PHYSICS

Strange Electrical Genius

This year the world celebrates the centenary of the birth of Nikola Tesla. He was one of the pioneers who laid the foundations of our electrical age.

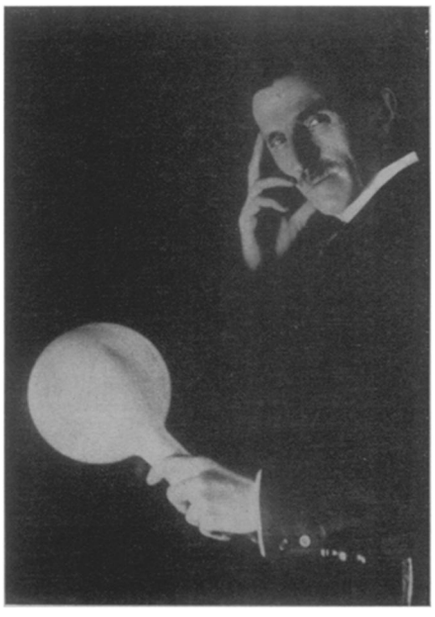
By WATSON DAVIS

➤ A HUNDRED YEARS ago on July 10 there was born in the little town of Smiljan, then in Austro-Hungary, one who was destined to become a strange electrical genius, destined to give the world the kind of electrical distribution system that it now uses.

This individual was Nikola Tesla, who did his work in the last decade and a half of the nineteenth century. Dying at the age of 86, he lived over four decades of the twentieth century.

Upon successive birthdays, there were celebrations at which the great inventor was given decorations from Yugoslavia and Czechoslovakia, the region of his origin, and received greetings from friends and associates.

Although Tesla did not do his work primarily in Europe, whence he came at the age of 28, the major centenary celebration this year is in Belgrade to which the Tesla relics and mementos were taken by the Yugoslav ambassador, who was his uncle, at the time of his death.



NIKOLA TESLA — The strange genius assumed this mysterious pose when he sat for a portrait in the early days of this century after he had made his great contributions. He holds a gaseous tube glowing by induction.

Later in America the American Institute of Electrical Engineers holds a commemorative session Oct. 1 to 5 in Chicago.

Tesla was indeed a strange genius. The authoritative technical journal *Power,* in assaying his influence on the electrical industry, suggests that if men in the industry were asked to name those who laid the foundation of today's electrical generation and distribution, they would produce an impressive list — Edison, Bush, Thomson, Westinghouse and many others. But, almost surely, the journal commented, Tesla's name would be a significant omission.

Yet Tesla conceived the polyphase alternating current motor which is still basic to the electrical industry. He devised a suitable system of generation and distribution for applying it.

The old-timers and the historians recall the "battle of the systems" which occurred in the 1880's.

Pioneering Paper

In 1882 Edison's Pearl Street (New York) generating system opened, operating on direct current. There were lamps and motors. But, there were advantages in alternating current distribution. But the big difficulty was there was no successful alternating current motor. In May, 1888, Tesla, but four years in the United States, read a paper before the American Institute of Electrical Engineers. He described a new alternating current system. Its heart was the induction motor with its basic and beautiful concept of the rotating magnetic field.

As the journal *Power* tells the story:

"With characteristic vision, George Westinghouse realized the fundamental importance of the polyphase alternating current system and acquired the basic patents. Its first impact on the general public was at the Chicago World's Fair of 1893. There a 2-phase generator supplied motors and lamps, and, through rotary converters and motor-generators, a variety of direct current equipment.

"But it remained for the Niagara Falls power project to demonstrate in the most dramatic way possible that the polyphase alternating current was the system of the future. Since 1886 when a charter to develop its power had been granted, the eyes of the world had been on Niagara. An international commission, headed by Lord Kelvin, had reviewed 17 proposals, found none acceptable. Later, just five years after Tesla's AIEE paper, it was officially decided to use the polyphase system.

"In August, 1895, Niagara power was delivered to the first industrial customer and in 1896 alternating current transmission to Buffalo, 22 miles away, was begun. By that time, the steam turbine had been introduced in America and the modern age of electric power had truly opened.

"For Nikola Tesla, these far-reaching inventions were but a beginning. Still to come was brilliant work in high frequencies, thinking basic to much of today's radio art."

Tesla's high frequency generators for producing continuous waves, such as his Tesla coil, are used in one form or another in every radio and television set today. He even demonstrated in 1898 boats, cars and other moving objects which could be controlled and maneuvered completely by radio waves. In the early 1890's Tesla described heating bars of iron and melting lead and tin in the field of specially designed high frequency coils. This was high frequency induction heating. His experiments also were pioneering examples of what later became practical high frequency diathermy.

