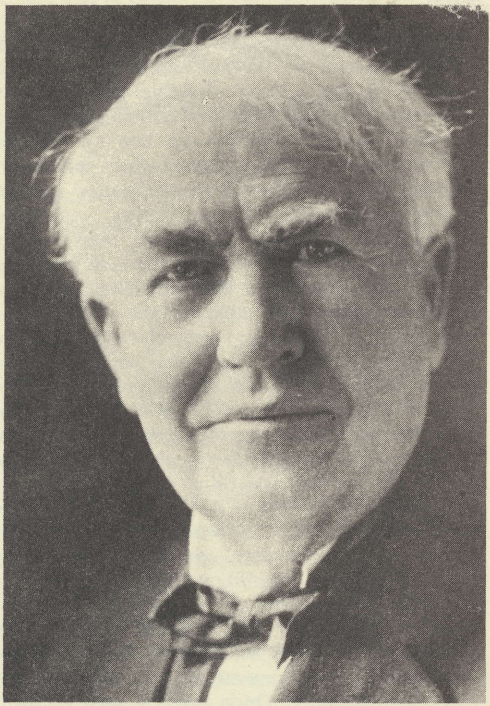


A Brief Biography

of

THOMAS ALVA EDISON

GODFATHER OF INDUSTRY

"BUT the man whose clothes were always wrinkled, whose hair was always tousled and who frequently lacked a shave probably did more than any other one man to influence the industrial civilization in which we live. To him we owe the phonograph and motion picture which spice hours of leisure; the universal electric motor and the nickel-iron-alkaline storage battery with their numberless commercial uses; the magnetic ore separator, the fluorescent lamp, the basic principles of modern electronics. Medicine thanks him for the fluoroscope, which he left to the public domain without patent. Chemical research follows the field he opened in his work on coaltar derivatives, synthetic carbolic acid, and a source of natural rubber that can be grown in the United States. His greatest contribution, perhaps, was the incandescent lamp—the germ from which sprouted the great power utility systems of our day . . .

Although his formal education stopped at the age of 12, his whole life was consumed by a passion for self-education, and he was a moving force behind the establishment of a great scientific journal. The number of his patents—1100—far exceeds that of any other inventor. And the 2500 notebooks in which he recorded the progress of thousands of experiments are still being gleaned of unused material. Once, asked in what his interests lay, Edison smilingly responded, 'Everything.' If we ask ourselves where the fruits of his life are seen, we might well answer, 'Everywhere.' "

From *Nation's Heritage*

THOMAS ALVA EDISON

The Story of a Great American

JOURNEYING from Holland, the Edison family originally landed in Elizabethport, New Jersey, about 1730. In Colonial times, they farmed a large tract of land not far from West Orange, New Jersey, where Thomas A. Edison made his home some 160 years later. Their fortunes fluctuated with their politics. Like many well-to-do landowners of that time, John Edison, a great-grandfather of the inventor, remained a Loyalist during the revolution, suffered imprisonment and was under sentence of execution from which he was saved only through the efforts of his own and his wife's prominent Whig relatives. His lands were confiscated, however, and the family migrated to Nova Scotia, where they remained until 1811, when they moved to Vienna, Ontario. Edison's grandfather, Captain Samuel Edison, served with the British in the War of 1812.

In Ontario, Edison's father, another Samuel, met and married Nancy Elliott, schoolteacher and daughter of a minister whose family had

originally come from Connecticut where her grandfather Ebenezer Elliott had served as a captain in Washington's army.

The younger Samuel now became involved in another political struggle — the much later and unsuccessful Canadian counterpart of the American Revolution known as the Papineau-MacKenzie Rebellion. Upon the failure of this movement, he was forced to escape across the border to the United States, and after innumerable dangers and hardships, finally reached the town of Milan, Ohio, where he decided to settle.

Thomas Edison's Early Days

The brick cottage in which Thomas Alva Edison was born on February 11, 1847, still stands in Milan, Ohio. Its humble size and simple design serve as a constant reminder that in America, a humble beginning does not hamper the rise to success.

Even as a boy of pre-school age, "Al" Edison was extraordinarily inquisitive; he wanted to find out things for himself. The story is told of how he tried — unsuccessfully — to solve the mystery of hatching eggs by sitting on them, himself, in his brother-in-law's barn. Among other tales of his youth in Milan are his narrow escape from drowning in the barge canal that ran alongside

the Edison home, and his public spanking in the town square after he accidentally had set fire to his father's barn.

When he was seven years old, his family moved again; this time to Port Huron, Michigan. But, unlike their earlier migrations by wagon, the trip was made by railroad train and lake schooner.

