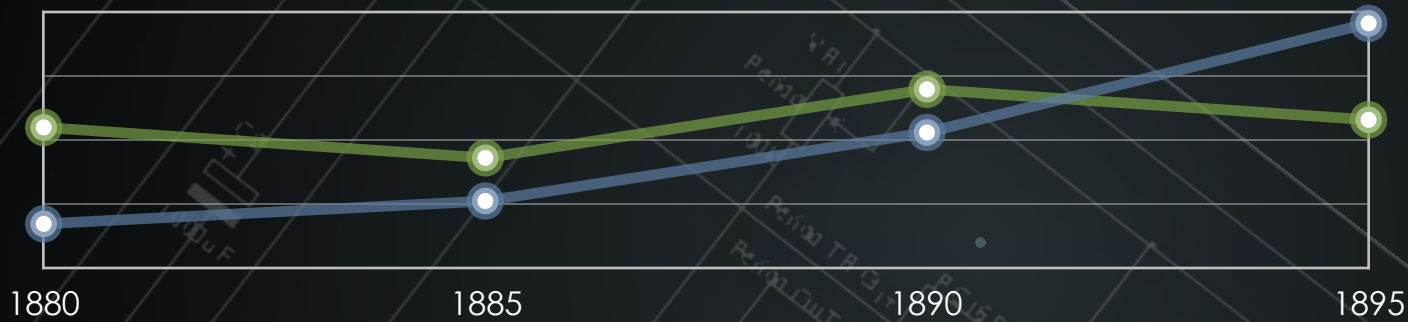


ac vs. dc



EDISON BULB - 1879

After working for many years on improving the designs of many others, Edison created the first practical light bulb. The patent for the Edison Electric Lightbulb was granted in 1880.



TESLA COIL - 1891

High voltage, low current resonant transformer designed by Nikola Tesla allowing him to perform many experiments involving alternating current, lighting technologies, and X-ray generation.

These were also used to demonstrate the safety of electrical current when performing for the public in his dispute with Thomas Edison.

People Involved:

Nikola Tesla
Thomas Edison
George Westinghouse

Introduction

Between 1880 and 1895, there was a feud between two inventors: Thomas Edison and Nikola Tesla. The feud was for electrical supremacy, both of them having found ways to harness electricity and channel it in a way that people could use it. Edison created Direct Current (DC), and Tesla created Alternating Current (AC). Both systems are used today with homes and businesses being primarily run by alternating current, and cars and mobile systems being run with direct current. Regardless of the outcome, the very public bickering between these two great inventors was quite electrifying.

Arc Lamp

The first type of widely used electric light was the arc lamp. These lamps had been around for most of the 19th century but by the late 1870s were beginning to be installed in cities in large scale systems powered by central generating plants. Arc lighting systems were extremely brilliant

