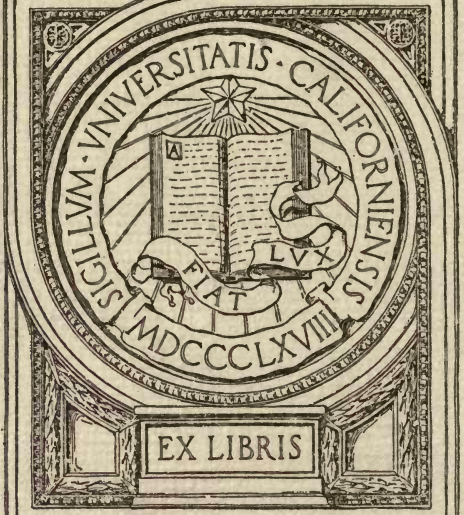
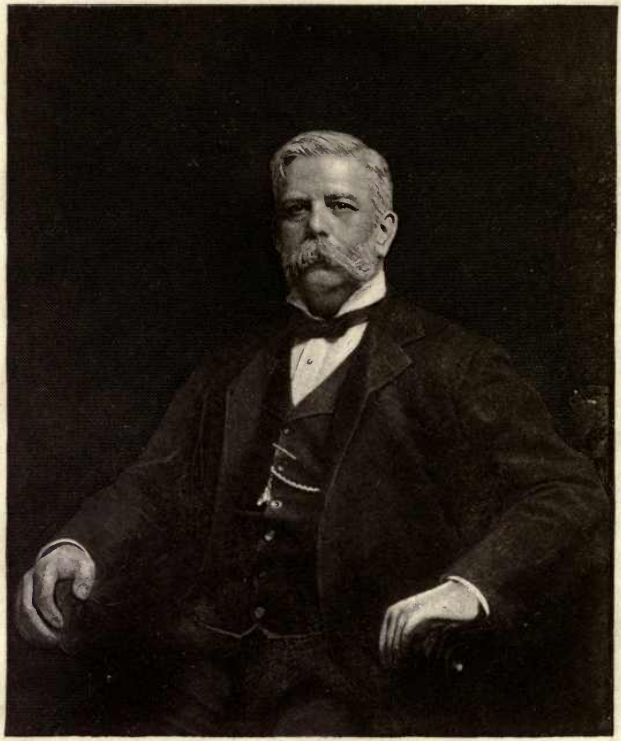
GEORGE WESTINGHOUSE





GEORGE WESTINGHOUSE

1846—1914

by

A. Warren

A TRIBUTE

By Arthur Warren

NAPOLEON, at the age of 24 captured Toulon and was made brigadier-general. Three years later he attracted the attention of the world by the victories of his Italian campaign. William Pitt at the age of 24 became Prime Minister of England. George Westinghouse at 24 had not only invented, but had secured the adoption of the air brake, the most important safety device ever known, and the chief agency which helped to transform railways from their primitive conditions to their present state of immense efficiency and magnitude.

George Westinghouse did many other things of first importance to mankind, and became one of the most famous and honored men of our time. In his later years he was justly called "the greatest living engineer." Throughout his career he afforded one of the most remarkable

examples of ingenuity, persistence, courage, integrity and usefulness that modern history records. From the time when he began to earn his living he was his own master; he never worked for salary or wages; but he did not begin with money; he neither inherited any, nor was given any in any form. At the outset he was his own capital. From his mind came inventions on which he founded industries which, under his direction, grew to huge dimensions. He lived to be the head of great manufacturing establishments, which, in America and other countries employed 50,000 persons and $200,000,000 of capital.

He was born in the village of Central Bridge, Schoharie County, New York, October 6, 1846. He died in the city of New York, March 12, 1914. He was of American parentage descended on his

father's side from German ancestry, and on his mother's from Dutch. When he was ten years old his parents moved to Schenectady where his father became a manufacturer of agricultural machinery. The father's factory still stands there, and is still conducted under the Westinghouse name. It faces the huge establishment of the corporation which became the chief competitor of the son whom these pages commemorate, and who will have a place in our hearts while life lasts.

