

1876

Company Evolution

Thomas A. Edison moves into his new laboratory at Menlo Park, New Jersey. A year earlier he had decided to give up his telegraphic machine manufacturing interests and devote all of his time to invention in a peaceful setting away from the bustle of the city (Newark, New Jersey).

Power Generation

Charles F. Brush constructs his second hand-built dynamo. He successfully demonstrates the development to his employer and sponsor, George W. Stockly, Manager of the Cleveland Telegraph and Supply Company, founded in 1872. The Brush dynamo was one of the first to show that electric power could be put to practical use.

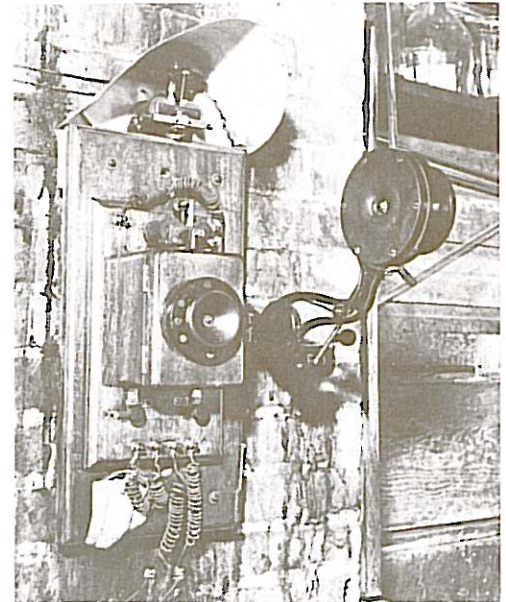
Communications

Alexander Graham Bell demonstrates his telephone at the Philadelphia Centennial.

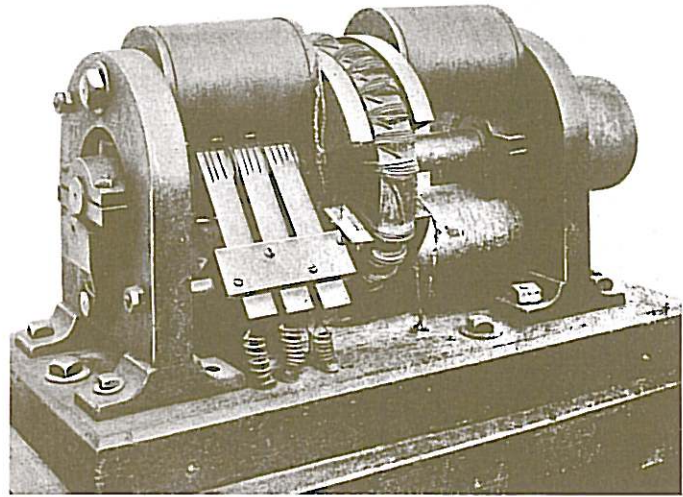
Edison invents the carbon telephone transmitter improving on Bell's earlier telephone which had limited transmission ability. Patent rights to the Edison transmitter were purchased by the American Speaking Telephone Company, a subsidiary of the Western Union Telegraph Company.

Edison patents his mimeograph machine. It consisted of an electric pen that made 8,000 punctures per minute on a sheet of waxed paper which served as the stencil. An inked felt roller transferred the ink supply through the perforated sheet onto the blank sheet below.

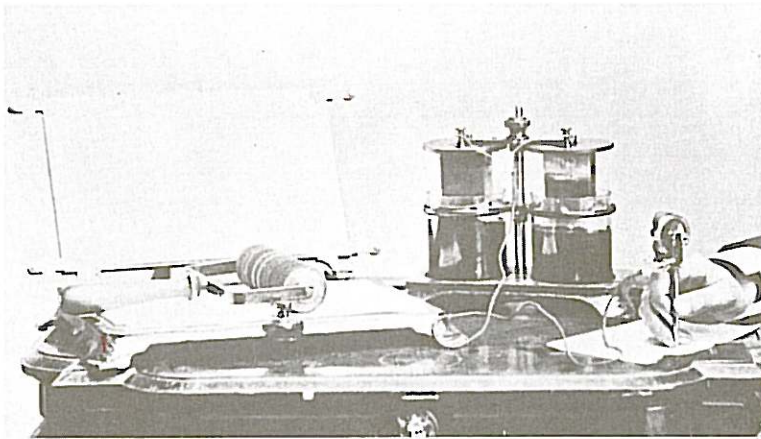
The Western Union Telegraph Company completes installation of the Edison quadruplex telegraph system on its lines. The system, which permitted four messages to be sent simultaneously over a single circuit, doubled the capacity of existing wires and revolutionized the telegraphic communications industry.