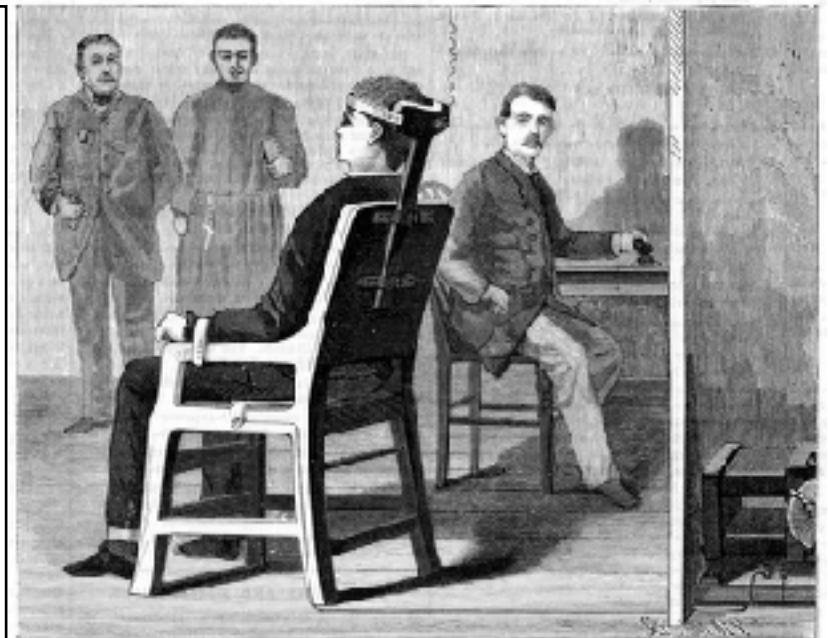
and capable of lighting whole streets, factory yards, or the interior of large buildings. They needed high voltages (above 3000 volts) and some ran better on alternating current. Alternating current had been under development for a while in Europe with contributions being made to the field by Guillaume Duchenne (1850s), the dynamo work of Zénobe Gramme, Ganz Works (1870s), Sebastian Ziani de Ferranti (1880s), Lucien Gaulard, and Galileo Ferraris. The high voltages allowed a central generating station to supply a large area, up to 7-mile (11 km) long circuits since the capacity of a wire is proportional to the square of the current traveling on it, each doubling of the voltage would allow the same size cable to transmit the same amount of power four times the distance. 1880 saw the installation of large-scale arc lighting systems in several US cities including a central station set up by the Brush Electric Company in December 1880 to supply a 2-mile (3.2 km) length of Broadway in New York City with a 3500 volt demonstration arc lighting system. The disadvantage of arc lighting was it was maintenance intensive, buzzed, flickered, constituted a fire hazard, was really only suitable for outdoor lighting, and, at the high voltages used, was dangerous to work with.



Edison Illuminating Company

In 1878 inventor Thomas Edison saw a market for a system that could bring electric lighting directly into a customer's business or home, a niche not served by arc lighting systems. By 1882 the investor-owned utility Edison Illuminating Company was established in New York City. Edison designed his "utility" to compete with the then established gas lighting utilities, basing it on a relatively low 110 volt direct current supply to power a high resistance incandescent lamp he had invented for the system. Edison direct current

systems would be sold to cities throughout the United States, making it a standard with Edison controlling all technical development and holding all the key patents. Direct current worked well with incandescent lamps, which were the principal load of the day. Direct-current systems could be directly used with storage batteries, providing valuable load-leveling and backup power during interruptions of generator operation. Direct-current generators could be easily paralleled, allowing economical operation by using smaller machines during periods of light load and improving reliability. Edison had invented a meter to allow customers to be billed for energy proportional to consumption, but this meter worked only with direct current. Direct current also worked well with electric motors, an advantage DC would hold throughout the 1880s. The primary drawback with the Edison direct current system was that it ran at 110 volts from generation to its final destination giving it a relatively short useful transmission range: to keep the size of the expensive copper conductors down generating plants had to be situated in the middle of population centers and could only supply customers less than a mile from the plant.



EXECUTION BY ELECTRICITY, SHORTLY TO BE INTRODUCED IN N. Y. STATE.

Westinghouse and the Electric Chair

Although New York had a criminal procedure code that specified electrocution via an electric chair, it did not spell out the type of electricity, the amount of current, or exactly how it would be supplied, since these were still relative unknowns. The New York Medico-Legal Society, an informal society composed of doctors and lawyers, was given the task of working out the details and of animal experiments on voltage amounts, conductivity. During this time they sought the ended up expanding the War of Currents into general debate over capital punishment in After the Medico-Legal Society formed their Frederick Peterson, who had been an electrocution of dogs with AC at Columbia submitted to the committee. The claims that best current to use was questioned with some experiments were not scientifically carried out and their November meeting the committee electricity, direct current or alternating current, was not determined.

How a Tesla Coil Works

(Video)

in late 1888 through early 1889 conducted a series electrode design and placement, and skin advice of Harold Brown as a consultant. This the development of the chair and the the US.

committee in September 1888 chairman assistant at Brown's July 1888 public College, had the results of those experiments AC was more deadly than DC and was the committee members, pointing out that Brown's were on animals smaller than a human being. At recommended 3000 volts although the type of