

Early Industry and Inventions

MAIN IDEA

New machines and factories changed the way people lived and worked in the late 1700s and early 1800s.

WHY IT MATTERS NOW

The industrial development that began more than 200 years ago continues today.

TERMS & NAMES

Samuel Slater	interchangeable parts
Industrial Revolution	Robert Fulton
factory system	Samuel F. B. Morse
Lowell mills	

ONE AMERICAN'S STORY

In 1789, the Englishman **Samuel Slater** sailed to the United States under a false name. It was illegal for textile workers like him to leave the country. Britain wanted no other nation to copy its new machines for making thread and cloth. But Slater was going to bring the secret to America.

With the backing of investor Moses Brown, Slater built the first successful water-powered textile mill in America. You will learn in Section 1 how the development of industries changed the ways Americans lived and worked.



Samuel Slater's mill was located in Pawtucket, Rhode Island.

Free Enterprise and Factories

The War of 1812 brought great economic changes to the United States. It sowed the seeds for an Industrial Revolution like the one begun in Britain during the late 18th century. During the **Industrial Revolution**, factory machines replaced hand tools, and large-scale manufacturing replaced farming as the main form of work. For example, before the Industrial Revolution, women spun thread and wove cloth at home using spinning wheels and hand looms. The invention of such machines as the spinning jenny and the power loom made it possible for unskilled workers to produce cloth. These workers, who were often children, could produce more cloth, more quickly.

The **factory system** brought many workers and machines together under one roof. Most factories were built near a source of water to power the machines. People left their farms and crowded into cities where the

Taking Notes

Use your chart to take notes about early industry and inventions.

Causes



factories were. They worked for wages, on a set schedule. Their way of life changed, and not always for the better.

Many Americans, such as Thomas Jefferson, did not want the United States to industrialize. But the War of 1812 led the country in that direction. Because the British naval blockade kept imported goods from reaching U.S. shores, Americans had to start manufacturing their own goods. The blockade also stopped investors from spending money on shipping and trade. Instead, they invested in new American industries. Taking advantage of the country's free enterprise system, American businessmen built their own factories, starting in New England. These businessmen and their region grew wealthier.

Vocabulary

industrialize: to develop factories

ReadingHistory

A. Recognizing Effects How did the War of 1812 cause economic changes in America?

Factories Come to New England

New England was a good place to set up factories for several reasons. Factories needed water power, and New England had many fast-moving rivers. For transportation, it also had ships and access to the ocean. In addition, New England had a willing labor force. The area's first factory workers were families who were tired of scraping a living from their stony fields.

Samuel Slater built his first spinning mill in Pawtucket, Rhode Island, in 1790. He hired eight children between the ages of 7 and 12, paying them a low wage. Later, he built a larger mill and employed whole families. As Slater influenced others to start mills, his family system of employment spread through Rhode Island, Connecticut, and southern Massachusetts.

The Lowell Mills Hire Women

In 1813, the American textile industry leaped forward when Francis Cabot Lowell built a factory in Waltham, in eastern Massachusetts.

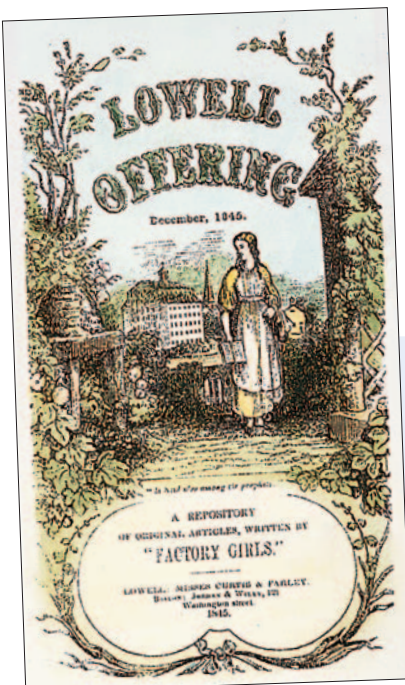
This factory not only spun raw cotton into yarn, but wove it into cloth on power looms. Lowell had seen power looms in English mills and had figured out how to build them. Like Samuel Slater, he had brought secrets to America.

The Waltham factory was so successful that Lowell and his partners built a new factory town, Lowell, near the Merrimack and Concord rivers. The **Lowell mills**, textile mills in the village, employed farm girls who lived in company-owned boardinghouses. "Lowell girls" worked 12½-hour days in deafening noise.

Background

Founded in 1826, the town was named for Lowell, who died in 1817.

Lowell girls published a literary magazine.