Edison's carbon transmitter telephone — more practical than Bell's early models because of the improved transmitter and induction coil it employed.



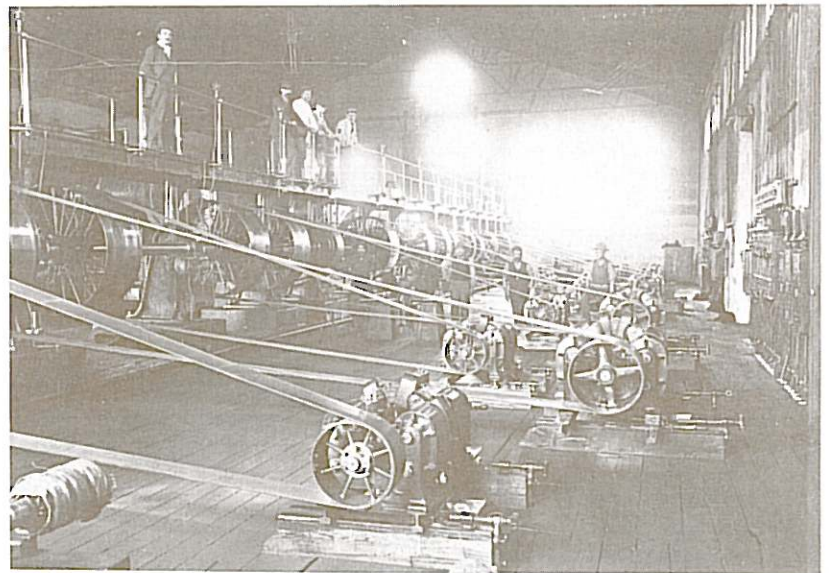
Charles F. Brush and his dynamo — the first dynamo to support theories that electrical power could be put to practical use.



Edison's electric pen — the forerunner of the mimeograph.



*A Brush arc lamp and arc lamps
in the Brill Brothers Store
in New York City.*



*A Brush dynamo room
in South America*

1877

Lighting

Edison increases his Menlo Park staff and begins his incandescent lamp experiments. At the same time, he starts development of what he envisions as a complete electric lighting system.

Brush is granted patents on his copper-coated carbons for arc lamps and the first open-coil arc dynamo.

The Cleveland Telegraph Supply Company receives the sole right to manufacture Brush's dynamos and arc lamps. After several months of testing, the Franklin Institute of Philadelphia decides to purchase a Brush dynamo, citing it as one of the most efficient and the best engineered of its type.

Electricity

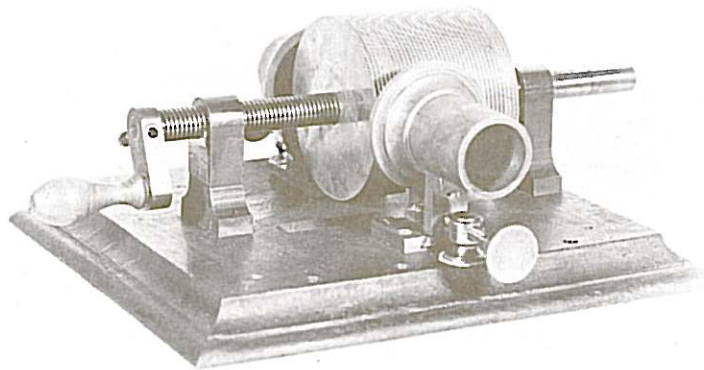
Elihu Thomson, Assistant Professor of Chemistry at the Central High School in Philadelphia, demonstrates that by passing sufficient current through a coil of German silver it can be used as a heating element. Two years earlier, he demonstrated the production of "electric waves" and the ability to detect them. In 1887, Heinrich Hertz demonstrated electromagnetic waves, and in 1895, Marconi put them to practical use in the first wireless transmission of messages.

Communications

Edison invents the phonograph. A grooved cylinder, covered with tin foil, was turned by hand with a stylus attached to a diaphragm resting against it on either side. The tin foil recorded the vibrations of the diaphragm which were caused by the voice. When the stylus was returned to its original position and the cylinder was rotated again, the original vibrations were reproduced with the sound playing through the diaphragm on the other side.