A clearer understanding of the man is gained if we know something of the boy. He was a worker, not only a diligent but a progressive one. During his school years he spent his out-of-school hours, his holidays, his school vacations, in his father's machine shop. He did this because he loved mechanical work. He learned the use of tools, he studied en-

gineering; he had a zealous fondness for mathematics. In his early teens he designed and built a rotary engine. Between school and college, he served in the Civil War, first with the cavalry, subsequently as a naval engineer. On leaving college he invented a device for replacing derailed cars on the tracks. Having constructed the device he traveled for the purpose of selling it, developing thus early in life the capacity for handling and financing his inventions that made him remarkable in an age remarkable for its men of constructive genius.

His energy was phenomenal. He strode from one achievement to another. Nothing daunted him. His life was a succession of contests, but it was also rich in victories. As there cannot be victories without contests, it may be appropriate

to say that his contests were a result of his indomitable passion for service. His imagination was active and it ranged far. It enabled him not merely to see opportunities but to create them. He used it with the ability of a trained mechanic and the flaming ardor of a pioneer. He did not work in the field of pure science, conducting research for the sake of scientific achievement only, but, like his friend Lord Kelvin, the greatest scientific mind of the nineteenth century, he was keen for making the revelations of science serve the needs of man.

Much has been written in celebration of his foresight. It had an extraordinary part in his life. Most men have their convictions thrust upon them against their inclination; his came as an effect of what Tyndall called "the scientific use of the imagination." When he began work on a

subject he looked all around it, and through it, and as it were, calculated its expansive powers. From the beginning he practiced the standardization of parts, a course of first importance both to manufacturers and users of apparatus. And when alternating current apparatus was invented he saw, sooner than anyone else, the possibilities of that current's service. More than to any other man, the introduction and development of alternating current systems for light and power were due. But he had to subdue scepticism, and bitter and powerful opposition in that work. For years he fought every inch of the way, against continuous efforts not only to prevent but to crush him. What does not the world owe to his memory for his valiant advance? Many times he accomplished what other men declared would be impossible—first the air brake,

then the safe and economic distribution of natural gas for industrial power and domestic fuel; then the mechanisms for the alternating current; in later years the air spring and the geared turbine.

He took big views, he applied his ideas in a big way, solving his problems on a generous scale. When he undertook the solution of geared-turbine problems in connection with the propulsion of ships, he built an experimental installation, not timidly and of small dimensions, but of 6000 horsepower. He proved what he sought to prove, and then went on to improve that. And men ceased to doubt. But years before this he had been the first to take up actively the steam turbine problems to which Parsons, in England, had opened the way by the performances of a fast little boat, the TURBINIA. He bought the Parsons

patents for America and applied them to electrical work, driving generators. But as in almost all the cases of his purchase of other men's patents, he had to redesign and rebuild the apparatus "from the ground up," to meet American conditions and the problems he had set himself. He went through an experience like this with the alternating current patents of Gaulard and Gibbs, and with the gas engine, with the air spring. If it be asked why he bought patents only to do the work all over again, the answer is that although he found his way the better way, he always encouraged men who had useful ideas. Himself an inventor he sympathized with inventors, and he knew what it meant to bring forth and develop ideas. He was always fair and often generous, and it was his habit to give to others credit for what they had done.