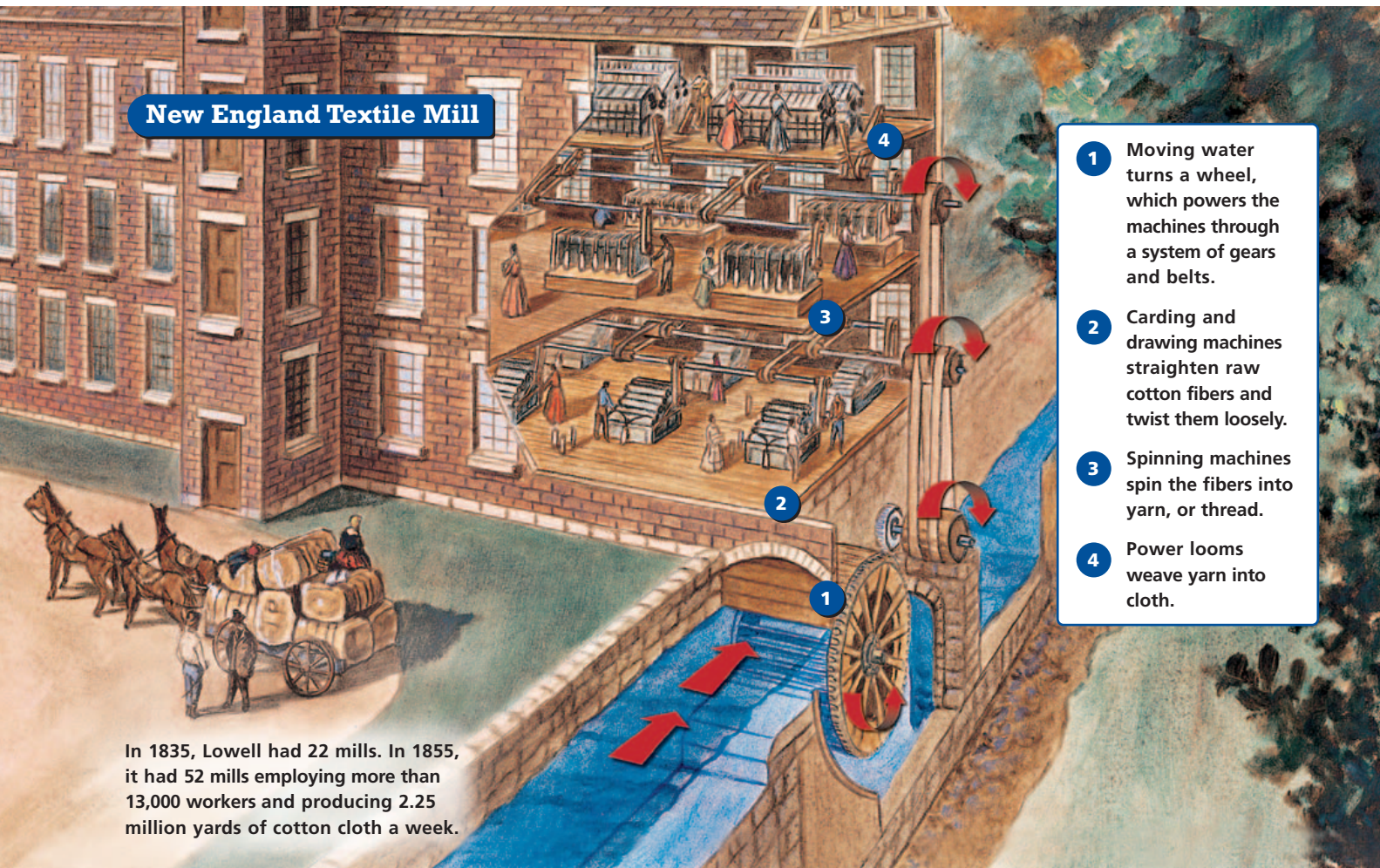


A VOICE FROM THE PAST

At first the hours seemed very long . . . and when I went out at night the sound of the mill was in my ears You know that people learn to sleep with the thunder of Niagara [falls] in their ears, and a cotton mill is no worse, though you wonder that we do not have to hold our breath in such a noise.

"Letters from Susan," quoted in the *Lowell Offering*

New England Textile Mill



In 1835, Lowell had 22 mills. In 1855, it had 52 mills employing more than 13,000 workers and producing 2.25 million yards of cotton cloth a week.

- 1 Moving water turns a wheel, which powers the machines through a system of gears and belts.
- 2 Carding and drawing machines straighten raw cotton fibers and twist them loosely.
- 3 Spinning machines spin the fibers into yarn, or thread.
- 4 Power looms weave yarn into cloth.

Young women came to Lowell in spite of the noise. In the early years, wages were high—between two and four dollars a week. Older women supervised the girls, making them follow strict rules and attend church. Girls read books, went to lectures, and even published a literary magazine—the *Lowell Offering*. Usually they worked for only a few years, until they married. By the 1830s, however, falling profits meant that wages dropped and working conditions worsened for the Lowell girls.

ReadingHistory

B. Contrasting

How did the Lowell mills differ from Slater's mill?

The Lowell mills and other early factories ran on water power. Factories built after the 1830s were run by more powerful steam engines. Because steam engines used coal and wood, not fast-moving water, factories could be built away from rivers and beyond New England.

A New Way to Manufacture

New manufacturing methods changed the style of work in other industries besides the textile industry. In 1797, the U.S. government hired the inventor Eli Whitney to make 10,000 muskets for the army. He was to have the guns ready in two years. Before this time, guns were made one at a time by gunsmiths, from start to finish. Each gun differed slightly. If a part broke, a new part had to be created to match the broken one.

