

SCIENCE AND TECHNOLOGY 1836–1913

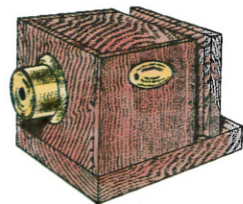
Technological progress continued at an ever-increasing pace. Major developments in communications and transportation were to change the world forever.



The telephone was invented by Alexander Graham Bell in 1875. The first public telephone exchange opened in Pittsburgh, in 1877.



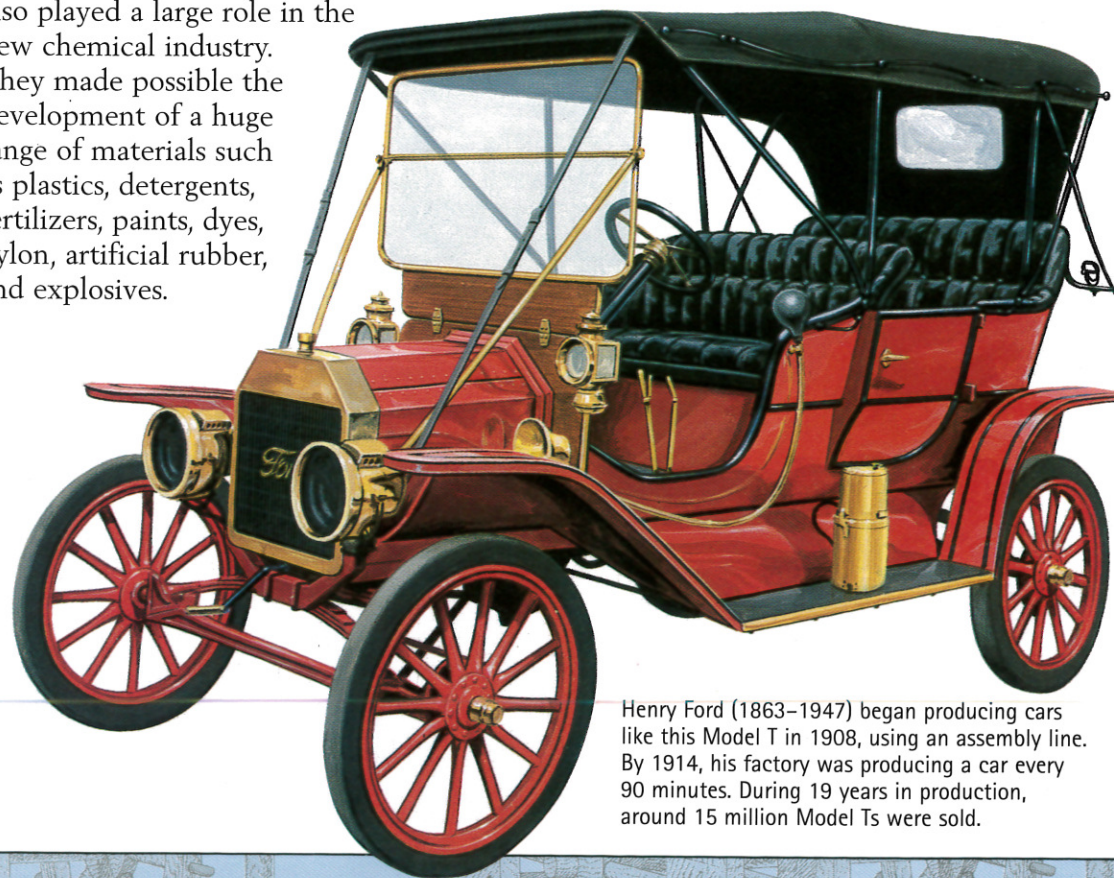
An American, Whitcomb Judson, invented the zipper in 1891. The first one, called a clasp locker, looked like the hooks and eyes that it replaced.



The daguerreotype camera appeared in 1838. It was not until 1888 that George Eastman made photography available to all with the first roll film camera, the Kodak box.

Industry continued to develop, with new inventions, new products, and factories producing new types of goods. In 1850, coal and steam engines still provided the power for machinery, but by the early 1900s, electricity and oil were being used instead. In 1859, Edwin L. Drake found substantial reserves of oil at a depth of only 69 ft. (22m) in Oil Creek, Pennsylvania. Oil was to provide the fuel for the internal combustion engine. This, in turn, led to the invention of the first automobiles.

The German engineer Gottlieb Daimler invented the high-speed internal combustion engine in 1887. This was to prove convincingly better than the steam engines that had been used previously. In the United States, Frank and Charles Duryea produced their first vehicles in 1892, and Henry Ford made his first experimental car in 1893. Oil products also played a large role in the new chemical industry. They made possible the development of a huge range of materials such as plastics, detergents, fertilizers, paints, dyes, nylon, artificial rubber, and explosives.