Two further instances of his "looking ahead" may be cited here. In the early days of the commercial use of the telephone he designed and built a complete automatic central exchange system. But nobody appreciated it, and his patents expired before the telephone people and the public could be persuaded that an automatic system could be useful, or would be needed. By this time he was too much engrossed in other departments of electrical work to give the matter further attention. Again:—When the Interborough Rapid Transit Co. was compelled by the enormous increase of traffic to lengthen its trains in the New York Subway, and to operate them at closer intervals and at higher speeds, it found that it must save time, not by minutes but by seconds and fractions of seconds in making up, coupling and uncoupling cars, and the air

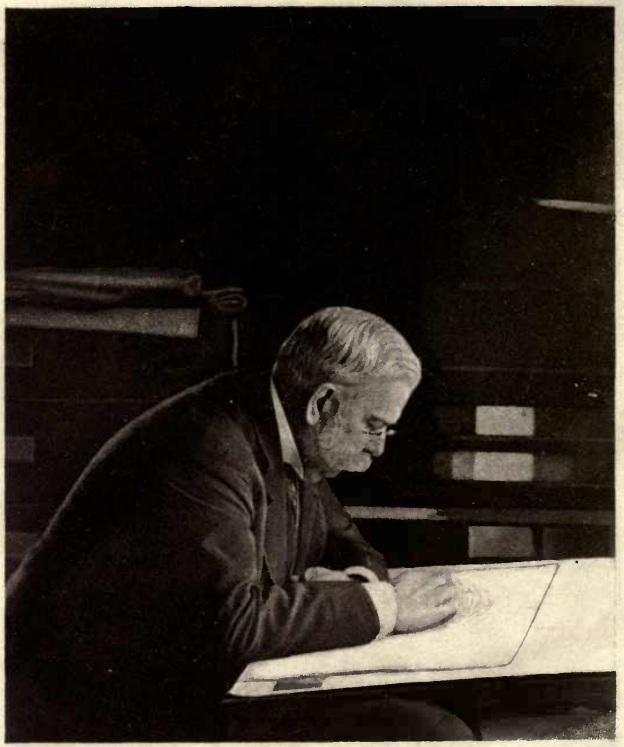
and electric connections. It was learned that Mr. Westinghouse had, fully a dozen years before, invented and perfected an automatic coupler which not only held cars rigidly together as a "solid" train, but also with a single motion coupled or uncoupled the cars and the electric and air connections. His original invention also coupled the steam pipes at the same time, but steam, of course, was not needed on the electric trains. Mr. Westinghouse had been half a generation ahead of the times in this invention, and the subway trains were the first to adopt it. He had foreseen that such conditions must arise, and he was prepared for them before any railroad realized that it would ever have to deal with them.

This little book cannot dwell upon all that George Westinghouse did; it can only glance at the nature of his life work,

and can no more than suggest the character of the man. His achievements were great, but greater than all was his character. From association with him men caught inspiration. He radiated enthusiasm and energy. He demanded honest work and honest dealing. All that he was, he gave forth to whatever work he had in hand. He imposed no limitations upon his own hours, nor upon his own output of energy. He believed sincerely that his mission was to be useful; and he was useful to the extent that few men ever dreamed of being. His personality was both compelling and persuasive. You believed in that clear-eyed, enthusiastic man whose face was lighted with eagerness and sincerity. And they that were associated with him gave him their loyal affection. He was tireless and knew no fear. He was considerate of other men,

especially of labor, and his men knew that. They knew he was the most constant worker in all the Westinghouse forces; that he could do whatever any of them could do. Their faith was never shaken. His integrity was as firm as a mountain range. His tastes were simple; his honor never tarnished; his life was open for all to read; he was free from any desire for parade. It was true of him that he never cared for wealth as a possession; he valued it only as a tool, an instrument which enabled him to carry out his ideas. He was as unostentatious at the height of his power and fortune, as when he was obscure in youth. He was a great man:—

" * * * take him for all in all,
We shall not look upon his like again."



IMPORTANT EVENTS

1846

Born in Central Bridge, Schoharie County, New York.

1856

Moved to Schenectady, N. Y. with his father who there established the Schenectady Agricultural Works.

1857-1860

Attended school and worked in father's factory.

1861

Invented a Rotary Engine.

1863-1865

In army and navy during the Civil War, being honorably discharged at own request from position of Assistant Engineer, United States Navy.

1865-1866

Resumed studies, entering Union College at Schenectady, N. Y.

1866

First railway invention — device made of cast steel for replacing derailed cars, also reversible steel railroad frog.