In the 1893 World's Fair he showed wirelessly-lit vacuum and gas-filled tubes. He produced artificial lightning before the turn of the century. The idea of using synchronous clocks for keeping time, powered and kept in step by a single master generator, was conceived by him in 1900. Facsimile, radar and broadcasting were visualized by Tesla in principle.

Tesla was a "lone wolf" inventor who did not link up with the established industries, which his brilliance had done so much to create. He followed new ideas and new challenges, in some cases losing his laboratories and inventions through financial difficulties.

Communication With Planets

When he lived beyond the three score and ten of tradition, he dreamed of continued achievements, many of which his contemporaries considered impossible. When 81, he predicted that interplanetary communication would become a reality in the immediate future. Upon the same occasion in 1937 he predicted "cheap radium." This was not so far-fetched a prediction when it is considered that in the atomic energy program the radiation-producing equivalent of radium, cobalt 60, is now relatively cheap. But not all his inspirations were so predictive. Earlier, at the age of 78, he claimed a new invention which would, through a "death-beam," destroy 10,000 planes 250 miles away.

In his latter years Tesla's projects became, as the *Power* article explains, "more grandiose, his ways more mysterious, his pronouncements more Olympian."

Great pioneering inventors tend to fade into history.

● RADIO

Saturday, July 14, 1956, 1:45-2:00 p.m. EDT

"Adventures in Science" with Watson Davis, Director of Science Service, over the CBS Radio Network. Check your local CBS station.

Mr. Robert Fairthorne, senior principal scientific officer, Royal Aircraft Establishment in Great Britain, will discuss "Machines and Mathematics."

In the case of Tesla, his name is likely to be used longer than many others. This is due to the fact that the building of a Tesla Coil for the purpose of producing spectacular electrical discharges will continue to be a favorite science fair project for many of the thousands of boys and girls who find scientific experiments so much fun as they learn to become new generations of scientists.

Science News Letter, July 7, 1956

MEDICINE

Drug Fails to Bring Expected Improvement

➤ HOPE THAT ISONIAZID, widely used and effective drug in treating tuberculosis, would help patients with another disease, multiple sclerosis, is destroyed by a report to the American Neurological Association meeting in Atlantic City.

The report, based on a study of 186 patients in 11 Veterans Administration Hospitals, was given by Dr. Benedict Nagler, chief of VA's neurology service and chairman of the VA cooperative study.

Science News Letter, July 7, 1956

BOTANY

Chemical Probes Plant Senses

➤ PLANTS can be fooled into not knowing which way is up.

A recently discovered chemical keeps plants from responding to gravity by checking their perception mechanisms.

Called N-1-naphthylphthalamic acid, the anti-gravity chemical gives science a new tool to study whatever sensory devices seedlings may have.

Michigan State University scientists working with U. S. Department of Agriculture researchers have discovered that the compound prevents perception of gravity in plants. It does this, the investigators say, by checking growth changes normally caused by gravity.

French scientists first showed that plant seedlings treated with the acid failed to respond to gravity.

Researchers suspected the compound inhibited growth, thereby making the seedlings indifferent to gravity. The United States scientists, Drs. Te May Ching and Robert S. Bandurski of Michigan State University, and Dr. Robert H. Hamilton Jr. of the Department of Agriculture, showed this was not the case.

Science News Letter, July 7, 1956

METALLURGY

New Super Alloy

See Front Cover

➤ A "MADE-TO-ORDER" super-alloy that represents a major step forward in metallurgy was shown in New York by its developers, scientists of the Westinghouse Research Laboratories, Pittsburgh, Pa.

The alloy, called Nivco, was hailed by the scientists as the forerunner of a new class of metals that can be "tailor-made" to do a specific job.

Important as is the alloy itself, the research technique used to develop the alloy is perhaps more important, the Westinghouse researchers hinted. The process permits the "predesign" of a needed set of properties into an alloy before it is ever prepared, thereby eliminating the time- and money-consuming "cut-and-try" metallurgical methods now being used, Dr. Clarence Zener, acting director of Westinghouse research, said.

The new material, which is five times stronger than 12% chrome steel, resists breakdown when subjected to temperatures as high as 1,200 degrees Fahrenheit and mechanical vibration.

Although the exact ingredients of the new alloy were not disclosed, Dr. A. W. Cochardt, advisory metallurgist at the research center, said it contained principally cobalt and nickel and smaller amounts of five additional elements.

An immediate application for the alloy will be for high-temperature steam turbine blades.

The alloy resulted from mixing it first on paper by putting into the theoretical recipe all the characteristics the Westinghouse scientists wanted. To kill the effects of mechanical vibration, for example, the scientists controlled the magnetic arrangement of the atoms, before the alloy was actually prepared.

The tuning forks shown on the front cover of this week's SCIENCE NEWS LETTER show that the predesigned magnetic structure minimizes vibration. The fork at the right is made of the new super-alloy, Nivco. *(Continued on page 12.)*