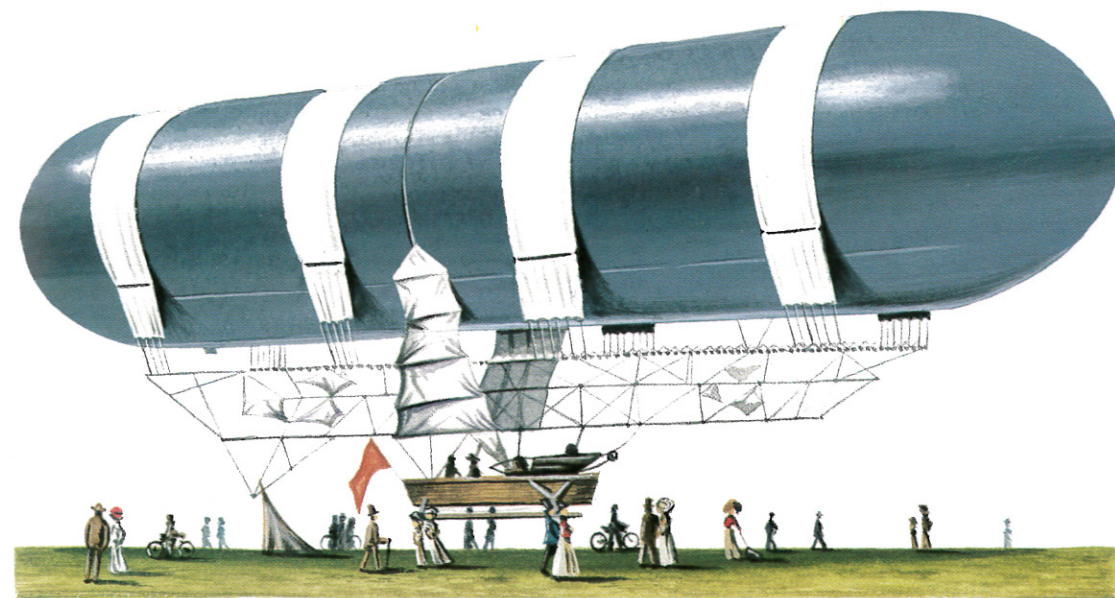


Henry Ford (1863–1947) began producing cars like this Model T in 1908, using an assembly line. By 1914, his factory was producing a car every 90 minutes. During 19 years in production, around 15 million Model Ts were sold.



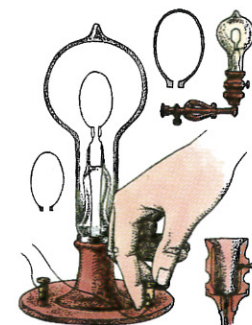
The first bicycles were uncomfortable and dangerous. The "penny farthing" was invented by James Starley in the early 1870s, and had solid tires and no brakes.

The Scottish-born American inventor Alexander Graham Bell invented the telephone, and the first public exchange opened in Pittsburgh in 1877. That same year, prolific inventor Thomas Alva Edison produced the phonograph. This enabled sound to be recorded and played back on a foil-coated cylinder.

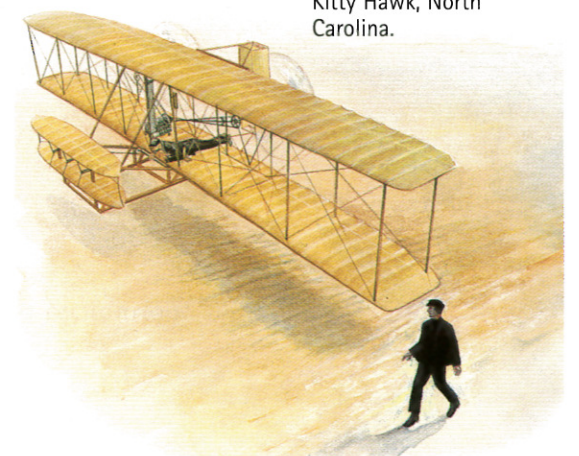


◀ Balloons were used for observation in the American Civil War. One of the observers was a retired German army officer named Zeppelin. He was an inventor of airships, which are sometimes called Zeppelins after him. Airships were more useful than balloons, because they could move under their own power.

In 1879, Edison demonstrated the electric lightbulb, and in 1882, the world's first large-scale electric power station, designed and installed by Edison, was completed in New York City. The kinetoscope, used to produce moving pictures, was invented in 1891, again by Edison, and he was able to synchronize this with his phonograph to produce the first talking motion pictures in 1913.



Thomas Edison was a pioneer of the electric lightbulb. In 1880, his system was first used to light a steamship.



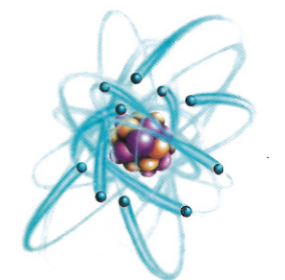
▼ Wilbur and Orville Wright used gliders to test their experiments in controlled airplane flight. They made the first powered flight on December 17, 1903, at Kitty Hawk, North Carolina.

▼ An early radio, called a wireless, had glass tubes. No one knew that radio waves existed until German scientist Heinrich Hertz (1857–1894) proved it in 1888, by transmitting and receiving them in his laboratory.



WHEN IT HAPPENED

- 1837 Samuel Morse invents Morse Code
- 1856 Bessemer converter invented
- 1859 First oil well drilled in Pennsylvania
- 1867 Nobel invents dynamite
- 1868 Frenchman Georges Leclanché invents the dry-cell battery
- 1869 Mendeleev devises periodic table
- 1875 First telephone call made by Bell
- 1877 Nikolaus Otto patents four-stroke internal combustion engine
- 1877 First public telephone exchange
- 1882 First hydroelectric power plant uses water to generate electricity
- 1885 First automobiles built in Germany
- 1887 Dunlop invents pneumatic tire
- 1896 Marconi invents first radio system
- 1903 First powered and controlled flight by the Wright brothers
- 1909 Leo Baekeland invents the first plastic, Bakelite



Scientists believed that all things were made up of atoms. Proof was provided by Ernest Rutherford's discovery of the atomic nucleus in 1911.