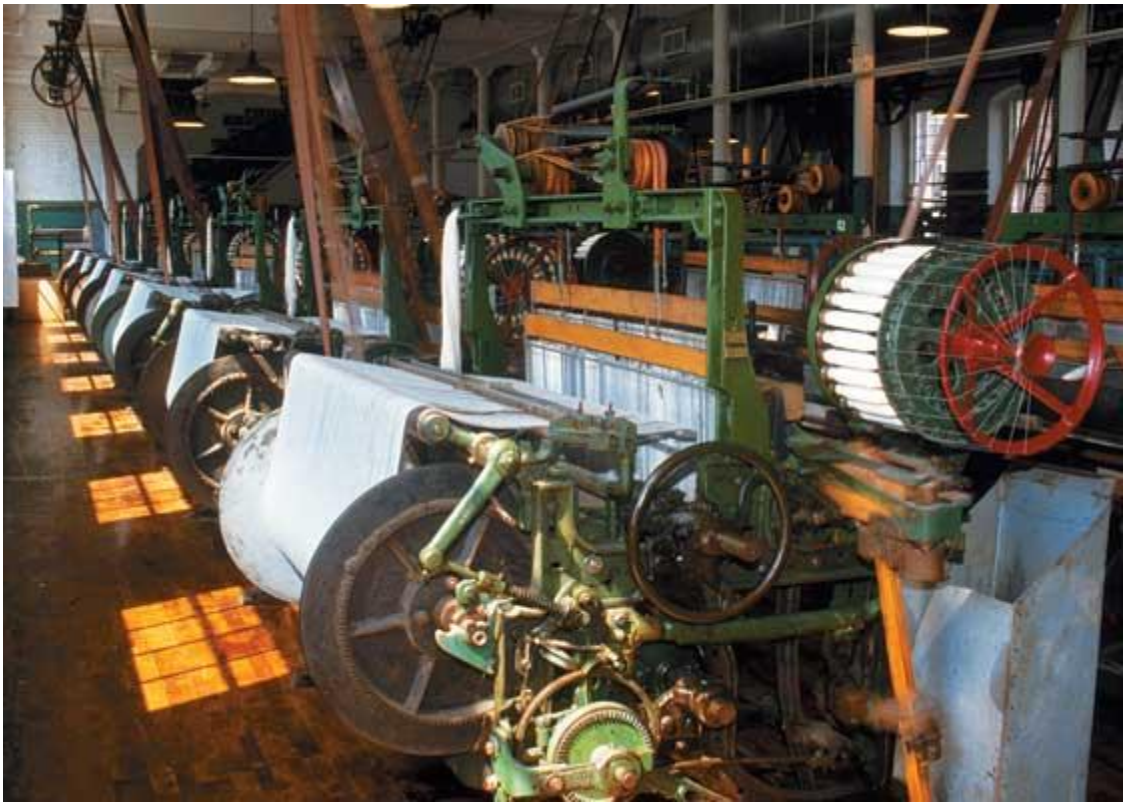
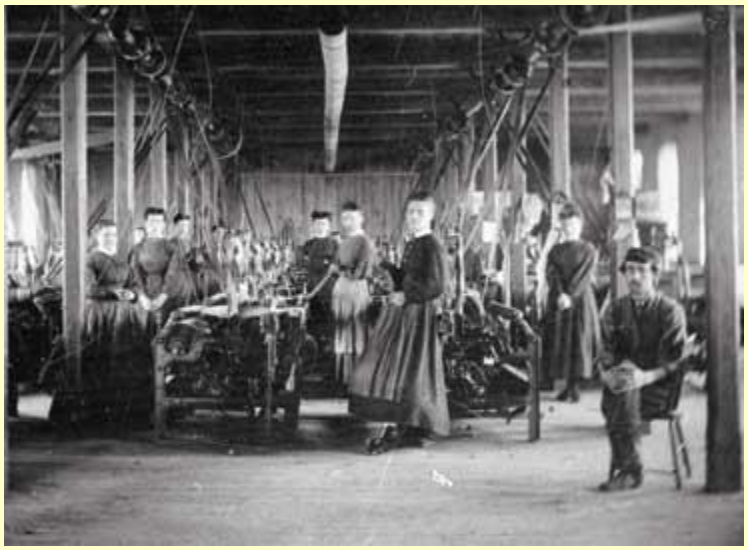
Chapter 12
The North
1790–1860