Edison's original tin foil phonograph played the first recorded words of its inventor:

*Mary had a little lamb,
Its fleece was white as snow,
And everywhere that Mary went
The lamb was sure to go.*



1878

Company Evolution

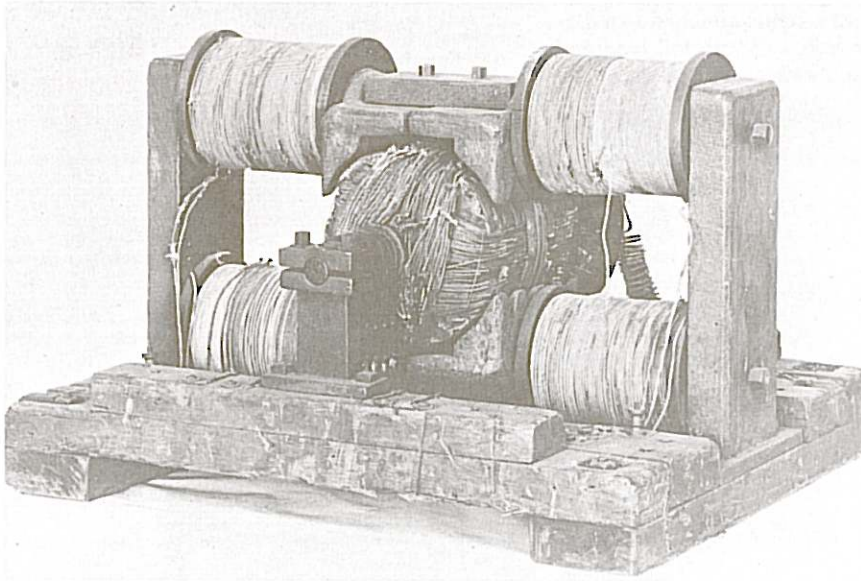
The Edison Electric Light Company is founded to support Edison's lighting research. Organizational and financial backing for the company was provided by Grosvenor P. Lowrey, Edison's patent attorney; J.P. Morgan, financier; and others. The founding of this company marked the beginning of the General Electric Company lineage.

Lighting

Brush is granted a patent on the first series arc lamp, marking the beginning of the arc lighting industry.

Five Brush dynamos power twenty arc lamps in the front windows of Wanamaker's Philadelphia store.

Thomson demonstrates his alternating-current dynamo and transformers at the Franklin Institute. He and Edwin J. Houston devise a vibrating arc lamp powered by the Thomson dynamo.



Thomson's first dynamo — built for a demonstration at the Franklin Institute, Philadelphia.

1879

Lighting

Edison invents the carbon filament incandescent lamp. On October 21, the first commercially practical incandescent lamp completes a 40 hour duration test at the Menlo Park Laboratory.

On December 31, Edison gives the first public demonstration of his electric lighting system in the streets and buildings at Menlo Park. The entire system was interconnected using underground mains.

Edison installs a small dynamo for lighting on the "Jeanette", the James Gordon Bennett arctic exploration ship. Although the lighting system was a success, the exploration was not, and the ship was lost in the Arctic.

Brush promotes the formation of the California Electric Light Company of San Francisco, the first electric central station for arc lighting in the world.

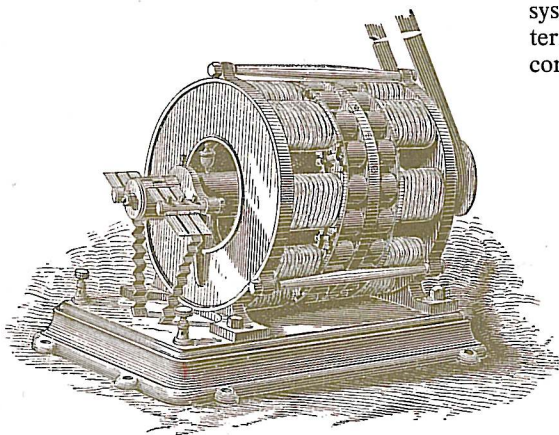
Brush receives patents on compound wiring and secondary distribution systems for arc lighting.

The first large-scale installation of arc lighting is made in Monumental Park, Cleveland using Brush lights on a 250-foot mast.

Niagara Falls is illuminated for the first time on July 4th, using 16 Brush arc lamps powered by a Brush dynamo.

James J. Wood constructs a spark-free dynamo and arc lamp. His employer, James Brady, owner of the Brady Manufacturing Company, agrees to build the dynamos in return for a half interest in the patent.