Edison's formal schooling was of short duration and of little value to him. To use his own words, he "was usually at the foot of the class." His teacher did not have the patience to cope with so active and inquisitive a mind, so his mother withdrew him from school and capably undertook the task of his education herself. In spite of his lack of formal schooling, Edison recognized the great worth of education and, in his later years, sponsored the famous Edison scholarships for outstanding high school graduates who were selected each year through a national contest.

Young Tom's First Laboratory

Most of Edison's vast knowledge was acquired through independent study and training. At the age of eleven, for example, he had his own chemical laboratory in the cellar of his Port Huron home and had read such books as Gibbon's "De-

cline and Fall of the Roman Empire," Sears' "History of the World," Burton's "Anatomy of Melancholy," and the "Dictionary of Sciences."

At twelve, his parents permitted him to take a job as newsboy and candy "butcher" on the train of the Grand Trunk Railroad running from Port Huron to Detroit. In this, his first job, Edison exhibited a knack for business and an ambition that far exceeded that of the average boy of his years. He maintained a chemical laboratory in the train's baggage car, which also served to house a printing press on which young Edison ran off copies of "The Weekly Herald," the first newspaper ever edited, published and printed aboard a moving train. In addition, he became a middle-man for fresh vegetables and fruit, buying from the farmers along the route and selling to Detroit markets.

When only thirteen years old, he was earning several dollars a day, a tidy sum even for a man in that period. Already he was putting into practice a theory followed throughout his life — that hard work and sound thinking recognize no substitutes.

One of the most widely known stories about Edison is the one which attributes his deafness to a quick-tempered trainman who soundly boxed his ears when Edison's traveling labora-

At fourteen, young Tom was selling candy and newspapers on a train plying between his hometown of Port Huron, Michigan, and Detroit. Simultaneously, he was learning telegraphy, the field in which he scored his earliest successes as an inventor, and experimenting in his own chemistry laboratory.

Edison was at the White House in Washington, D.C. to demonstrate one of his early tinfoil phonographs to President Rutherford B. Hayes when this photograph was taken in April of 1878. Edison considered the phonograph his favorite invention.

tory caused a fire to break out in the baggage car. Only part of the tale is true: the fire broke out and the trainman boxed his ears, but Edison himself never believed his deafness resulted from this incident. He traced it to a later occasion when another trainman thoughtlessly picked him up by the ears to help him aboard a train that was pulling out of a station.

It was during this period that a dramatic incident occurred which altered the entire course of Edison's career and which, therefore, may well have also altered the course of world progress. At Mt. Clemens, Michigan, the young Edison risked his own life to save the station agent's little boy from death under a moving freight car. The grateful father taught him telegraphy as a reward. Edison's association with telegraphy brought to a climax his interest in electricity — a word with which the name of Edison was to become inseparably associated — and led him into studies and experiments which resulted in some of the world's greatest inventions.

A Telegrapher at Seventeen

Edison's skill as a sender and receiver earned him a job as a regular telegrapher on the Grand Trunk line at Stratford Junction, Ontario, when only seventeen years of age. His creative imag-

ination, however, proved his downfall in this instance. He was fired when a supervisor happened across the secret of one of the young inventor's creations—a device for automatically "reporting in" on the wire in Morse code every hour, when, in actuality, Edison was napping to make up for sleep lost in pursuing his studies.

As a telegrapher, Edison travelled throughout the middle west, always studying and experimenting to improve the crude telegraph apparatus of the era. Turning eastward, Edison went to Boston where he went to work for Western Union as an operator. In his spare time, he created his first invention to be patented—a machine for electrically recording and counting the "Ayes" and "Nays" cast by members of a legislative body. While the invention earned him no money, because members of Congress could not be interested in any device to speed up proceedings, it did teach him a commercial lesson. Then and there he decided never again to invent anything unless he was sure it was wanted.

From Boston, Edison went to New York, where he landed, poor and in debt, in 1869. While working as an employee of the Gold and Stock Telegraph Company and later as a partner with Franklin L. Pope in their own electrical engineering company, Edison invented the Universal Stock Printer. For this device he received $40,000, the first money an invention brought him.

To Edison, the mere possession of money meant nothing; its only value rested in its ability to provide the tools and equipment necessary for further work and experiment. With the $40,000 he opened a factory in Newark, New Jersey, in 1870, where he manufactured stock tickers and devoted his energies to invention.

By the time he was twenty-three, his established methods of hard work and sound thinking had catapulted him to a point on the road to success rarely attained by one so young.