Whitney sought a better way to make guns. In 1801, he went to Washington with a box containing piles of musket parts. He took a part from each pile and assembled a musket in seconds. He had just demonstrated the use of **interchangeable parts**, parts that are exactly alike.



Robert Fulton invented the *Clermont*, a steamboat.

Machines that produced exactly matching parts soon became standard in industries. Interchangeable parts speeded up production, made repairs easy, and allowed the use of lower-paid, less-skilled workers. But the new system also required a new style of management, with inspectors to make sure each piece was uniform. Workers who were used to more independence disliked such close supervision.

ReadingHistory
C. Recognizing Effects What were the effects of using interchangeable parts?

Moving People, Goods, and Messages

New inventions increased factory production. They also improved transportation and communication. Steamboats carried people and goods farther and faster and led to the growth of cities like New Orleans and St. Louis. **Robert Fulton** invented a steamboat that could move against the current or a strong wind. He launched the *Clermont* on the Hudson River in 1807. Its steam engine turned two side paddle wheels, which pulled the boat through the water.

The *Clermont* was dubbed “Fulton’s Folly” and described as “looking precisely like a backwoods saw-mill mounted on a scow [boat] and set on fire.” But it made the 300-mile trip from New York to Albany and back in a record 62 hours. Even Fulton had not expected to travel so quickly.

A VOICE FROM THE PAST

I overtook many sloops and schooners, beating to the windward, and parted with them as if they had been at anchor. The power of propelling boats by steam is now fully proved.

Robert Fulton, quoted in *Robert Fulton and the “Clermont”*

In 1811, the first steamship traveled down the Mississippi and Ohio rivers. But its engine was not powerful enough to return upriver, against the current. Henry Miller Shreve, a trader on the Mississippi, designed

a more powerful engine. He installed it on a double-decker boat with a paddle wheel in the back. In 1816, he sailed this boat up the Mississippi and launched a new era of trade and transportation on the river.

In 1837, **Samuel F. B. Morse** first demonstrated his telegraph. This machine sent long and short pulses of electricity along a wire. These pulses could be translated into letters of a message. With the telegraph, it took only seconds to communicate with someone in another city. In 1844, the first long-distance telegraph line carried news from Baltimore to Washington, D.C., about who had been nominated for president. Telegraph lines spanned the country by 1861, bringing people closer as a nation. Both the telegraph and the steamboat brought more national unity.

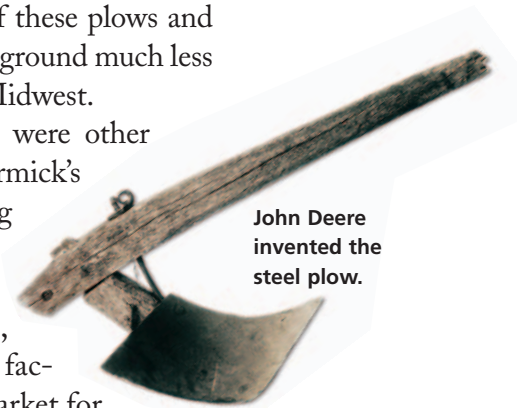
ReadingHistory
D. Recognizing Effects What made the steamboat and telegraph such important inventions?

Technology Improves Farming

Other new inventions increased farm production. In 1836, the blacksmith John Deere invented a lightweight plow with a steel cutting edge. Older cast-iron plows were designed for the light, sandy soil of New England. But rich, heavy Midwestern soil clung to the bottom of these plows and slowed farmers down. Deere's new plow made preparing ground much less work. As a result, more farmers began to move to the Midwest.

The mechanical reaper and the threshing machine were other inventions that improved agriculture. Cyrus McCormick's reaper, patented in 1834, cut ripe grain. The threshing machine separated kernels of wheat from husks.

New technologies linked regions and contributed to national unity. With new farm equipment, Midwestern farmers grew food to feed Northeastern factory workers. In turn, Midwestern farmers became a market for Northeastern manufactured goods. The growth of Northeastern textile mills increased demand for Southern cotton. This led to the expansion of slavery in the South, as you will learn in Section 2.



John Deere invented the steel plow.

Vocabulary
patented: protected by a patent, which gives an inventor the sole right to make, use, or sell an invention

Section 1 Assessment

1. Terms & Names

Explain the significance of:

- Samuel Slater
- Industrial Revolution
- factory system
- Lowell mills
- interchangeable parts
- Robert Fulton
- Samuel F. B. Morse

2. Using Graphics

On a chart like the one below, note new inventions, their dates, and their effects on the United States.

Invention	Date	Effects

Which inventions did most to link the nation? Explain.

3. Main Ideas

- Why was New England a good place to build early factories?
- What were working conditions like in Lowell mills?
- How were different U.S. regions linked economically?

4. Critical Thinking

Evaluating How would you judge Samuel Slater and Francis Lowell, who brought secrets to the United States illegally?

THINK ABOUT

- what they gained
- how they affected the United States and England
- what you believe about keeping technology secret

ACTIVITY OPTIONS

SCIENCE
SPEECH

Explain how an invention from this chapter works, either in an oral report or a labeled diagram.