocks
5. Free of wires ,cables

6. DISADVANTAGES

1. Heavy cost
2. Under production and improvements

7. CONCLUSION

The need of a wireless mode of transfer of energy and electricity is a necessity because this is an efficient, safe, non-hazardous solution to all the problems faced by us. The efficiency is bound to increase since there is no issue of power loss over wires and coils instead of being lost in the process of transfer. With the development of efficiency of the transfer mediums, now we can opt for long distance power transmission using the power of wireless modes.

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