Edison's Hectic Years

With his success as an inventor and manufacturer at the age of twenty-three, Thomas Alva Edison in 1870 plunged into a period of feverish endeavor that has no parallel in the lives of other great men of science. His fertile brain and boundless energy drove him from one great invention to another, each of which, in turn, launched new manufacturing enterprises, giving employment to thousands of people. Few were his working days that did not extend through twenty of the twenty-four hours. The group of men who worked closely with him as his immediate assistants

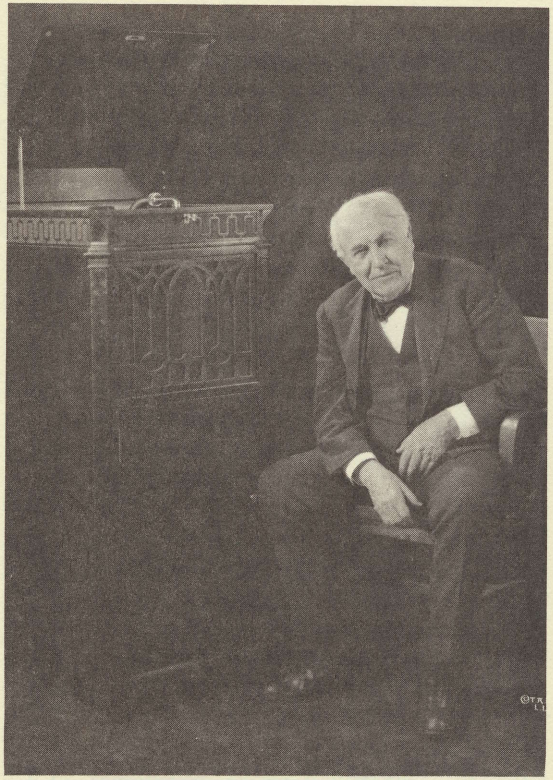
earned the name of the "insomnia squad" as they tried valiantly to follow the pace set by the "boss."

Actually there was no "boss" since, as the men who worked with him have testified, he worked harder, longer, and looked less like the owner of the plant than anyone present. A casual visitor, we are told, would have regarded Edison as one of the least likely persons to have been in charge, judging by outward appearances. Democracy walked with him through his laboratory.

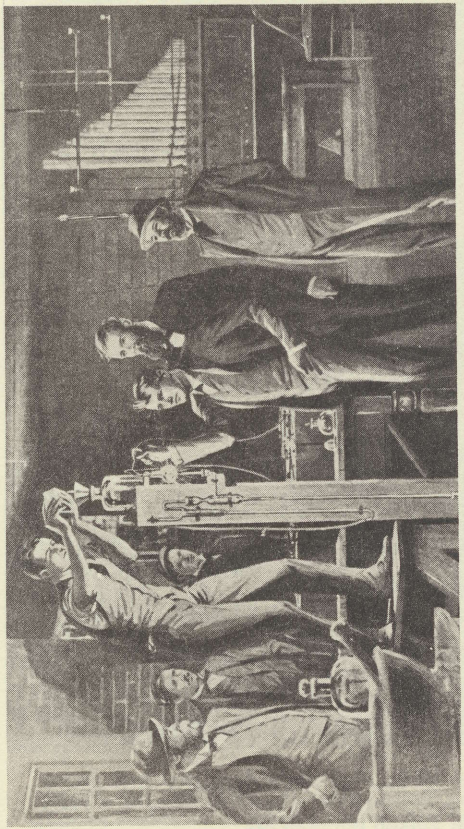
Work in his Newark plants constantly demanded more time for production than creation, so in 1876, in order to devote more of his energies to invention, he turned the management of his factories over to trusted assistants and established laboratories at Menlo Park, New Jersey.

Before moving to Menlo Park, however, Edison made one of his great discoveries, an electrical phenomenon he called "etheric force." This was the discovery that electrically generated waves would traverse an open circuit — the principle on which wireless telegraphy and radio are founded. The idea that electricity would traverse space was almost beyond belief at that time.

In a related field of research, Edison also discovered that messages could be sent through space by induction, in which a current generated



Years later, at seventy-four and still going strong, Edison listens to a recording on a 1921 model Edison phonograph.



Edison, left hand in trouser pocket, watches intently as his incandescent electric lamp burns brightly in his Menlo Park, New Jersey, laboratory. Artist's re-creation of this historic event of October 21, 1879, depicts Edison at age thirty-two.

in one set of wires induced a like current to flow through another set of wires between which no connection existed. As a result of this research, he received patents in 1885 on the transmission of signals, by induction, between a moving train and a station and between ship and shore.