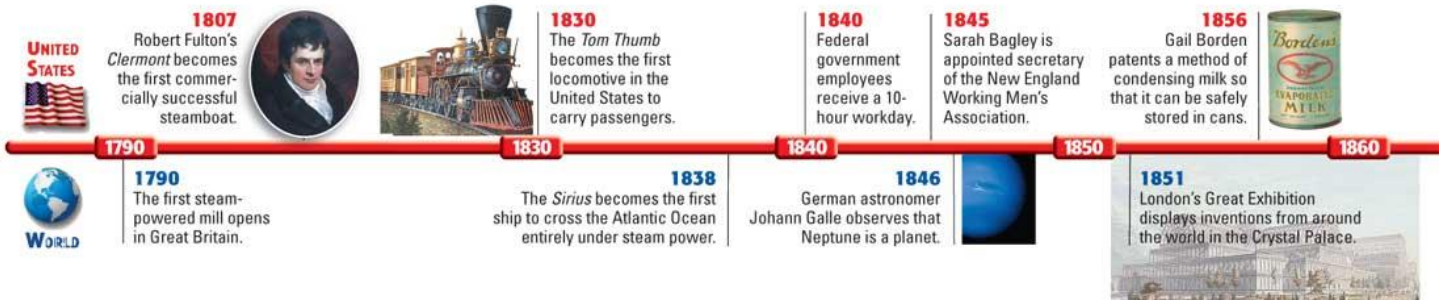




Textile mill workers were often women.

What You Will Learn…

New machinery led to the construction of new mills, often along rivers. In this chapter you will learn about changes in the lives of Americans in the North as a result of rapid industrialization.



Section 1

The Industrial Revolution in America

If YOU were there...

You live in a small Pennsylvania town in the 1780s. Your father is a blacksmith, but you earn money for the family, too. You raise sheep and spin their wool into yarn. Your sisters knit the yarn into warm wool gloves and mittens. You sell your products to merchants in the city. But now you hear that someone has invented machines that can spin thread and make cloth.

Would you still be able to earn the same amount of money for your family? Why?

BUILDING BACKGROUND In the early 1700s making goods depended on the hard work of humans and animals. It had been that way for hundreds of years. Then new technology brought a change so radical that it is called a revolution. It began in Great Britain and soon spread to the United States.

The Industrial Revolution

At the beginning of the 1700s, the majority of people in Europe and the United States were farmers. They made most of what they needed by hand. For example, female family members usually made clothing. First, they used a spinning wheel to spin raw materials, such as cotton or wool, into thread. Then they used a hand loom to weave the thread into cloth.

Some families produced extra cloth to sell to merchants, who sold it for a profit. In towns, a few skilled workers made goods by hand in their own shops. These workers included blacksmiths, carpenters, and shoemakers. Their ways of life had stayed the same for generations.