Thomson and Houston install their first commercial arc lighting system in Fuller's Bakery in Philadelphia. The three-phase alternating current winding used in the dynamo was later to become fundamental to the design of electric power systems.



Wood's spark-free dynamo.

1880

Company Evolution

Sigmund Bergmann, a good friend of Edison's, organizes Bergmann & Co. in New York for the manufacture of light fixtures, meters, junction boxes, and other accessories to complete the production of Edison's lighting systems.

Brush Electric Company of Cleveland is formed from the Telegraph Supply Company to continue the production of Brush's dynamos and arc lights.

Lighting

Edison is granted his main lamp patent, no. 223,898, on January 27, covering the fundamental features of the carbon filament lamp. Edison adopts carbonized bamboo filaments for his lamps and increases their rated life to 600 hours.

Edison establishes the first incandescent lamp factory at Menlo Park, New Jersey.

The first commercial installation of incandescent lights in the world is completed by Edison on the Steamship "S.S. Columbia".

The first municipally owned electric light plant is put into service at Wabash, Indiana, using four Brush arc lamps above the courthouse. An installation of Brush arc lamps is also made on Broadway, New York City.

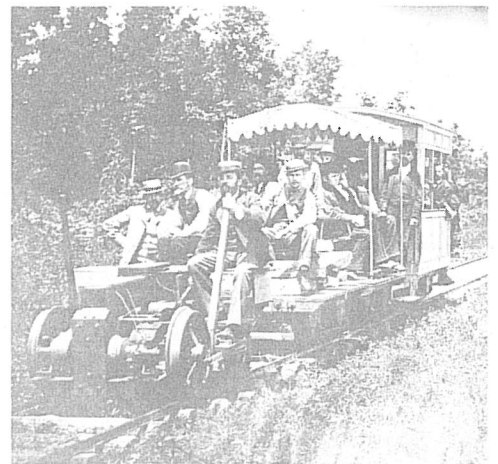
Brush receives a patent on his automatic cutout for arc lamps.

Edison files his first patent for a large-scale public electric distribution system. (The patent was not issued until 1887.)

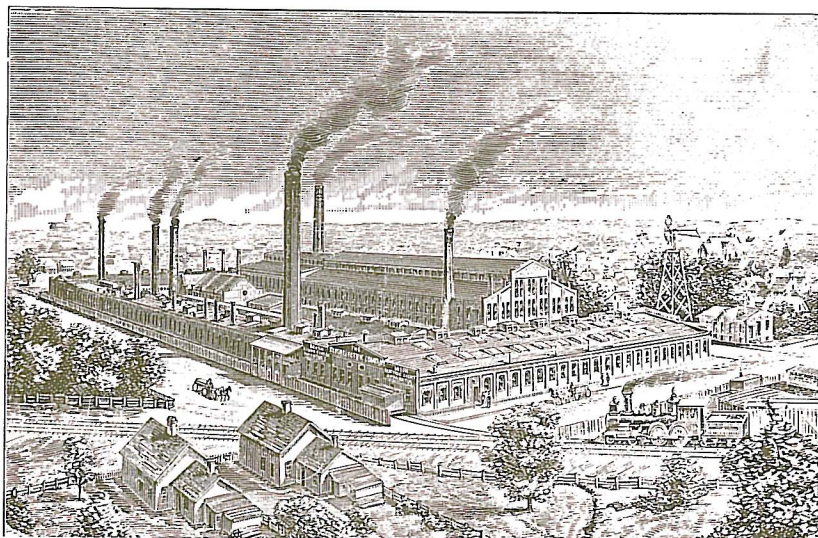
The Thomson-Houston arc dynamo is patented. Its manufacture, along with a line of arc lights, is begun by the American Electric Company, New Britain, Connecticut.