Edison Aids Marconi

Guglielmo Marconi had become a personal friend of Edison's and, because of this friendship, Edison made these patents available to him rather than to a competitor who offered more money. Thus, these patents enabled Marconi to become recognized as the inventor of the wireless telegraph.

Edison was the first to give credit where credit was due, even though some of his earlier experiments and discoveries laid the groundwork for his successors.

It was at Newark, too, that Edison invented the "electric pen," forerunner of the mimeograph machine.

With the opening of his Menlo Park laboratories, Edison devoted most of his time to invention rather than to the manufacture of things. The results were astounding.

One of the greatest of the many "firsts" at-

tributed to Edison is the carrying out of research on an organized basis. Before Edison did this, the process of invention was usually a one-man and one-brain undertaking. At Menlo Park, Edison surrounded himself with scientific apparatus and trained assistants who handled the drudgery and time-consuming details of research, making possible his most acclaimed invention, the incandescent electric lamp. Menlo Park itself was an experiment for Edison, and he did not really perfect his invention of organized research in industry until eleven years later, when he transferred operations to West Orange on a greatly enlarged scale.

Edison's Favorite — The Phonograph

The carbon telephone transmitter which made the telephone commercially practical was invented by Edison in 1877, the same year he gave the world the phonograph.

Until Edison produced the carbon transmitter, telephone communication had been highly impractical. He sold his rights in the invention to Western Union which, in turn, reached an agreement with the company backed by Alexander Graham Bell, and for many years thereafter telephone instruments bore the names of both Bell and Edison. To use Edison's expression, it

was fifty-fifty — he invented the transmitter and Bell the receiver.

Edison's carbon transmitter later helped to make radio possible in that the same principle was adopted in developing a practical microphone.

The phonograph not only was Edison's favorite invention, but it probably was one of the most original ever created. In most instances, the inventor is the man who first perfects a device or method for achieving a result which for a long period of time had been a goal of experimentation and research by others as well as himself. But in the case of the phonograph, the idea of recording sound for later reproduction had not been conceived until Edison received his inspiration while experimenting with the automatic telegraph. Just as amazing, perhaps, is the fact that his first phonograph, although just a crude model, was a complete success.

Lawyer Steals Edison Patents

Edison worked at breakneck speed during the decade following 1876. Not alone was his own tireless constitution responsible for this pace; the period was one of unending competition and no holds were barred by his competitors. Despite his almost inhuman capacity for work, others in

some instances gained recognition for creations that were rightfully his. On one occasion, a lawyer entrusted to file applications for fifty-seven new patents stole the papers instead and sold them to Edison's rivals.

The desire for revenge formed no part of Edison's character, as revealed by his reaction to the theft of these patents. Even after long years had gone by he steadfastly refused to name the dishonest attorney. "His family might suffer," he told associates who suggested that he make public the lawyer's name.

Edison followed a policy which, absurd though it may sound today in contrast to the secrecy now surrounding most inventive endeavor, permitted the press to know and report even minute advances he made in experiments leading to the perfection of the first practical incandescent lamp.

The Edison Lamp

Others before and in the same period with Edison toiled long and hard to produce a practical incandescent lamp. The idea was not original with him, but it required the Edison genius to solve the difficult problems involved.

Many persons tried to deprive Edison of the honor of having been the first to perfect a practical incandescent electric lamp, but they all met with failure. Edison's claim was too genuine to be set aside, even by the courts which, for one reason or another, might have been inclined to bias.

An English jurist considering the claim of an English inventor, for example, might well be inclined to rule against Edison, if such a ruling were at all possible. But Lord Justice Fry, sitting in one of Great Britain's Royal Courts of Justice, made this commentary on the claims of Joseph W. Swan, an English inventor: "Swan could not do what Edison did . . . the difference between a carbon rod (as employed by Swan) and a carbon filament (Mr. Edison's method) was the difference between success and failure.

"Mr. Edison used the filament instead of the rod for a definite purpose, and by diminution of the sectional area made a physical law subserve the end he had in view. The smallness of size, then, was no casual matter, but was intended to bring about, and did bring about, a result which the rod could never produce, and so converted failure into success."