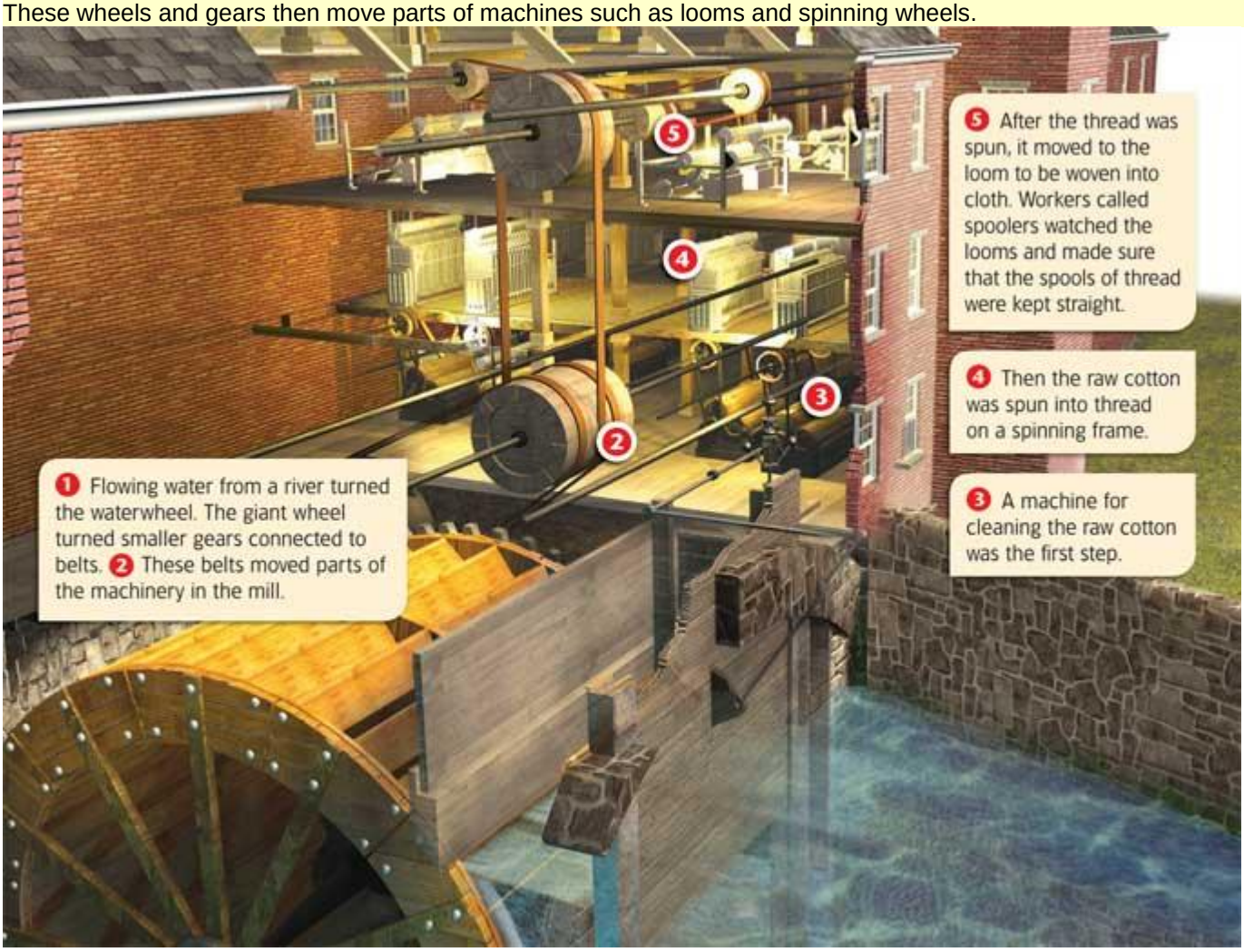
A Need for Change

By the mid-1700s, however, changes in Great Britain led to a greater demand for manufactured goods. As agriculture and roads improved, cities and populations grew.

Textile Mill and Water Frame

SCIENCE AND TECHNOLOGY

A water frame adapts the power of flowing water into energy that moves wheels and gears through a system of belts. These wheels and gears then move parts of machines such as looms and spinning wheels.



Overseas trade also expanded. Traditional manufacturing methods did not produce enough goods to meet everyone's needs.

People began creating ways to use machines to make things more **efficient.** These developments led to the **Industrial Revolution, a period of rapid growth in usingmachines for manufacturing and production that began in the mid-1700s.**

Textile Industry

The first important breakthrough of the Industrial Revolution took place in how **textiles, or cloth items**, were made. Before the Industrial Revolution, spinning thread took much more time than making cloth. Several workers were needed to spin enough thread to supply a single weaver.

In 1769 Englishman **Richard Arkwright** invented a large spinning machine called a water frame. The water frame could produce dozens of cotton threads at the same time. It lowered the cost of cotton cloth and increased the speed of textile production.

The water frame used flowing water as its source of power. Merchants began to build large textile mills, or factories, near rivers and streams. The mills were filled with spinning machines. Merchants began hiring people to work in the mills.

Additional improvements also speeded up the spinning process. Britain soon had the world's most productive textile manufacturing industry.

New Machines and Processes

New machines encouraged the rise of new processes in business and manufacturing. As the machines used to make products became more efficient, the processes involved changed dramatically.

Slater and His Secrets

The new textile machines allowed Great Britain to produce cloth more quickly and inexpensively than other countries could. To protect British industry, the British Parliament had made it illegal for skilled mechanics or machine plans to leave the country. Disguised as a farmer, **Samuel Slater**, a skilled British mechanic, immigrated to the United States after carefully memorizing the designs of textile mill machines. Soon after arriving, he sent a letter to Moses Brown, who owned a textile business in New England. Slater claimed he could improve the way textiles were manufactured in the United States.

Brown had one of his workers test Slater's knowledge of machinery. Slater passed. Brown's son, Smith Brown, and son-in-law, William Almy, formed a partnership with Slater. In 1793 they opened their first mill in Pawtucket, Rhode Island. The production of cotton thread by American machines had begun. Slater ran the mill and the machinery. He was confident that his new machines would work well.

> "If I do not make as good yarn as they do in England, I will have nothing for my services, but will throw the whole of what I have attempted over the bridge."
>
> —Samuel Slater, quoted in *The Ingenious Yankees*, by Joseph and Francis Gies

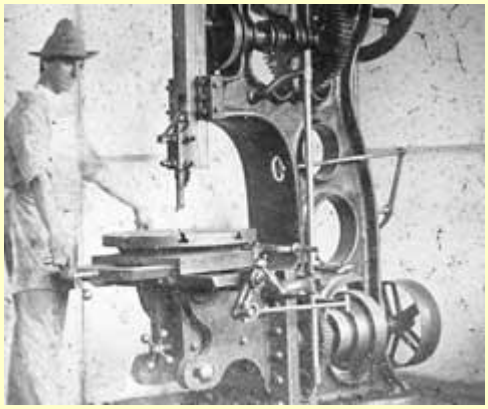
Slater's machines worked, and the Pawtucket mill became a success. Slater's wife also invented a new cotton thread for sewing. In 1798 Slater formed his own company to build a mill. By the time he died in 1835, he owned all or part of 13 textile mills.

