HISTORY OF CIVILIZATION

THE AGE OF PROGRESS

(*1871 –1929*)

The Age of Progress covers the latter decades of the 19th century and the early years of the 20th. Building on the advances of the industrial revolution, this "post-revolutionary" period is similarly defined by remarkable technological and industrial innovation. An era of firsts—steel bridges, sewing machines, bicycles, typewriters, radios, automobiles, airplanes, electric light bulbs, the telephone, photography, and the first motion picture—the Age of Progress gave birth to unprecedented modes of productivity, transportation, and communication. Thomas Alva Edison, Wilbur and Orville Wright, and Charles Darwin are among the historic figures discussed. Special emphasis is given to the sociology of industrial advancement—most notably the development of leisure. Challenging map exercises and provocative review questions encourage meaningful reflection and historical analysis. Tests and answer keys included.

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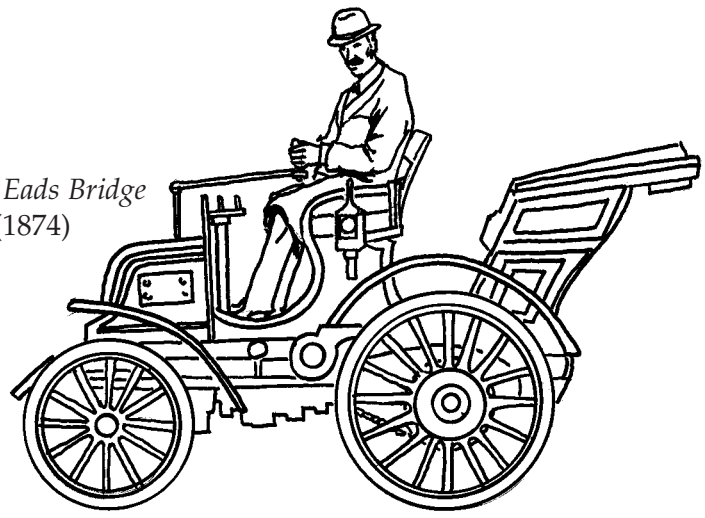
William James Hinchey (1874)
St. Louis Art Museum



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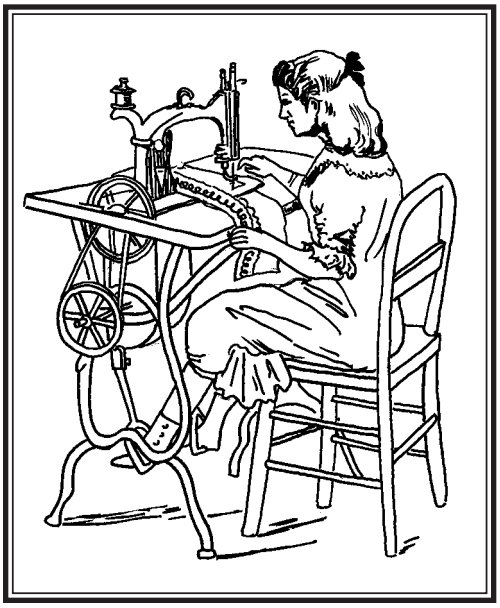
The Second Industrial Revolution

During the second half of the nineteenth century, Europe and the United States experienced further advances in industry and mechanization. These new stages of inventiveness and scientific advancement were not completely separate from the Industrial Revolution of earlier decades. However, historians commonly describe the innovations of the final decades of the 1800s as the Second Industrial Revolution.

Some major differences between the two creative movements are clear. During the earlier Industrial Revolution, the emphasis had been on improving and mechanizing the production of textiles and the application of steam power to all things productive. In addition, steam was used to develop the first railroads and steamships.



But this second phase was different in scope. The Second Industrial Revolution relied on heavy industrial production. Important inventions also marked this phase—from the bicycle to the telephone to the typewriter to the portable camera. Also, in this second phase of industrialization, new sources of power—such as electricity and gasoline—began to seriously compete with steam as the fundamental sources of power. Developments in the chemical, metallurgy, and communications fields also determined the scope of the Second Industrial Revolution.

A closer look at the period of late-nineteenth-century industrialization reveals just how important industrialization had become in Europe and abroad. From 1870 to 1890, the major iron-producing nations of Europe and the United States expanded their production from eleven million to twenty-three million tons. More and more iron ore was smelted into steel, bringing about significant growth in that industry, as well.

During the same decades (1870–1890), steel production (with the United States and Germany leading the way) increased from five hundred thousand tons to eleven million tons. Both iron and steel were being used to produce great bridges, rails for railroads, huge ocean-going vessels, and the framework for the early skyscrapers of the period, plus thousands of other uses.

An earlier innovation, which made the production of steel less expensive, was developed in 1856 by an English inventor named Henry Bessemer (1813–1898). He developed an efficient process for producing steel by blasting molten iron with hot air, resulting in a burnoff of carbon impurities, which gives steel its strength. The Bessemer Process proved a boon to the steel industry.