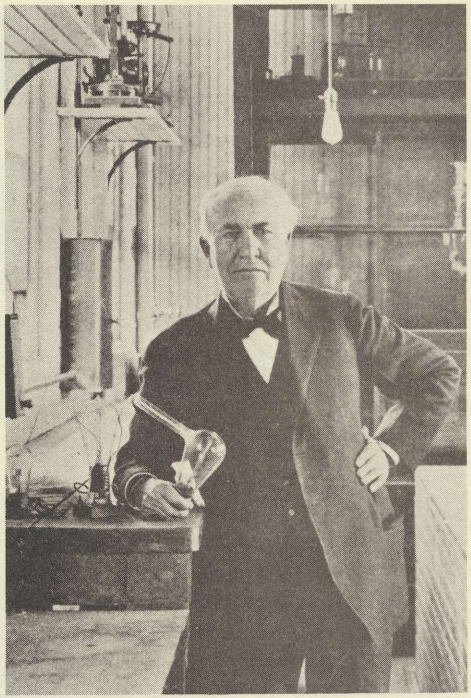
Edison realized that the invention of a practical lamp alone was not enough to replace gas as the most-used means of lighting. Therefore, his work on the electric light is even more aston-

ishing, because in addition to perfecting a commercially practical lamp he also invented a complete generation and distribution system, including dynamos, conductors, fuses, meters, sockets, and numerous other devices. Of 1,097 United States patents granted to Edison during his lifetime—by far the greatest number ever granted to one individual—356 dealt with electric lighting and the generation and distribution of electricity.

The "Edison Effect"

The year 1883 was significant for Edison in that, by his discovery of what was to become known as the "Edison effect," he pushed aside a veil of darkness behind which were to be found all the wonders of electronics. Edison in this achievement discovered the previously unknown phenomenon by which an independent wire or plate, when placed between the legs of the filament in an electric bulb, serves as a valve to control the flow of current. This discovery unearthed the fundamental principle on which rests the modern science of electronics.

In that year, 1883, Edison filed a patent on an electrical indicator employing the "Edison effect," the first application in the field of electronics.



Edison's experiments with incandescent lighting led to his launching the science of electronics. He is shown here, years later, with three of his "Edison Effect" bulbs, forerunners of the electronic tubes used in radio and television.

Although he was best known for his electric light and power systems and the phonograph, Edison was equally superb as a chemist. Out of this laboratory in West Orange, New Jersey, came such things as the nickel-iron-alkaline battery and the birth of America's coal-tar chemical industry.

The facilities of Menlo Park were proving inadequate to meet the requirements of Edison's amazing ability. He began looking around for a place more suitable for his needs. This he found in the little Essex County community of West Orange in northern New Jersey. He gave the orders that set workmen to the task of building a new and greater research laboratory.

The West Orange Laboratory

Thomas Alva Edison entered into a new and the fullest phase of his career when, at the age of forty, he moved his talents and tools from Menlo Park to his great new laboratory at West Orange, New Jersey, on November 24, 1887.

One of his first undertakings was the development of his favorite creation, the phonograph. The pressure of his work in connection with the perfection and installation of electric lighting systems throughout the country had made it impossible for him to concentrate on the phonograph, but now he went to work in earnest to see that the instrument fulfilled the high destiny he had held out for it from its beginning ten years earlier.

During the first four years of his occupancy of his new laboratory at West Orange, he took out more than eighty patents on improvements

on the cylinder phonograph and its businessman's counterpart, the dictating machine.

At the same time, Edison interested himself in an entirely different field, one that was as new to the world as it was to him. That field was the motion picture. Eadweard Muybridge and others had done some experimental work, but had only hinted of motion pictures. Muybridge, for example, by the employment of multiple cameras strung along a racetrack, had taken successive shots of a trotting horse, but he offered no method whereby the pictures could be viewed in motion.

The Motion Picture Camera

Two things led Edison to the invention of the motion picture camera: his idea that motion could be captured by having one camera that would take repeated pictures at high speed, and a new celluloid film developed by George Eastman for use in still photography that proved adaptable to Edison's proposed camera.

To Edison's mind, motion pictures would do for the eye what the phonograph did for the ear. Thus, we find that on October 6, 1889, when they first projected an experimental motion picture in his laboratory, he gave birth to sound pictures, as well. This first movie actually was

a "talkie." The picture was accompanied by synchronized sound from a phonograph record.

He applied for a patent on the motion picture camera on July 31, 1891. The first commercial showing of motion pictures occurred three years later, April 14, 1894, with the opening of a "peephole" Kinetoscope parlor at 1155 Broadway, New York City.

Several men developed machines for projecting motion pictures. The best such projector, to Edison's mind, was one built by Thomas Armat. Edison acquired the rights to Armat's crude machine and then perfected it at his West Orange laboratory.

Commercial projection of motion pictures as we know it today began on April 23, 1896, at Koster and Bial's Music Hall, New York City, where the Edison Vitascope, embodying the basic principles of Armat's invention with improvements added by Edison, was used.