Other Americans began building textile mills. Most were located in the Northeast. In New England in particular, merchants had the money to invest in new mills. More importantly, this region had many rivers and streams that provided a reliable supply of power. Fewer mills were built in the South, partly because investors in the South concentrated on expanding agriculture. There, agriculture was seen as an easier way to make money.

Elements of Mass Production

Interchangeable Parts
Eli Whitney developed the idea of using interchangeable parts. Interchangeable, or identical, parts are needed so each part does not have to be custom-made by hand.

Machine Tools
Machine tools like this one make parts that are identical and therefore interchangeable.



Division of Labor
Mass production uses a division of labor in which the work is divided among several people, each doing a specific task, like the worker shown here.

Mass-Produced Goods
The end result are goods that have been mass-produced. Eli Whitney used mass-production techniques to manufacture firearms.

CONNECT TO ECONOMICS

Mass-production techniques allow manufacturers to efficiently create more goods for the marketplace. Mass production requires the use of interchangeable parts, machine tools, and the division of labor.

A Manufacturing Breakthrough

Despite these great changes, most manufacturing was still done by hand. In the late 1790s the U.S. government worried about a possible war with France, so it wanted more muskets for the army. Skilled workers made the parts for each weapon by hand. No two parts were exactly alike, and carefully fitting all the pieces together took much time and skill.

As a result, American gun makers could not produce the muskets quickly enough to satisfy the government's demand. Factories needed better **technology, the tools used to produce items or to do work.**

In 1798 inventor **Eli Whitney** tried to address some of these problems. Whitney gave officials a proposal for mass-producing guns for the U.S. government using water-powered machinery. Whitney explained the benefits of his ideas.

> "I am persuaded that machinery moved by water [and] adapted to this business would greatly reduce the labor and facilitate [ease] the manufacture of this article."
>
> —Eli Whitney, quoted in *Technology in America*, edited by Carroll W. Pursell

Whitney also came up with the idea of using **interchangeable parts**—**parts of a machine that are identical.** Using interchangeable parts made machines easier to assemble and broken parts easier to replace. Whitney promised to build 10,000 muskets in two years. The federal government gave him money to build his factory, and in 1801 Whitney was called to Washington, D.C., to give a demonstration.

Whitney stood before President John Adams and his secetary of war. He had an assortment of parts for 10 guns. He then randomly chose parts and quickly assembled them into muskets. To the audience's amazement, he repeated the process several times.

Whitney's Influence

Whitney had proven that American inventors could improve upon the new British technology. Machines that produced matching parts soon became standard in industry. Interchangeable parts sped up **mass production, the efficient production of large numbers of identical goods.**

These circumstances began to change around the time of the War of 1812. Since the 1790s, wars between European powers had interfered with U.S. trade. American customers were no longer able to get all the manufactured goods they were used to buying from British and European manufacturers. Then, during the War of 1812, British ships blockaded eastern seaports, preventing foreign ships from delivering goods. Americans began to buy the items they needed from American manufacturers instead of from foreign suppliers. As profits for American factories grew, manufacturers began to spend more money expanding their factories. State banks and private investors began to lend money to manufacturers for their businesses.

At the same time, many Americans began to realize that the United States had been relying too heavily on foreign goods. If the United States could not meet its own needs, it might be weak and open to attack. Former president Thomas Jefferson, who had once opposed manufacturing, changed his mind. He, too, realized that the United States was too dependent on imports.

> "To be independent for the comforts of life we must fabricate [make] them ourselves. We must now place the manufacturer by the side of the agriculturalist [farmer]."
>
> —Thomas Jefferson, from *The Writings of Thomas Jefferson*, edited by P. L. Ford

In February 1815, New Yorkers celebrated the end of the War of 1812 and the return of free trade. The streets were decorated and filled with merchants whose ships were loaded with goods. "With Peace and Commerce, America Prospers," declared one display. Eager businesspeople prepared to lead the United States into a period of industrial growth. They urged northern politicians to pass higher tariffs on foreign goods to protect American companies.

SUMMARY AND PREVIEW The Industrial Revolution started with the textile industry in England but soon spread to the United States. In the next section you will learn about how the spread of factories changed the working lives of many Americans.

Section 2
Changes in Working Life

If YOU were there...

You live on a dairy farm in Massachusetts in about 1820. On the farm, you get up at dawn to milk the cows, and your work goes on until night. But now you have a chance at a different life. A nearby textile mill is hiring young people. You would leave the farm and live with other workers. You could go to classes. Most important, you could earn money of your own.

Would you go to work in the textile mill? Why?

BUILDING BACKGROUND As factories and mills were established, the way people worked changed drastically. One dramatic change was the opportunity that factory work gave to young women. For young women in farm families, it was almost the only chance they had to earn their own money and a measure of independence.

