1 The Growth of Industry

TERMS & NAMES
petroleum
patent
business cycle
Bessemer steel process
generator
Thomas Edison
Alexander Graham Bell
Centennial Exhibition

MAIN IDEA
The growth of industry during the years 1860 to 1914 transformed life in America.

WHY IT MATTERS NOW
Modern businesses rely on many of the inventions and products developed during that time.

ONE AMERICAN'S STORY

In the 1850s, most Americans lit their homes with oil lamps. They could have used kerosene, an oil made from coal, but it was expensive. Then, in 1855, a chemist reported that kerosene could be made more cheaply from an oily liquid called petroleum.

However, people didn't know how to obtain petroleum from underground. They just gathered it slowly when it seeped to the surface. In 1857, Edwin Drake visited a site in Pennsylvania where petroleum oozed to the surface.

A VOICE FROM THE PAST

Within ten minutes after my arrival . . . I had made up my mind that [petroleum] could be obtained in large quantities by Boreing as for Salt Water.

Edwin Drake, quoted in *The Americans: The Democratic Experience*

Drake began drilling in 1859. He struck oil in August. This event launched the oil industry—one of many new industries that developed in the late 1800s, as this section explains.

The wooden structure is Drake's first oil well.

The Industrial Revolution Continues

Throughout the 1800s, factory production expanded in the United States. By the Civil War, factory production had spread beyond New England textiles to other regions and industries. Several factors encouraged this growth.

1. **Plentiful natural resources.** America had immense forests and large supplies of water. It also had vast mineral wealth, including coal, iron, copper, silver, and gold. Industry used these resources to manufacture a variety of goods.
2. **Growing population.** From 1860 to 1900, the U.S. population grew from 31.5 million to 76 million. This led to a growing need for goods. The demand for goods spurred the growth of industry.

3. **Improved transportation.** In the early 1800s, steamboats, canals, and railroads made it possible to ship items long distances more quickly. Railroad building boomed after the Civil War. As shipping raw materials and finished goods to markets became even easier, industry grew.
4. **High immigration.** Between 1860 and 1900, about 14 million people immigrated to the United States. Many of them knew specialized trades, such as metalworking. Such knowledge was valuable to industries. In addition, unskilled immigrants supplied the labor that growing industry needed.
5. **New inventions.** New machines and improved processes helped industry produce goods more efficiently. Inventors applied for patents for the machines or processes they invented. A **patent** is a government document giving an inventor the exclusive right to make and sell his or her invention for a specific number of years.
6. **Investment capital.** When the economy was thriving, many businesses made large profits. Hoping to share in those profits, banks and wealthy people lent businesses money. The businesses used this capital to build factories and buy equipment.
7. **Government assistance.** State and federal governments used tariffs, land grants, and subsidies to help businesses grow.

Background
Some of these canals were built because of Henry Clay's American System. (See Chapter 3.)

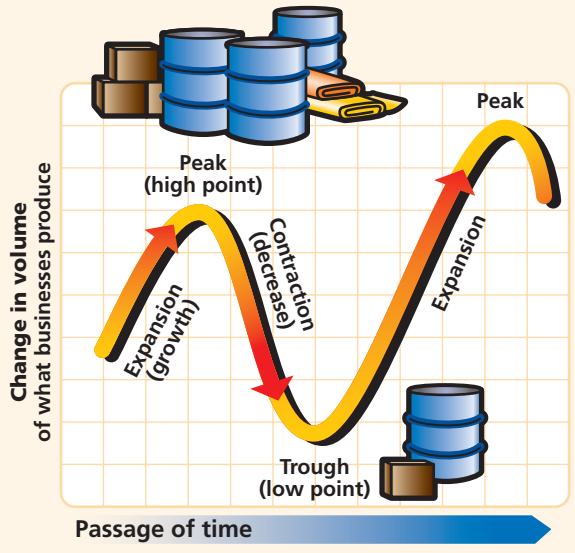
Vocabulary
capital: money and property used in a business

The Business Cycle

American industry did not grow at a steady pace; it experienced ups and downs. This pattern of good and bad times is called the **business cycle.** During good times, called booms, people buy more, and some invest in business. As a result, industries and businesses grow. During bad times, called busts, spending and investing decrease. Industries lay off workers and make fewer goods. Businesses may shrink—or even close. Such a period of low economic activity is a depression.