Transportation

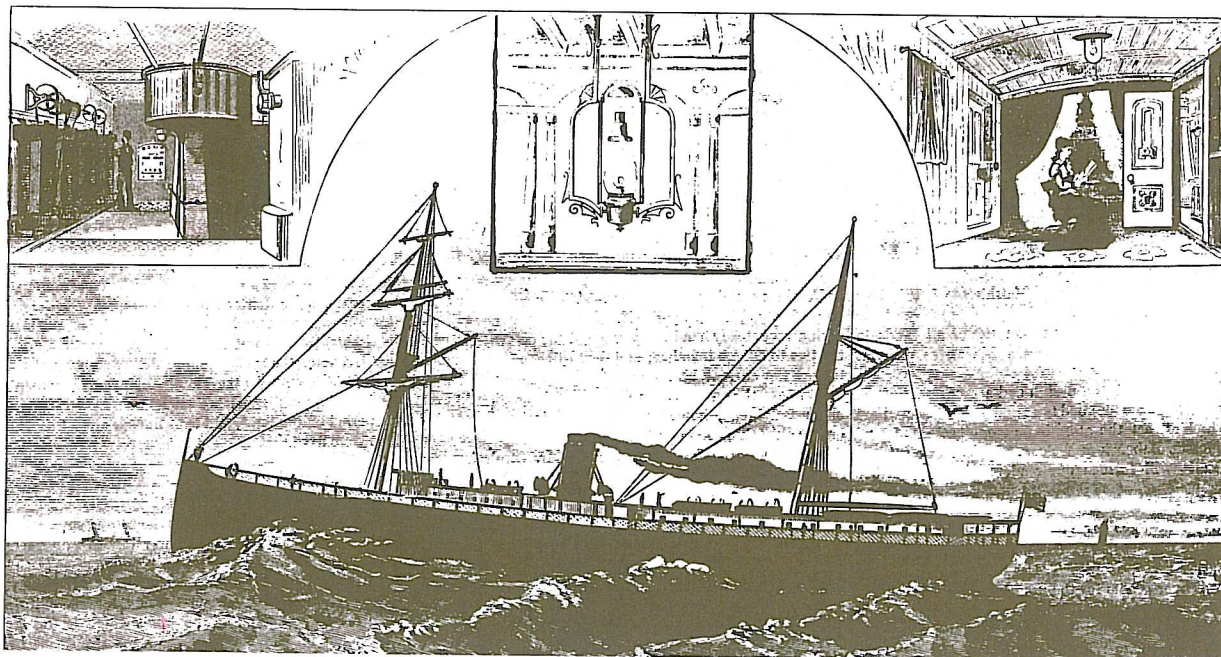
Edison's electric railway undergoes trials at Menlo Park. It uses many of his new inventions for drive and braking systems.



Edison's electric railway on a trial run at the Menlo Park laboratories.



The Brush Electric Company — formed from the Cleveland Telegraph Supply Company to manufacture Brush dynamos and arc lights.



The "S.S. Columbia" — the first commercial installation of the Edison lighting system.

1883

Company Evolution

The Thomson-Houston Company, a reorganization of the American Electric Company, is formed by a group of Massachusetts shoe manufacturers headed by Charles A. Coffin. Its operations are later moved to Lynn, Massachusetts.

The Bentley-Knight Electric Railway Company is formed through the aid of the Brush Electric Company in Cleveland, Ohio.

Lighting

Thomson patents the magnetic blowout for the protection of arc lighting circuits from current surges.

San Francisco makes its first use of electric street lighting with the Brush system.

The first night baseball game is played in Fort Wayne, Indiana, using seventeen arc lights of 4,000 candlepower each.

The first photograph ever made using incandescent lamps is taken at Menlo Park, New Jersey.

Electricity

Edison discovers that electric current can flow through an evacuated space from a filament to a plate in an incandescent bulb. This phenomenon, later called the "Edison Effect", was patented by him and became the forerunner of electronics.

The first central station to use Edison's three-wire system begins operation at Sunbury, Pennsylvania. The Edison Electric Light Company inaugurates the first underground three-wire system at Brockton, Massachusetts.

Transportation

The first elevated electric railway in the United States is operated at the Chicago Railway Exposition by the Electric Railway Company.