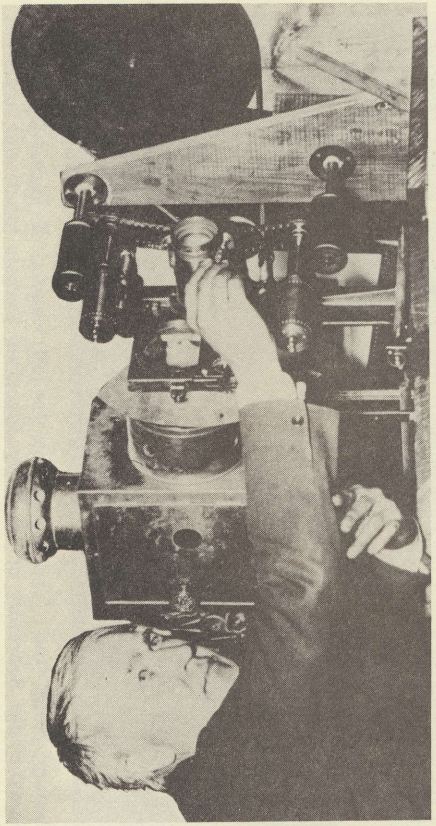
The Vitascope was Edison's name for the motion picture projector. When he added sound, he called it the Kinetophone, which he introduced commercially in 1913, or thirteen years before Hollywood adopted that means of improving motion-picture entertainment.

With Wilhelm Konrad Roentgen's discovery of the X-ray in 1895, Edison turned his attention

to the mysteries of these invisible rays. Within a few months he developed the fluoroscope, which invention he did not patent, choosing to leave it in the public domain because of its universal need in medicine and surgery. On May 16, 1896, he applied for a patent on the first fluorescent electric light, an invention which stemmed directly from his experimentation with the X-ray.

At the turn of the century, Edison propelled himself into one of the great sagas of science—his search for an acidless battery. Others scoffed at his theory that somewhere in nature there existed the elements for a battery which would not destroy itself by corrosive action, but Edison was not to be denied. After ten years of exhaustive experimentation he produced the alkaline storage battery, which today is employed in hundreds of industrial applications, such as providing power for mine haulage and inter- and intra-plant transportation, and in railway train lighting.

No field of scientific endeavor seemed foreign to his talents. When, in 1914, a shortage of carbolic acid developed because World War I had cut off European supplies, Edison quickly devised a method of making domestic carbolic acid and was producing a ton a day within a month.



Edison adjusts the lens on an early motion picture projector. He invented the motion picture camera "to do for the eye what his phonograph did for the ear."

During World War I, Thomas Edison (far left) headed the Naval Consulting Board under Secretary of the Navy Josephus Daniels (next) and Assistant Secretary Franklin D. Roosevelt (far right), later to become President.

Edison and the War

New problems were heaped on Edison by the approaching entry of the United States into the war and the destruction by fire of his giant West Orange manufacturing plant. His laboratory, fortunately, was spared from the flames. Almost before the embers died, new buildings began to rise from the ruins.

America at that time was almost entirely dependent upon foreign sources for fundamental coal-tar derivatives vital to many manufacturing processes. These derivatives were to become increasingly essential for the production of explosives, so Edison established plants for their manufacture. His work is recognized as having laid the groundwork for the important development of the coal-tar chemical industry in the nation today.

Josephus Daniels, then Secretary of the Navy, foresaw the country's need for technological advances in its preparedness program. His mind turned to one man, Thomas Edison, to undertake such a program, and in 1915, Edison became president of the newly created Naval Consulting Board, forerunner of the Navy Department's great research division of today. A colossal bronze head of the inventor, honoring him as the

founder of the Naval Research Laboratories, was unveiled December 3, 1952, on the mall at the Anacostia, Maryland, Laboratories.

Edison arranged for leading scientists to serve with him on the Consulting Board and also made available to the government the facilities of his laboratory. Much of the Consulting Board's effort was directed against the German submarine menace. Among the many inventions and ideas turned over to the Navy were devices and methods for detecting submarines by sound from moving vessels and for detecting enemy planes, for locating gun positions by range sounding, improved torpedoes, a high-speed signalling shutter for searchlights, and underwater searchlights. These and many other devices and formulas of prime importance came out of the Edison laboratory.

With the end of the war, Edison, although he had passed the seventy mark, thought only in terms of scientific and industrial progress. There would be time enough to think of taking it easy when he reached one hundred, he said. "My desire," he once remarked at this period of his life, "is to do everything within my power to further free the people from drudgery, and create the largest possible measure of happiness and prosperity."