America experienced depressions in 1837 and 1857. Both were eventually followed by periods of strong economic growth. In the late 1800s, there were two harsh depressions, also called panics. The depression of 1873 lasted five years. At its height, three million people were out of work. During the depression that began in 1893, thousands of businesses failed, including more than 300 railroads.

The Business Cycle



SKILLBUILDER Interpreting Charts
1. *How does the amount of goods produced at the peak compare to the amount at the trough?*
2. *Are all peaks equally prosperous? Explain.*

ReadingHistory
A. Recognizing Effects How do you think depressions affect ordinary people?

Even with these economic highs and lows, industries in the United States grew tremendously between 1860 and 1900. Overall, the amount of manufactured goods increased six times during these years.

Steel: The Backbone of Industry

The steel industry contributed to America's industrial growth. Before the mid-1800s, steel was very expensive to manufacture because the steel-making process used huge amounts of coal. In the 1850s, William Kelly in the United States and Henry Bessemer in England independently developed a new process for making steel. It used less than one-seventh of the coal that the older process used. This new manufacturing technique was called the **Bessemer steel process.**

Reading **History**
B. Drawing Conclusions Which industries benefited from the steel products mentioned here?

Because the Bessemer process cut the cost of steel, the nation's steel output increased 500 times between 1867 and 1900. Industry began to make many products out of steel instead of iron. These products included plows, barbed wire, nails, and beams for buildings. But the main use of steel throughout the late 1800s was for rails for the expanding railroads. (See Section 2.)

Edison and Electricity

Another industry that grew during the late 1800s was the electric-power industry. By the 1870s, inventors had designed efficient generators. A **generator** is a machine that produces electric current. As a result, people grew eager to tap the power of electricity.

The inventor who found the most ways to use electricity was **Thomas Edison.** In 1876, he opened a laboratory in Menlo Park, New Jersey. He employed many assistants, whom he organized into teams to do research. Edison's laboratory invented so many things that Edison received more than 1,000 U.S. patents, more than any other individual inventor.

Edison would start with an idea for a possible invention. Then he would work hard to make that idea a reality—even if problems arose.

A VOICE FROM THE PAST

It has been just so in all my inventions. The first step is an intuition—and comes with a burst, *then* difficulties arise. . . . "Bugs"—as such little faults and difficulties are called—show themselves and months of anxious watching, study and labor are requisite [needed] before commercial success—or failure—is certainly reached.

Thomas Edison, quoted in *Edison* by Matthew Josephson

Reading **History**
C. Finding Main Ideas According to Edison, is inventing easy?

Edison's most famous invention was practical electric lighting. Other inventors had already created electric lights, but they were too bright and

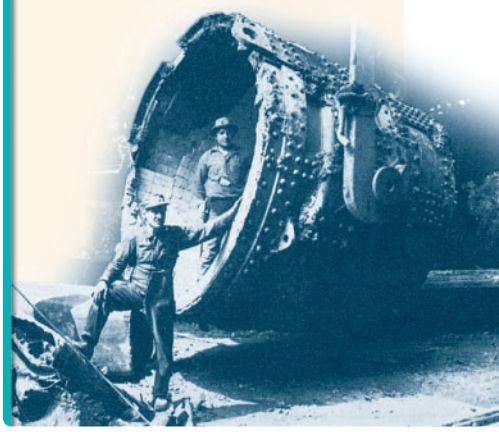
Connections TO SCIENCE

IRON VS. STEEL

Why is the comic book hero Superman also called the man of steel? People often use the word *steel* as a synonym for strength.

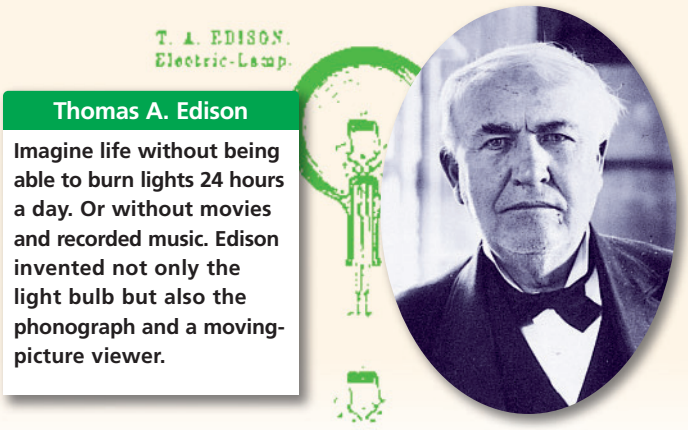
Steel is an iron alloy—a blend of iron and other materials such as carbon. But steel is stronger and more durable than iron. That is why steel replaced iron in many industries in the late 1800s. A giant ladle (bucket) used to pour melted steel is pictured below.