Mills Change Workers' Lives

Workers no longer needed the specific skills of craftspeople to run the machines of the new mills. The lives of workers changed along with their jobs. Resistance to these changes sometimes sparked protests.

Many mill owners in the United States could not find enough people to work in factories because other jobs were available. At first, Samuel Slater and his two partners used apprentices—young men who worked for several years to learn the trade. However, they often were given only simple work. For example, their jobs included feeding cotton into the machines and cleaning the mill equipment. They grew tired of this work and frequently left. Apprentice James Horton, for example, ran away from Slater's mill. "Mr. Slater…keep me always at one thing…," Horton complained. "I might have stayed there until this time and never knew nothing."

Eventually, Slater began to hire entire families who moved to Pawtucket to work in the mills. This practice allowed Slater to fill his labor needs at a low cost. Children as well as adults worked in the mills.

On most farms children worked to help their families. Therefore, few people complained about the hiring of children to work in factories. H. Humphrey, an author of books on raising children, told parents that children needed to be useful. Humphrey wrote, "If he [a child] will not study, put him on to a farm, or send him into the shop, or in some other way provide regular employment for him." The machines made many tasks in the mill simple enough for children to do. Mill owners profited because they paid children low wages. Adults usually earned as much in a day as most children did in a week.

To attract families to his mill, Slater built housing for the workers. He also provided them with a company store where they could buy necessities. In addition, he started the practice of paying workers with credit at the company store. Instead of paying the full price for an item all at once, small payments could be made over a period of time. This practice allowed Slater to reinvest his money in his business.

Slater's strategy of hiring families and dividing factory work into simple tasks became known as the Rhode Island system. Mill owners throughout the Northeast copied Slater's methods. Owners advertised with "Men with growing families wanted." They also sent recruiters to poor communities to find new workers. For many people, the chance to work in a factory was a welcome opportunity to earn money and to learn a new skill.

One of the earliest of the mill towns, Slatersville, was named after Samuel Slater. The town was built by Slater and his brother John. It included two houses for workers and their families, the owner's house, the

company store, and the Slatersville Mill. The mill was the largest and most modern industrial building of its time.

The mills employed not only the textile workers who operated the machinery but also machine part makers and dam builders. Although the company store sold food and necessary items to workers, mill towns supported the same variety of businesses any other town needed to thrive. These included tailors and dressmakers, butchers, and other small workshops.

The Lowell System

Not all mill owners followed this system. **Francis Cabot Lowell**, a businessman from New England, developed a very different approach. His ideas completely changed the textile industry in the Northeast.

The **Lowell system** **was based on water-powered textile mills that employed young, unmarried women from local farms. The system included a loom that could both spin thread and weave cloth in the same mill.** Lowell constructed boardinghouses for the women. Boardinghouse residents were given a room and meals along with their jobs.

With financial support from investors of the Boston Manufacturing Company, Lowell's first textile mill opened in Waltham, Massachusetts, in 1814. "From the first starting of the first power loom there was not…doubt about the success," wrote one investor. In 1822, the company built a larger mill in a Massachusetts town later named Lowell. Visitors to Lowell were amazed by the clean factories and neatly kept boardinghouses as well as the new machinery.

The young millworkers soon became known as Lowell girls. The mills paid them between $2 and $4 each week. The workers paid $1.25 for room and board. These wages were much better than those women could earn per week in other available jobs, such as domestic work.

Many young women came to Lowell from across New England. They wanted the chance to earn money instead of working on the family farm. "I must of course have something of my own before many more years have passed over my head," wrote one young woman. The typical Lowell girl worked at the mills for about four years.

Unlike other factory workers, the Lowell girls were encouraged to use their free time to take classes and form women's clubs. They even wrote their own magazine, the *Lowell Offering*. Lucy Larcom, who started working at Lowell at age 11, later praised her fellow workers.

No record exists today of the name of this girl, who worked in a mill around 1850. Judging from the photograph, if she were in school today, she would probably be in the seventh or eighth grade. Although hard to see in this photograph, her hands and arms are scratched and swollen—telltale signs of the hard labor required of young girls who worked up to 14 hours per day.

TIME TABLE OF THE LOWELL MILLS

Morning Bells

First bell . . . . . 4:30 AM

Second bell . . . . . 5:30 AM

Third bell . . . . . 6:20 AM

Dinner (Lunch) Bells

Ring out . . . . . 12:00 PM

Ring in . . . . . 12:35 PM

Evening Bells

Ring out . . . . . 6:30 PM

Except on Saturday Evenings

—The Table of the Lowell Mills, October 21, 1851

History Close-up

Life of a Mill Girl

Primary Source

MAGAZINE ARTICLE

Sarah G. Bagley and Workers' Rights

Lowell girl Sarah G. Bagley wrote magazine articles and made speeches about working in the mills. She organized workers to help change conditions.