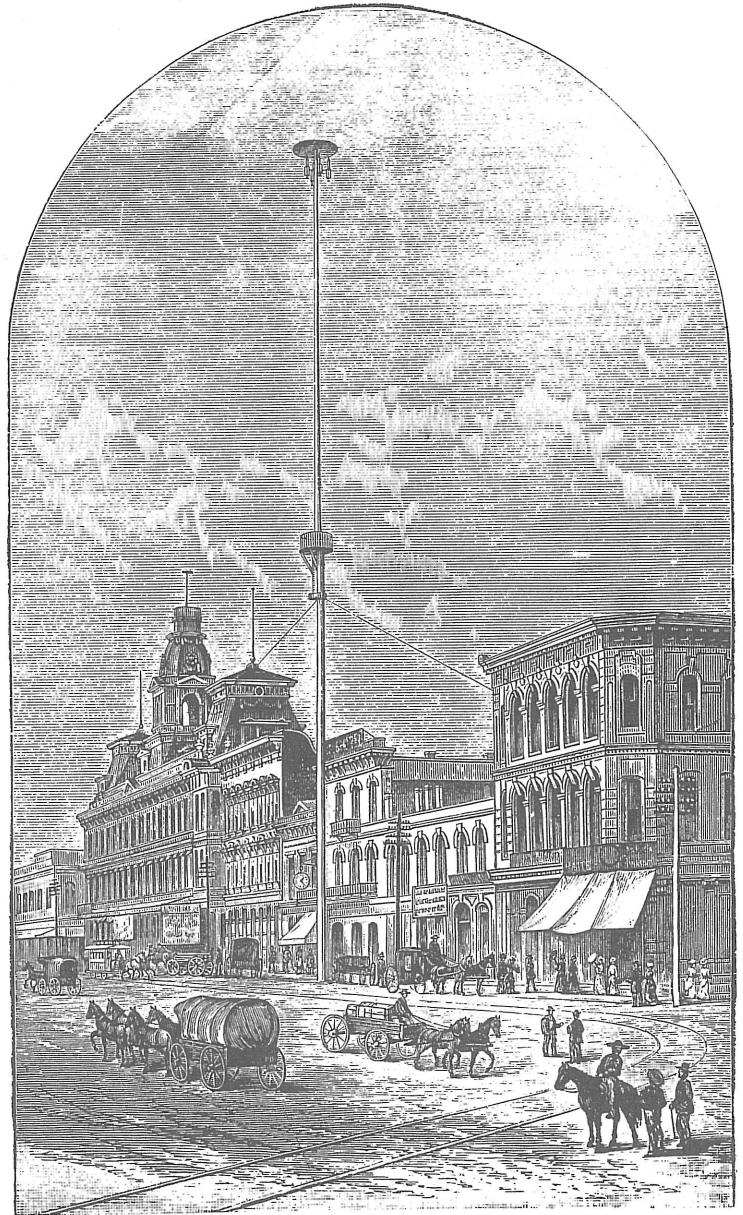
Edison's exhibit of a third-rail trolley line is opened to the public in Chicago, Illinois.



The first incandescent lamp photo, Menlo Park.



Elihu Thomson.



The Brush Electric Company arc lighting system for the Los Angeles, California light tower.

1884

Company Evolution

Edison's lamp manufacturing business at Harrison, New Jersey becomes the Edison Lamp Company.

Frank Sprague demonstrates his invention of a DC motor. He forms the Sprague Electric Railway and Motor Company to exploit this and his other inventions.

Transportation

The Bentley-Knight Company demonstrates the first electric street railway in Cleveland, Ohio, using an early form of the third-rail system with Brush dynamos and motors.

The first electric submarine in America, "The Peacemaker", is built by the Delameter Iron Works of New York City. The vessel used Brush storage batteries and a Brush 12-hp motor for propulsion.

Electricity

George Westinghouse forms the Westinghouse Electric and Manufacturing Company in Pittsburgh, Pennsylvania, after purchasing William Stanley's incandescent lamp and DC dynamo patents from the Swan Incandescent Electric Light Company.

Industrial Products

Alfred and Eugene Cowles produce the first electric industrial furnace using a Brush dynamo for current. With this furnace, they produced the first alloy of aluminum; and later, synthetic rubies and sapphires.



A Bentley-Knight trolley, powered by contact with an electric conduit between the tracks.

THE PREDECESSORS of the GENERAL ELECTRIC COMPANY

The chart on the following page illustrates the evolution of the company and the rapid growth of the electrical industry during the last twenty years of the nineteenth century. The various companies and their founders intended to promote the particular inventions they felt would revolutionize their fields. Edison's incandescent lighting systems; Brush's arc lamps and dynamos; Wood's "spark-free dynamos" and electric regulating systems; Thomson's and Houston's arc lamps, dynamos, motors, generators, transformers, and alternating-current power systems; and Sprague and Van Depoele's electric street railway systems were all developed by their own companies.

By 1890, Edison had organized his various businesses into the Edison General Electric Company. The Thomson-Houston Company and the various companies that had merged it were led by Charles A. Coffin, a former shoe manufacturer from Lynn, Massachusetts. These mergers with competitors and the patent rights owned by each company put them into a dominant position in the electrical industry. As businesses expanded, it had become increasingly difficult for either company to produce complete electrical installations relying solely on their own technology. In 1892, these two major companies combined to form General Electric.