Stainless steel, invented in the early 1900s, has an additional benefit: it doesn't rust. Stainless steel is used in tools, machines, and many household items, such as pots, pans, and utensils.



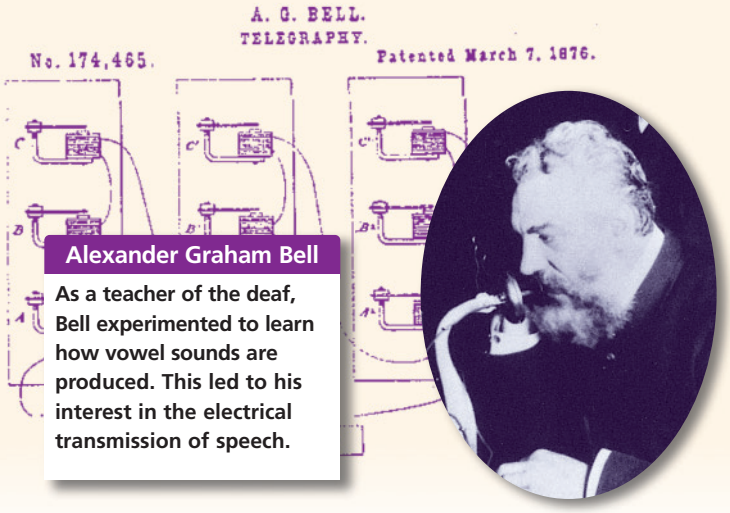
CONNECTIONS TO SCIENCE

American Inventors, *1870–1900*



Thomas A. Edison

Imagine life without being able to burn lights 24 hours a day. Or without movies and recorded music. Edison invented not only the light bulb but also the phonograph and a moving-picture viewer.



Alexander Graham Bell

As a teacher of the deaf, Bell experimented to learn how vowel sounds are produced. This led to his interest in the electrical transmission of speech.

flickery for home use. Edison figured out how to make a safe, steady light bulb. He also invented a system to deliver electricity to buildings.

By 1882, he had installed electric lighting in a half-mile-square area of New York City. Electric lighting quickly replaced gaslights. By the late 1880s, Edison's factory produced about a million light bulbs a year.

Bell and the Telephone

Electricity played a role in communications devices invented during the 1800s. In 1835, Samuel Morse developed the telegraph. It allowed people to use electrical impulses to send messages over long distances.

The next step in communications was the telephone, invented by **Alexander Graham Bell.** He was a Scottish immigrant who taught deaf students in Boston. At night, Bell and his assistant, Thomas Watson, tried to invent a device to transmit human speech using electricity.

After years of experiments, Bell succeeded. One day in March 1876, he was adjusting the transmitter in the laboratory in his apartment. Watson was in another room with the receiver. The two doors between the rooms were shut. According to Watson's memoirs, Bell accidentally spilled acid on himself and said, "Mr. Watson, come here. I want you." Watson rushed down the hall. He burst into the laboratory, exclaiming that he had heard and understood Bell's words through the receiver.

Bell showed his telephone at the **Centennial Exhibition** in June 1876. That was an exhibition in Philadelphia to celebrate America's 100th birthday. There, several of the world's leading scientists and the emperor of Brazil saw his demonstration. Afterward, they declared, "Here is the greatest marvel ever achieved in electrical science."