> "Is anyone such a fool as to suppose that out of six thousand factory girls in Lowell, sixty would be there if they could help it? Whenever I raise the point that it is immoral to shut us up in a close room twelve hours a day in the most monotonous and tedious of employment I am told that we have come to the mills voluntarily and we can leave when we will. Voluntarily!… the whip which brings us to Lowell is necessity. We must have money; a father's debts are to be paid, an aged mother to be supported, a brother's ambition to be aided and so the factories are supplied. Is this to act from free will?…Is this freedom? To my mind it is slavery."
>
> —Sarah G. Bagley, quoted in *The Belles of New England: The Women of the Textile Mills and the Families Whose Wealth They Wove, by* William Moran

> "I regard it as one of the privileges [advantages] of my youth that I…[grew] up among those active, interesting girls, whose lives…had principle [ideals] and purpose distinctly their own."
>
> —Lucy Larcom, from *A New England Girlhood*

Mill life was hard, however. The workday was between 12 and 14 hours long, and daily life was carefully controlled. Ringing bells ordered workers to breakfast or lunch. Employees had to work harder and faster to keep up with new equipment. Cotton dust also began to cause health problems, such as chronic cough, for workers.

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Workers Organize

Factories continued to spread in the 1800s. Craftspeople, who made goods by hand, felt threatened. Factories quickly produced low-priced goods. To compete with factories, shop owners had to hire more workers and pay them less. Shoemaker William Frazier complained about the situation in the mid-1840s. "We have to sit on our seats from twelve to sixteen hours per day, to earn one dollar."

The wages of factory workers also went down as people competed for jobs. A wave of immigration in the 1840s brought people from other, poorer countries. They were willing to work for low pay. More immigrants came to the Northeast, where the mills were located, than to the South. Competition for jobs also came from people unemployed during the financial Panic of 1837. For example, about 50,000 workers in New York City alone had lost their jobs.

The Beginning of Trade Unions

Facing low wages and the fear of losing their jobs, skilled workers formed **trade unions, groups that tried to improve pay and working conditions.** Eventually, unskilled factory workers also formed trade unions. Most employers did not want to hire union workers. Employers believed that the higher cost of union employees prevented competition with other manufacturers.

Sometimes labor unions staged protests called **strikes. Workers on strike refuse to work until employers meet their demands.** Most early strikes were not successful, however. Courts and police usually supported companies, not striking union members.

Labor Reform Efforts

A strong voice in the union movement was that of millworker **Sarah G. Bagley**. She founded the Lowell Female Labor Reform Association in 1844 and publicized the struggles of factory laborers. The association's two main goals were to influence an investigation of working conditions by the Massachusetts state legislature and to obtain a 10-hour workday. Members of the association passed out pamphlets and circulated petitions.

President Martin Van Buren had granted a 10-hour workday in 1840 for many federal employees. Bagley wanted this rule to apply to employees of private businesses. These men and women often worked 12 to 14 hours per day, six days per week.

Many working men and women supported the 10-hour-workday campaign, despite the opposition of business owners. In 1845 Sarah Bagley was elected vice president of the New England Working Men's Association. She was the first woman to hold such a high-ranking position in the American labor movement.

Over time, the unions achieved some **concrete** legal victories. Connecticut, Maine, New Hampshire, Ohio, Pennsylvania, and a few other states passed 10-hour-workday laws.

For factory workers in other states, long hours remained common. One witness described how children were "summoned by the factory bell before daylight" and worked until eight o'clock at night "with nothing but [a] recess of forty-five minutes to get their dinner." Union supporters continued to fight for work reforms such as an end to child labor in factories during the 1800s.

SUMMARY AND PREVIEW With the growth of factories, workers faced new opportunities and challenges. In the next section you will learn about how the Transportation Revolution brought changes to commerce and the daily lives of Americans.

Section 3
The Transportation Revolution

If YOU were there...

You live in a small town in Iowa in the 1860s. You've never been more than 30 miles from home and have always traveled by wagon or on horseback. Now there are plans to build a railroad westward from Chicago, 200 miles to the east. The tracks will come through your town! Twice a week, trains will bring goods from the city and take people farther west.

How would the coming of the railroad change your life?

