



# Tesla Maps Our Electrical Future

*Simple Daylight Television, Baby Electric Planes, Cosmic Rays of Tremendous Intensity Foreseen by Scientific Wizard*

By H. Winfield Secor, E. E.

**D**O you use an alternating-current induction motor? A high-frequency coil? A filamentless vacuum lamp (such as the neon lamp)? . . . At least you know these things and benefit by their use, as most of us do who live in this modern age of wonders. And you will be interested to know that not only these but many other modern electrical methods and appliances are conceptions of the brain of Dr. Nikola Tesla, perhaps the greatest master of electricity alive today.

Fundamental—that is the word that tells best why Dr. Tesla's name is less commonly heard than that of Edison. For practically half a century Dr. Tesla has occupied himself with the roots and essences of his chosen subject. How essentially necessary to modern industry, offices, and homes is alternating current! For most industrial requirements, direct current is not suited at all. Long-distance transmission of such a current is wasteful and impracticable, as no simple, efficient machinery is available for generating and transforming it at high voltages. Alternating current, on the contrary, lends itself admirably to high voltage generation and to transformation into current of any strength or volume as well as into direct current, at the point of use. . . . Without alternating current, in short, we could not proceed with modern life. Yet more than



*One of Dr. Tesla's striking experiments. A blare of light produced in a filamentless bulb by wireless power transmitted from a loop carrying terrific currents oscillating eighty million times per second.*

forty years ago Dr. Tesla discovered the principle of this form of electricity, invented machinery for generating and transforming it, and introduced it to a world which until then had been limping along with direct current as best it could.

Dr. Tesla's service in this immense field opened up by him is summed up strikingly by Dr. A. B. Behrend, in his book on the alternating-current induction motor:—"Were we to eliminate from our industrial world the results of Mr. Tesla's work, the wheels of industry would cease to turn, our electric trains and cars would stop, our towns would be dark, our mills dead and idle. So far-reaching is this work that it has become the warp and woof of industry."

Because Dr. Tesla knows the principles of electricity and has checked his knowledge in practice, he is able to speak with certainty about electricity not only of today but also of tomorrow. . . . His forecast of the electrical future is not that of an imaginative "philosopher," but of an

experimenter and calculator. He is sure of what can be done, because he knows what has been done—by himself. Some results of some of his conclusions he imparted to me in a recent interview.

"Neon lamps are in the public favor and are being used for store windows and in signs (*Continued on page 1124*)

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quite extensively," said Dr. Tesla, "but I had similar filamentless, gas-filled electric lamps in my laboratory at Houston Street over thirty years ago. I even had these lamps standardized to 50 candle-power each, and used them instead of the orthodox illuminating devices. It seems that I was also far ahead of my time in the use of filamentless tubes, bent in the shapes of characters and other forms, as now extensively used. The light from properly filled vacuum tubes is of indescribable beauty, hygienic and more economical, and the lamps last forever. For these reasons, I predict that very shortly the old-fashioned incandescent lamp, having a filament heated to brightness by the passage of electric current through it, will entirely disappear and that we will shortly be using new filamentless, gas-filled lamps in our homes, offices and factories throughout the world."

I asked Dr. Tesla what he thought of the eventual development and form of television apparatus.

"The present day television inventors are on the wrong track," said Dr. Tesla, "and we shall see in a future not distant, a very simple means of transmitting the living daylight image over a wire or by wireless, without the use of any scanning disc, special synchronizing means and all the bewildering paraphernalia now employed to give an image the size of a postage stamp, and one that is far from satisfactory at that. I have made discoveries many years ago which give me every reason to believe that television of the future will have all of the complicated parts located at the transmitting or central station, and all that the subscriber will have in his home or office to receive the reproduced image will be practically nothing but a screen, together with a suitable wave or station selector."