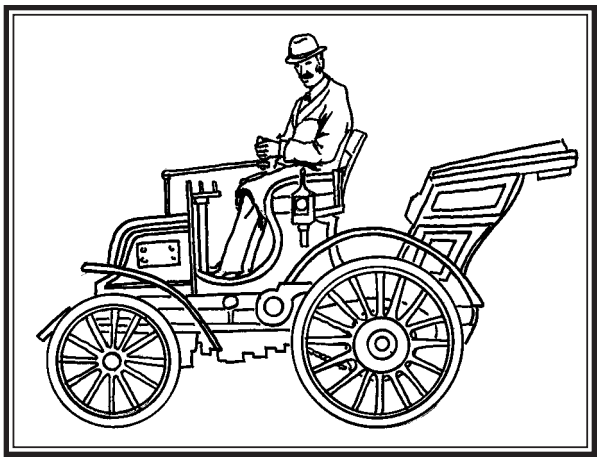
In the chemical field, innovations were changing the nature of agriculture. Several chemical fertilizers were in use by the second half of the nineteenth century, just as new farm machinery was being invented, such as the mechanical reaper and the harvester. During the 1870s, Swedish inventors introduced the first cream separator, which helped mechanize dairy production. The development of refrigeration helped preserve foods and allowed for the shipment to market—by rail or steamship—of perishable produce over great distances. Commercial canning—using tin imported through colonial trade—brought well-preserved foods to the tables of city-dwellers.

While the earlier Industrial Revolution had been centered in textile production, the Second Industrial Revolution continued to bring further innovations. Isaac Singer (1811–1875), an American inventor, patented the first foot-powered sewing machine for home use in 1851. Over the following twelve years, Singer patented twenty improvements on his earliest model. Such machines helped to produce inexpensive clothing, both at home and in factories. The sewing machines led to other clothing-producing devices, such as leather-stitchers, button-holers, and shoe-makers. The results were clear. In 1850, one shoemaker took ten hours to make a single pair of shoes. By 1900, a team of cobblers could produce ten pair of shoes in a few hours.

Innovation and Invention

Innovation and inventiveness were just as important to the Second Industrial Revolution as they were to the earlier phase. Electricity was at the center of much of this inventiveness. In 1879, the extraordinary American inventor Thomas Alva Edison (1847–1931) invented the first commercially successful incandescent electric light. Through the years to follow, electric lighting replaced gas and kerosene as the primary sources of artificial illumination.

His invention was preceded by several key applications of electricity in the 1800s. An Italian named Alessandro Volta (1745–1827) had invented the chemical battery in 1800. An Englishman, Michael Faraday (1791–1867), created the electromagnetic generator the year before his death.



With such innovations and adaptations in harnessing electricity came the development of efficient power transmission systems for building electric railways. In 1887, an American inventor, Frank Sprague (1857–1934), designed a successful streetcar system in Richmond, Virginia, which was powered by electricity. In later years, Sprague invented and installed high-speed and automatic electric elevators, allowing for taller skyscrapers. By the mid-1890s, he developed a system called *multiple-unit control* that allowed the motorman on an electrically powered train to control the motors on each of the train's cars. This innovation led to an improved power system for subway trains. (The first subway in Europe—built in London—was thirty years old by the 1890s, and featured a steam-powered train.)

Just as electricity was catching on as a viable power source, so was petroleum. The first commercial oil wells were drilled in 1859 in Pennsylvania by Edwin Drake (1819–1880). Over the following decades, engineers kept busy developing more uses for oil-based products.

One of the important uses of petroleum was its application as the power for new machinery and machines. As early as 1860, a French inventor Jean Joseph Etienne Lenoir (1822–1900) built a one-cylinder internal combustion engine. (Lenoir used the same gas as that used in early street lights.) Three years later, Lenoir attached such an engine to a vehicle which traveled at a speed of three miles an hour.

Such engines helped create the first automobile. In 1885 Gottlieb Daimler (1834–1900) invented a small high-speed internal combustion engine that ran on gasoline. Another German inventor, Karl Benz (1844–1929), did the same thing in the same year, although he and Daimler did not work together. Daimler installed his small engine on a two-wheeled bicycle; Benz attached his to a three-wheeled vehicle. By 1890, a former associate of Daimler's, Emile Levassor (d. 1897) built the first true automobile, with an engine in the front, a clutch, shaft, and gears.

In 1892, a German mechanical engineer, Rudolf Diesel (1858–1913), patented an oil-burning engine. Rather than burning oil to produce steam as the moving power, Diesel's engine burned oil directly in the cylinders. Soon, diesel engines were outstripping coal-burning steam engines with four times the efficiency.

Despite many innovations in automobile production by German inventors, the French led the way in producing automobiles in the 1890s.

To help publicize this new mode of travel, in 1894, a French newspaper, *Le Petit Journal*, sponsored one of the earliest automobile races. Motor cars ran from Paris to Rouen. In 1895, another race was organized, extending from Paris to Bordeaux. The winner of that road race sped along in an automobile that averaged fifteen miles per hour! By 1914, the automobile was a well established form of transportation.

Research and Write

What was American inventor and innovator Henry Ford's chief contribution to the developing automobile industry?