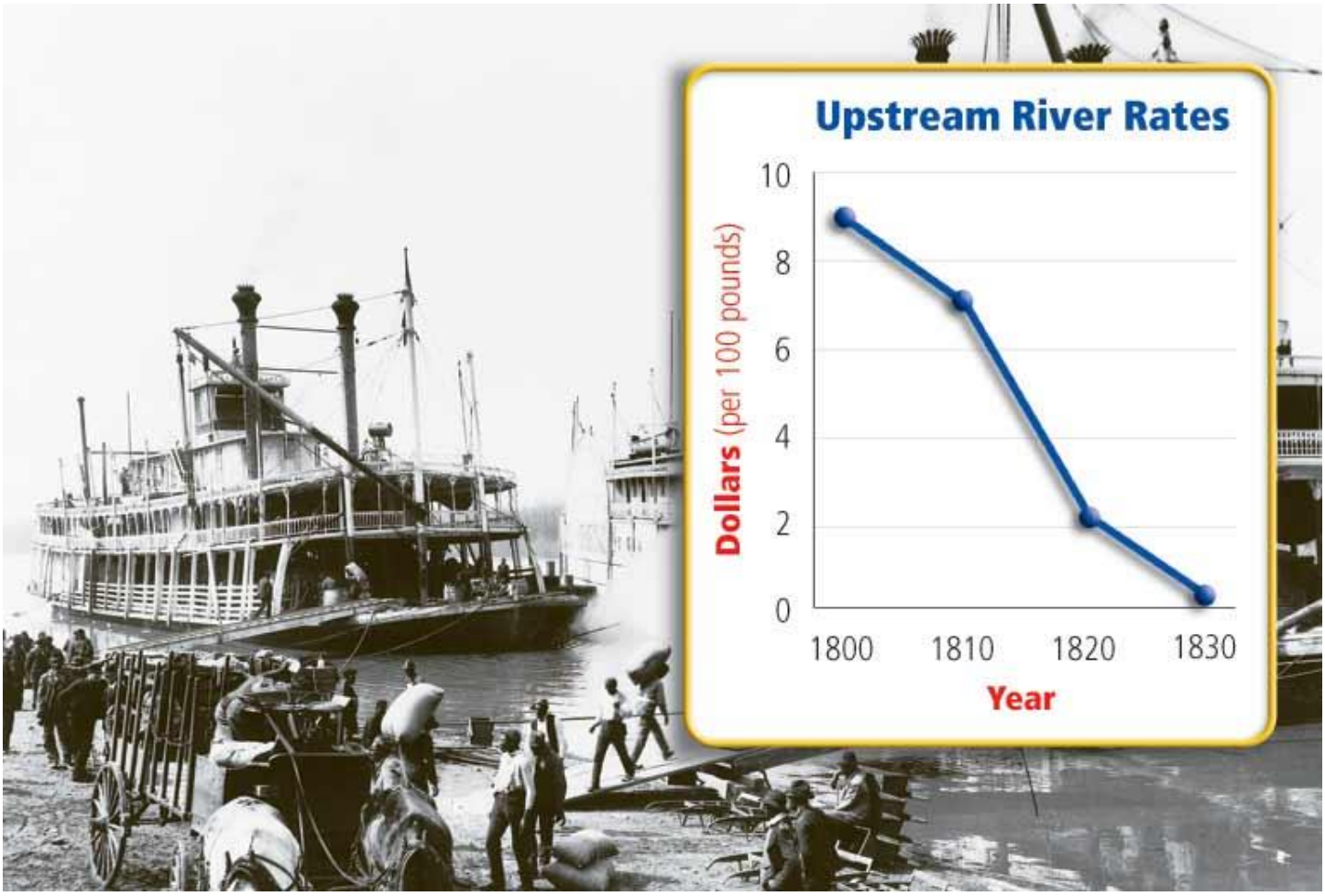
BUILDING BACKGROUND The Industrial Revolution changed how goods were made. It brought great changes in the ways that many Americans lived. But developments in technology led to major changes in other areas of life, too. New forms of transportation would bring remote parts of America closer together.

Trade and Daily Life

During the 1800s the United States was transformed by a **Transportation Revolution**—**a period of rapid growth in the speed and convenience of travel because of new methods of transportation.** The Transportation Revolution created a boom in business across the country, particularly by reducing shipping time and costs. As one foreign observer declared in 1835, "The Americans…have joined the Hudson to the Mississippi, and made the Atlantic Ocean communicate with the Gulf of Mexico."

These improvements were made possible largely by the invention of two new forms of transportation: the steamboat and steampowered trains. They enabled goods, people, and information to travel rapidly and efficiently across the United States.

Mississippi River Steamboats



Deckhands load a Mississippi River steamboat in Memphis, Tennessee. By the mid-1800s, hundreds of steamboats traveled up and down American rivers. Steamboats enabled Americans to ship more goods farther, faster, and for less money than ever before.

Steamboats

American and European inventors had developed steam-powered boats in the late 1700s. However, they were not in wide use until the early 1800s.

Steamboat Era

In 1803 American **Robert Fulton** tested his first steamboat design in France. Several years later, he tested **the first full-sized commercial steamboat, called the *Clermont*,** in the United States. On August 9, 1807, the *Clermont* traveled against the current up the Hudson River without trouble. Demand for steamboat ferry service soon arose.

The steamboat was well suited for river travel. It could move upriver and did not rely on wind power. Steamboats increased trade and profits because goods could be moved quickly and thus more cheaply. More than 500 steamboats were in use in the United States by 1840. By the 1850s, steamboats were also being used to carry people and goods across the Atlantic Ocean.