Among some of the interesting and revolutionary inventions perfected by Nikola Tesla, and which are little known to the public, we find such radically new apparatus as that for the wireless transmission of power, bladeless turbines, airplanes that rise and descend vertically, Tesla high frequency transformers, and the Tesla viscosity speedometer. The higher-priced American cars are fitted with the Tesla speedometer, which registers the speed in miles per hour; and also for the engineer's use there is the tachometer, or revolution counter, using the unique principle applied by Tesla, viz., the viscosity or drag of the air between two discs or cups. One of the accompanying diagrams shows the principle of this extremely simple and accurate speed indicator.

I asked Dr. Tesla if his speedometer was to be used on some of the American cars being built in very large numbers, and he stated that he had received inquiries from Ford and other quantity producers of automobiles, and as soon as the manufacturing price could be made to conform with the low cost necessary for the cheaper-priced cars, they undoubtedly would be fitted on these cars. This speedometer is based on the fact that when one disc is driven by a flexible shaft from the engine transmission, the drag of the air particles between this revolving disc and a closely positioned second disc is such that the latter will be turned through part of a circle, proportional to the speed of the driven disc. It is only necessary, therefore, to calibrate the second disc in revolutions per minute or miles per hour,

to have a perfect speed indicator.

In the Tesla steam turbine no blades of the usual type found in such machines are employed at all. Instead there is simply a series of smooth discs similar to a number of phonograph records, mounted on a shaft with a small space between them. When gas, steam or water, for example, is allowed to strike through or between these discs from the nozzle, the friction of the fluid on the surfaces of the discs causes a rotation of the same and their attached shaft. As much as twenty horse-power per pound of weight of rotor can be developed by his turbine. Dr. Tesla took out patent in every important country in the world on this unique type of prime mover and it represents the very simplest form of apparatus for converting energy yet discovered.

Aircraft of today are far away from the ultimate form, thinks Dr. Tesla, and the airplane of tomorrow will, he believes, be driven by wireless electric power transmitted from the central station or stations located at various spots on the earth. In this respect it is interesting to mention that Tesla has shown, thirty years ago in patents and in textbooks, the complete system for transmitting and receiving wireless power, with all the tuning circuits, transformers and other details.

Tesla upholds the startling theory formulated by him long ago, that the radio transmitters as now used, do not emit Hertz waves, as commonly believed, but waves of sound. He says that a Hertz wave would only be possible in a solid ether, but he has demonstrated already in 1897 that the ether is a gas, which can only transmit waves of sound; that is such as are propagated by alternate compressions and rarefactions of the medium in which transverse waves are absolutely impossible. Dr. Hertz, in his celebrated experiments, mistook sound waves for transverse waves and this illusion has been continually kept up by his followers, and has greatly retarded the development of the wireless art. As soon as the experts become convinced of this fact they will find a natural and simple explanation of all the puzzling phenomena of the so-called radio.

## Sees Wireless Power Transmission

Dr. Tesla bases his vast amount of work on the wireless transmission and reception on the marvelous phenomenon of terrestrial resonance, which he discovered in 1899, and his "magnifying transmitter." He considers the whole earth as a huge wire or conductor, and having determined its constants in electrical units, he has designed the proper wireless transmitter needed to set the globe into powerful electrical vibrations, so that at any point of its surface. If we desire to operate lights or motors according to Tesla's power transmission theory, all we have to do is to connect an electrical capacity, such as an antenna or other suitable system of conductors through the apparatus. This capacity then absorbs its proper quota of oscillating electrical energy of the transmitter. We have today only radio signals or radio-telephone speech, but if Tesla's theory is right, and many engineers think that it is, eventually we shall have no more power transmission lines running from central stations for hundreds of miles to supply us current for our electric fans, toasters, stoves and lights. We shall instead have an electrical capacity in the form of a ball or cylinder perhaps, placed in our attic or possibly in the ceiling of the house and when connected through a Tesla transformer to the earth, we will pick up the desired electrical energy to operate our

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household devices. It will be a simple matter to connect a meter with this arrangement, so that the energy can be measured and paid for in the regular way to the central station owners.