Honors Come to Edison

A great many honors and awards had been bestowed upon Edison by persons, societies, and countries throughout the world. To him, such things were nice to have but were not to be sought after. He could never get over being embarrassed when some new medal came his way. But one of his greatest honors was yet to come. On October 20, 1928, he was awarded the Congressional Medal of Honor—the nation's highest award in recognition of services rendered.

A year later on October 21, 1929, the fiftieth anniversary of his invention of the incandescent light, the world again paid homage to him. In ceremonies participated in by Herbert Hoover, then president of the United States, Henry Ford, Albert Einstein, and other world figures, Edison re-enacted the making of the first practical incandescent lamp.

Time was running out for Edison, even though his keen mind and energies refused to admit it. Creative thought and hard work still constituted his creed, and at the age of eighty he was launched on another great experiment. Remembering his nation's lack of preparedness for World War I, he attacked the problem of devising a method for domestic production of rubber

so that, in event of another war, the United States would not be dependent upon foreign sources for this vital material. From goldenrod grown in his experimental gardens at Fort Myers, Florida, Edison was to produce rubber before his death.

A peaceful death enveloped him at his home, "Glenmont," in Llewellyn Park, West Orange, New Jersey, on October 18, 1931. He was eighty-four. His lifetime had embraced four wars and as many depressions. His achievements, more so than those of any one man, had helped to lift America to the pinnacle of greatness. The world was his beneficiary.

Chronology

1847 February 11—born at Milan, Ohio, son of Samuel and Nancy Elliott Edison.

1854 Edison family moved to Port Huron, Michigan.

1859 A newsboy and "candy butcher" on the train of the Grand Trunk Railway, running between Port Huron and Detroit.

1862 Printed and published a newspaper, "The Weekly Herald," on the train—the first newspaper ever printed on a moving train.

1862 August—saved from death the young son of J. U. MacKenzie, Station Agent at Mt. Clemens, Michigan. In gratitude, the father taught Edison telegraphy.

1863 Began a five-year period during which he served as a telegraph operator in various cities of the Central Western States, always studying and experimenting to improve apparatus.

1868 Made his first patented invention—the Electrical Vote Recorder. Application for patent signed October 11, 1868.

1869 Landed in New York City, poor and in debt. Shortly afterwards, looking for work, was in operating room of the Gold Indicator Company when its apparatus broke down. No one but Edison could fix it and he was given a job as superintendent.

1869 October—established a partnership with Franklin L. Pope as electrical engineers.

1870 Received his first money for an invention — $40,000 paid him by the Gold and Stock Telegraph Company for his stock ticker. Opened a manufacturing shop in Newark where he made stock tickers and telegraph instruments.

1871 Assisted Christopher L. Sholes, the inventor of the typewriter, in making first successful working model.

1872 Began a four-year period during which he conducted manufacturing of telegraph instruments for Western Union Telegraph Company and Automatic Telegraph Company. He had several shops during this time in Newark, New Jersey. He worked on and completed many inventions, including the motograph, automatic telegraph system, duplex, quadruplex, sextuplex and multiplex telegraph systems; also paraffin paper and the carbon rheostat.

1875 November 22—discovered a previously unknown and unique electrical phenomenon which he called "etheric force." Twelve years later, this phenomenon was recognized as being due to electric waves in free space. This discovery is the foundation of wireless telegraphy.

1876 March 7—applied for patent on his invention of the "electric pen." Patent was granted August 8, same year. Licenses covering the pen were later obtained by the A. B. Dick Company of Chicago, for the manufacture of the mimeograph.

1876 April—moved from Newark to his newly constructed laboratory at Menlo Park, New Jersey. This was the first laboratory for organized industrial research.

1877 April 27—applied for patent on the carbon telephone transmitter which made telephony commercially practicable. This invention included the microphone which is used in radio broadcasting.

1877 August 12—invented the phonograph. Patent was issued by the United States Patent Office within two months after application without a single reference.

1878 September 8—accompanied by Professor George F. Barker and Professor A. B. Chandler, he visited William Wallace in Ansonia, Connecticut, where he became actively interested in the problem of electric lighting.

1878 October 24—incorporation of the Edison Electric Light Company.

1879 Invented the first practical incandescent electric lamp. The invention was perfected October 21, 1879 when the first lamp embodying the principles of the modern incandescent lamp had maintained its incandescence for more than forty hours.

1879 Invented radical improvements in construction of dynamos, making them suitable for generators for his system of distribution of current for light, heat and power. Invented systems of distribution, regulation and measurement of electric current, including sockets, switches, fuses, etc.