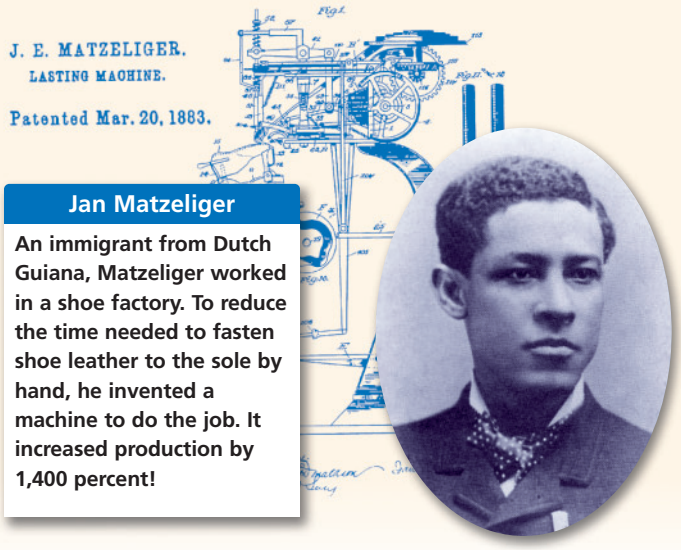
Reading **History**

D. Analyzing Points of View Why do you think the scientists said this about the telephone?

Inventions Change Industry

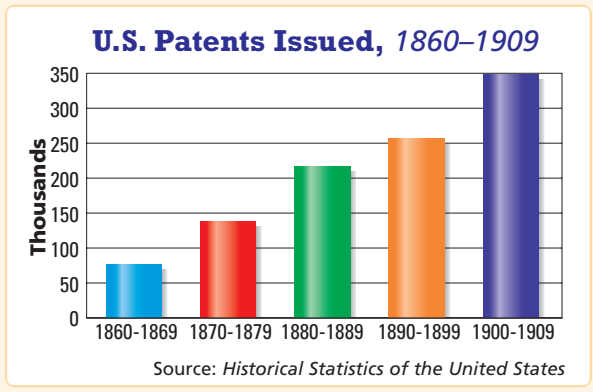
The telephone industry grew rapidly. By 1880, more than 50,000 telephones had been sold. The invention of the switchboard allowed more and more people to connect into a telephone network. Women commonly worked in the new job of switchboard operator.

The typewriter also opened jobs for women. Christopher Latham Sholes helped invent the first practical typewriter in 1867. He also



Jan Matzeliger

An immigrant from Dutch Guiana, Matzeliger worked in a shoe factory. To reduce the time needed to fasten shoe leather to the sole by hand, he invented a machine to do the job. It increased production by 1,400 percent!



SKILLBUILDER Interpreting Graphs

1. *How many more patents were issued from 1900 to 1909 than from 1860 to 1869?*
2. *Was this a time of increasing or decreasing inventiveness?*

improved the machine and sold his rights to it to a manufacturer who began to make typewriters in the 1870s.

The sewing machine also changed American life. Elias Howe first patented it in 1846. In the next few years, the sewing machine received many design improvements. Isaac Singer patented a sewing machine in 1851 and continued to improve it. It became a bestseller and led to a new industry. In factories, people produced ready-made clothes. Instead of being fitted to each buyer, clothes came in standard sizes and popular styles. Increasingly, people bought clothes instead of making their own.

Other inventors helped industry advance. African-American inventor Granville T. Woods patented devices to improve telephone and telegraph systems. Margaret Knight invented machines for the packaging and shoemaking industries and also improved motors and engines.

Of all the up-and-coming industries of the middle 1800s, one would have a larger impact on American life than any other. That was the railroad industry. You will read about railroads in Section 2.

Section 1 Assessment

1. Terms & Names

Explain the significance of:

- petroleum
- patent
- business cycle
- Bessemer steel process
- generator
- Thomas Edison
- Alexander Graham Bell
- Centennial Exhibition

2. Taking Notes

Use a cluster diagram like the one below to list some of the inventions of the late 1800s.

How has one of these inventions recently been improved?

3. Main Ideas

a. What factors contributed to industrial growth in the United States?

b. What is the business cycle?

c. What caused the steel-making industry to boom and why?

4. Critical Thinking

Recognizing Effects How did the inventions of the late 1800s make it easier to do business?

THINK ABOUT

- electric generators and light bulbs
- the telephone
- the typewriter

ACTIVITY OPTIONS

SCIENCE

TECHNOLOGY

Choose an invention and learn more about it. Create a **display** explaining how it works or design a **Web page** linking to sites with more information.