1867

Conceived the idea of the air brake. Married Margaret Erskine Walker. Removed to Pittsburgh.

1868

First successful test of the air brake was made.

1869

Organized, at 23 years of age, the Westinghouse Air Brake Company, of which he became President and so remained until removed by death.

1870

Made his first trip to Europe to introduce the air brake. Designed and built a jet steam turbine.

1871

Inaugurated Saturday half holiday at Air Brake Company, an innovation since almost universally adopted.

1872-1874

Made extensive air brake tests in England and Belgium.

1876

Designed and built a complete automatic central telephone exchange system.

1879

Invented a pneumatic system of interlocking signals, operated by compressed air.

1880

The Westinghouse Machine Company was organized for the purpose of building high speed engines designed by his brother, H. H. Westinghouse.

1881

The Union Switch & Signal Company organized to manufacture the Pneumatic Interlocking Switch and Signal apparatus.

1884

Invented a complete system for transmitting natural gas through pipes, and a meter for measuring same.

1885

Realized the possibilities of alternating current and purchased the transformer patents of Gaulard and Gibbs in England.

1886

Organized the Westinghouse Electric Company for the manufacture of electric lighting apparatus.

1887

Engaged Nikola Tesla who developed the alternating current induction motor. The famous Burlington air brake trials took place, resulting in the successful development of the instantaneous application of the air brake to all cars of a long train.

1889

Air Brake Company works removed from Pittsburgh to Wilmerding. Beginning of controversy over alternating current, the successful outcome of which has fully justified belief and confidence of Mr. Westinghouse in this form of energy.

1891

Reorganized the Westinghouse Electric Company, taking in the United States Electric Company and Consolidated Electric Light Company, forming the Westinghouse Electric & Manufacturing Company.

1892

Secured through personal efforts the contract from the World's Fair at Chicago for the electrical equipment.

1894

Secured the contract for the large generators at Niagara Falls, which marked an important epoch in the progress of the electrical industry.

Works of the Westinghouse Electric & Manufacturing Company moved to East Pittsburgh.

1896

Manufactured an 800 horsepower gas engine at works of the Machine Company.

1897

Secured patent rights from Charles A. Parsons of England for steam turbine.

1898

First Westinghouse steam turbines were installed in power plant of Westinghouse Air Brake Company, Wilmerding, Pa.

1902

British Company built plant at Manchester, England.

1904

Received idea from Mellville-McAlpine report of the mechanical reduction gear for turbines.

1905

Served with Grover Cleveland, and Justice Morgan J. O'Brien, as a trustee of the Equitable Life Assurance Society.

1908

Successfully reorganized the Westinghouse Electric & Manufacturing Company.

1910

Began development of Westinghouse Air Spring for automobiles.

1912

Installed Mechanical Reduction Gear on United States Collier, Neptune, proving it a complete success.

1913

Reorganized the financial affairs of the Westinghouse Machine Company.

1914

Reduction gear ordered by United States Navy Department for installation on two new Battleships and a repair ship in preference to any other similar device offered.

1914

March 12, died in New York City.

HONORS CONFERRED

1874

Awarded Benjamin Franklin medal for the invention of the Air Brake by the Franklin Institute, Philadelphia.

1884

Received the order of Leopold of Belgium from the King of Belgium.

1889

Received the order of the Royal Crown of Italy from the King of Italy.

1891

Received the degree of Doctor of Philosophy from Union College.

1895

Made a member of the Legion of Honor of France.

1905

Awarded the John Fritz medal by the four American Engineering Societies.

1906

Received the degree of Doctor of Laws from Königliche Technische Hochschule, Berlin.

1910

President of American Society of Mechanical Engineers.

1912

Awarded the Edison medal for meritorious achievements in the development of the alternating current system by the American Institute of Electrical Engineers.

1913

Awarded Grashoff medal by the Verein Deutsche Ingenieure for distinguished services rendered to technology—the first American to receive this honor.