1879 December 31—gave a public demonstration of his electric lighting system in streets and buildings at Menlo Park, New Jersey.

1880 April 3—invented the magnetic ore separator.

1880 May 13—started operation of the first passenger electric railways in this country at Menlo Park, New Jersey.

1880 Ushered in seven strenuous years of invention and endeavor in extending and improving the electric light, heat and power systems. During these years he took out upwards of 300 patents. Of 1,097 patents issued to Thomas A. Edison, 356 deal with electric lighting and power distribution.

1881 March 2—Edison arranged to open the Edison Machine Works at 104 Goerck Street, New York City.

1882 January 12—opened the first commercial incandescent lighting and power station at Holborn Viaduct, London, England.

1882 May 1—moved the first commercial incandescent lamp factory from Menlo Park to Harrison, New Jersey. Organized and established shops for the manufacture of dynamos, underground conductors, sockets, switches, fixtures, meters, etc.

1882 September 4—commenced the operation of the first commercial central station for incandescent lighting in this country at 257 Pearl Street, New York City.

1883 Discovered a previously unknown phenomenon. He found that an independent wire or plate, placed between the legs of the filament of an incandescent lamp, acted as a valve to control the flow of current. This became known as the "Edison Effect." This discovery covers the fundamental principle on which rests the modern science of electronics.

1885 March 27—patent executed on a system for communicating by means of wireless induction telegraphy between moving trains and railway stations.

1885 May 14—patent executed on a ship-to-shore wireless telegraphy system, by induction.

1886 December—moved plant of Edison Machine Works from 104 Goerck Street, New York City, to Schenectady, New York.

1887 November 24—moved his laboratory to West Orange. During the first four years of his occupancy of his West Orange laboratory, he took out over eighty patents on improvements on the cylinder phonograph.

1889 October 6—first projection of an experimental motion picture.

1894 April 14—first commercial showing of motion pictures took place with the opening of a "peephole" Kinetoscope parlor at 1155 Broadway, New York.

1896 Experimented with the X-ray discovered by Roentgen in 1895. Developed the fluoroscope which invention Mr. Edison did not patent, choosing to leave it to public domain because of its universal need in medicine and surgery.

1896 May 16—applied for a patent on the first fluorescent electric lamp. This invention sprang directly from his work on the fluoroscope.

1900 This year marked the beginning of a ten-year period of work which resulted in the invention of

the Edison nickel-iron-alkaline storage battery and its commercial introduction.

1901 Commenced construction on the Edison cement plant at New Village, New Jersey, and started quarrying operations at nearby Oxford.

1902 Worked on improving the Edison copper oxide primary battery.

1907 Developed the universal electric motor for operating dictating machines on either alternating or direct current.

1910 This year initiated a four-year period of work on improving the disc phonograph.

1913 Introduced the Kinetophone for talking motion pictures, after spending much time on its development.

1914 October 13—patent executed on electric safety lanterns which are used by miners for working lights. These miners' lamps have contributed in an important degree to the reduction of mine fatalities.

1914 Developed a process for the manufacture of synthetic carbolic acid. Designed a plant, and within a month was producing a ton a day to help overcome the acute shortage due to the World War.

1914 December 9—Edison's great plant at West Orange, New Jersey, was destroyed by fire. Immediate plans for rebuilding were laid and new buildings began to arise almost before the ruins of the old were cold.

1914 Invented the Telescribe, combining the telephone and the dictating phonograph.

1915 Established plants for the manufacture of fundamental coal-tar derivatives vital to many industries previously dependent on foreign sources. These coal-tar products were needed later for the production of wartime explosives. Mr. Edison's work in this field is recognized as having paved the way for the important development of the coal-tar chemical industry in the United States today.

1915 Became President of the Naval Consulting Board, at the request of Josephus Daniels, then Secretary of the Navy. During the war years, he did a large amount of work connected with national defense, particularly with reference to special experiments on over forty major war problems for the United States Government. At that time the late President, Franklin D. Roosevelt, was Assistant Secretary of the Navy.

1923 Made a study of economic conditions, the result of which was published in a pamphlet in 1924, when Mr. Edison presented to the Secretary of the Treasury a proposed amendment to the Federal Reserve Banking System.

1928 October 20—presented with the Congressional Medal of Honor by Andrew W. Mellon, Secretary of the Treasury.

1929 October 21—commemorating the Fiftieth Anniversary of the incandescent lamp and in the presence of President Hoover, Henry Ford and other world leaders, Mr. Edison re-enacted the making of the first practical incandescent lamp.

1931 October 18—died at Llewellyn Park, West Orange, New Jersey at the age of eighty-four.