Flying around the world with a Tesla powered airplane is a possibility of the near future. The plane will not have to store every bit of available space with gasoline and oil, nor will it have to carry a heavy engine or engines. A light electric motor will spin the propellers, if indeed we use propellers at all for tomorrow's aircraft; the necessary high frequency electrical energy for operating the motor will be accumulated by a suitable electrical capacity or antenna carried by the plane or other form of aircraft, whatever it may be. A recent patent granted to Dr. Tesla describes one method of causing a plane to rise and descend in a vertical line. As soon as we have a plane which can accurately and regularly rise and descend vertically, the day of the aerial taxi will be here, for we can then land or take off from any flat building roof in our great cities, no matter how small the roof may be. Dr. Tesla says that his flying machine can be condensed into a cube of less than 6 feet on a side, and its weight will be less than 250 pounds. It can be run through the streets and put in a garage, if desired, just like an automobile.

## Tesla's Artificial Lightning

One of the most interesting experiments in all electrical phenomena which has intrigued the writer for many years is the production of gigantic electrical discharges. We read every now and then about high voltage discharges in the neighborhood of a million volts or so, produced in the great laboratories of the large electrical manufacturing companies for testing insulators and the like; but no one up to the present time has even approximated the gigantic artificial lightning displays produced by Nikola Tesla in his famous Colorado wireless broadcasting plant forty years ago. Electrical experimenters who have studied Tesla's researches and seen some of the photographs of his stupendous electric discharges will remember that some of these measured 100 feet in length, the size of a man's arms, producing a roar comparable to that of Niagara, and which could be heard 12 miles away. College and electrical students in general, today, often build Tesla coils, which produce high frequency electric sparks of anywhere from one to three and sometimes 4 feet in length. A moment's reflection on the huge electrical discharges produced in the famous Tesla Colorado plant (in which he used 1500 kilowatts) just mentioned, will show the magnificent piece of engineering which was accomplished by him, when most of the present-day engineers were in their swaddling clothes. In those days Tesla built high frequency transformers over 50 feet in diameter, and in the production of some of his world-startling electrical phenomena he utilized the whole electrical output from a central station, involving the instantaneous discharge of millions of volts and thousands of amperes.

Tesla's theories are generally radically opposed to those entertained by the majority of scientists on many subjects, absorbing the interest of the public. He denies the existence of an electron as pictured by science and says that it has never been isolated. He thinks that some of the investigators have mistaken a hydrogen

molecule for an electron, a rather comical error when considering that the former is assumed to be 125,000,000,000,000 times bigger. He deprecates the popular idea of deriving motive power from the disintegration of atoms, or change of elements, and characterizes such schemes as worse than those involved in perpetual motion machines. He holds that radio-activity is due, not to forces in the substances themselves, but to a cosmic ray, the discovery of which he announced in 1897. In other words, an element like radium emits radiations merely because the cosmic ray impinges upon it, producing these secondary effects.

The element itself has no such energy, it all comes from the cosmic ray. Tesla says that he has proved the existence of this ray by mathematical analysis and experiment, finding both in perfect agreement. It would seem to follow, from Tesla's theory, that the radiation from radiums, or similar bodies, would change from place to place on the globe; and this has recently proved to be an actual fact, as determined by a Russian investigator.

Tesla assured the writer in a recent interview, that through a new discovery he has perfected rays of tremendous power, penetrating through miles of solid substances, will become available shortly, by the use of his high potential cathode tube, without a target.

Truly it may be said that Nikola Tesla was 100 years ahead of his time, and there is not the slightest doubt that his name will go down to posterity as one of the greatest inventors and electrical discoverers of all time. Hundreds of patents cover Tesla's inventions,\* and many thousands of his transcending ideas in the fields of mechanical and electrical invention have never been patented at all, but his ideas are recorded in his own private files.

\*See Tesla's Patent Numbers, and also Sewall's "Wireless Telegraphy." Also "Experiments With Currents of High Potential and High Frequency," by Nikola Tesla, 1890 and "Problem of Increasing Human Energy," Century Magazine of June, 1900.