Gibbons v. *Ogden*

Increased steamboat shipping led to conflict over waterway rights. In 1819 Aaron Ogden sued Thomas Gibbons for operating steamboats in New York waters that Ogden said he owned. Gibbons did not have a license to operate in New York, but argued that his federal license gave him the right to use New York waterways.

In the case of ***Gibbons* v. *Ogden*, which reached the Supreme Court in 1824, the Court reinforced the federal government's authority to regulate trade between the states by ending monopolistic control over waterways in several states.** The ruling freed up waters to even greater trade and shipping.

American Railroads

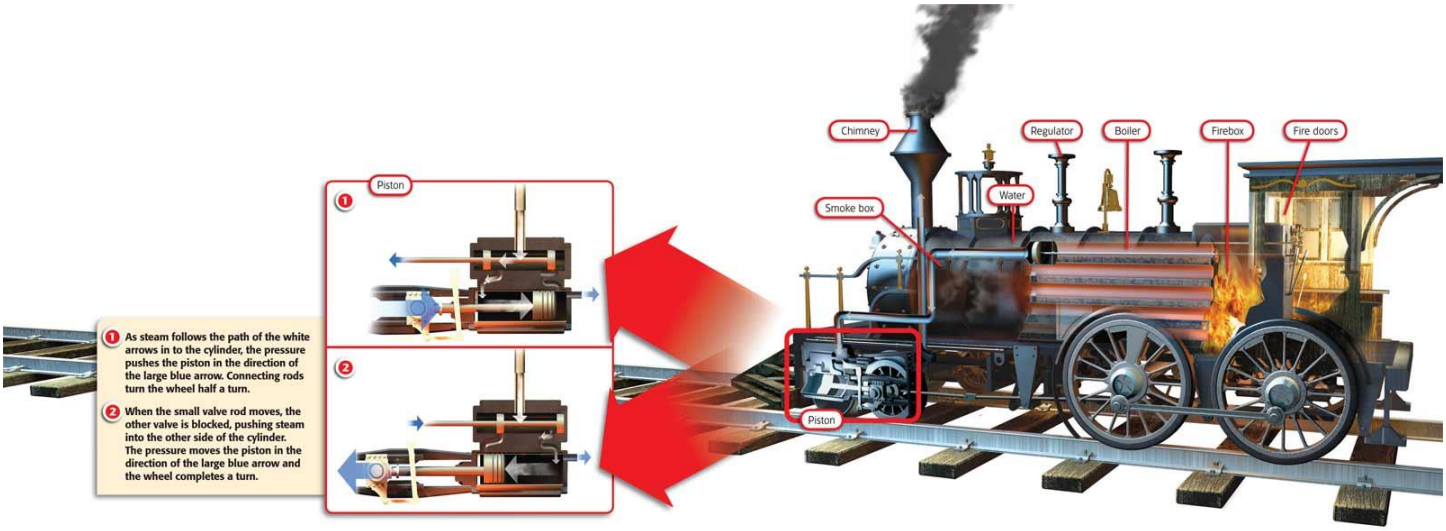
What the steamboat did for water travel, the train did for overland travel. Steam-powered trains had first been developed in Great Britain in the early 1800s. However, they did not become popular in the United States until the 1830s. In 1830 **Peter Cooper** built a small but powerful locomotive called the *Tom Thumb*. He raced the locomotive against a horse-drawn railcar. Eyewitness John Latrobe later described the race, in which *Tom Thumb* had a slow start and fell behind. Latrobe wrote, "The pace increased, the passengers shouted, the engine gained on the horse…then the engine passes the horse, and a great hurrah hailed the victory." Unfortunately for Cooper, victory was spoiled when *Tom Thumb* broke down and lost the race near the end.

Despite the defeat, the contest showed the power and speed of even a small locomotive. Railroad fever soon spread. By 1840 railroad companies had laid about 2,800 miles of track—more than existed in all of Europe. French economist Michel Chevalier described Americans as having "a perfect passion for railroads."

As more railroads were built, engineers and mechanics overcame many tough challenges. Most British railroads, for example, ran on straight tracks across flat ground. In the United States, however, many railroads had to run up and down steep mountains, around tight curves, and over swift rivers. Railroad companies also built the tracks quickly and often with the least expensive materials available. As time went on, engineers and mechanics built heavier, faster, and more powerful steam locomotives.

By 1860 about 30,000 miles of railroad linked almost every major city in the eastern United States. As a result, the economy surged forward. For example, American locomotives hauled more freight than those in any other country. The railroad companies quickly became some of the most powerful businesses in the nation. As the railroad system grew, manufacturers and farmers could send their goods to distant markets.

The Steam Train



SCIENCE AND TECHNOLOGY

Boiling water produces steam, which pushes pistons back and forth in a steam engine. These pistons are connected to rods that rotate the wheels of the locomotive.

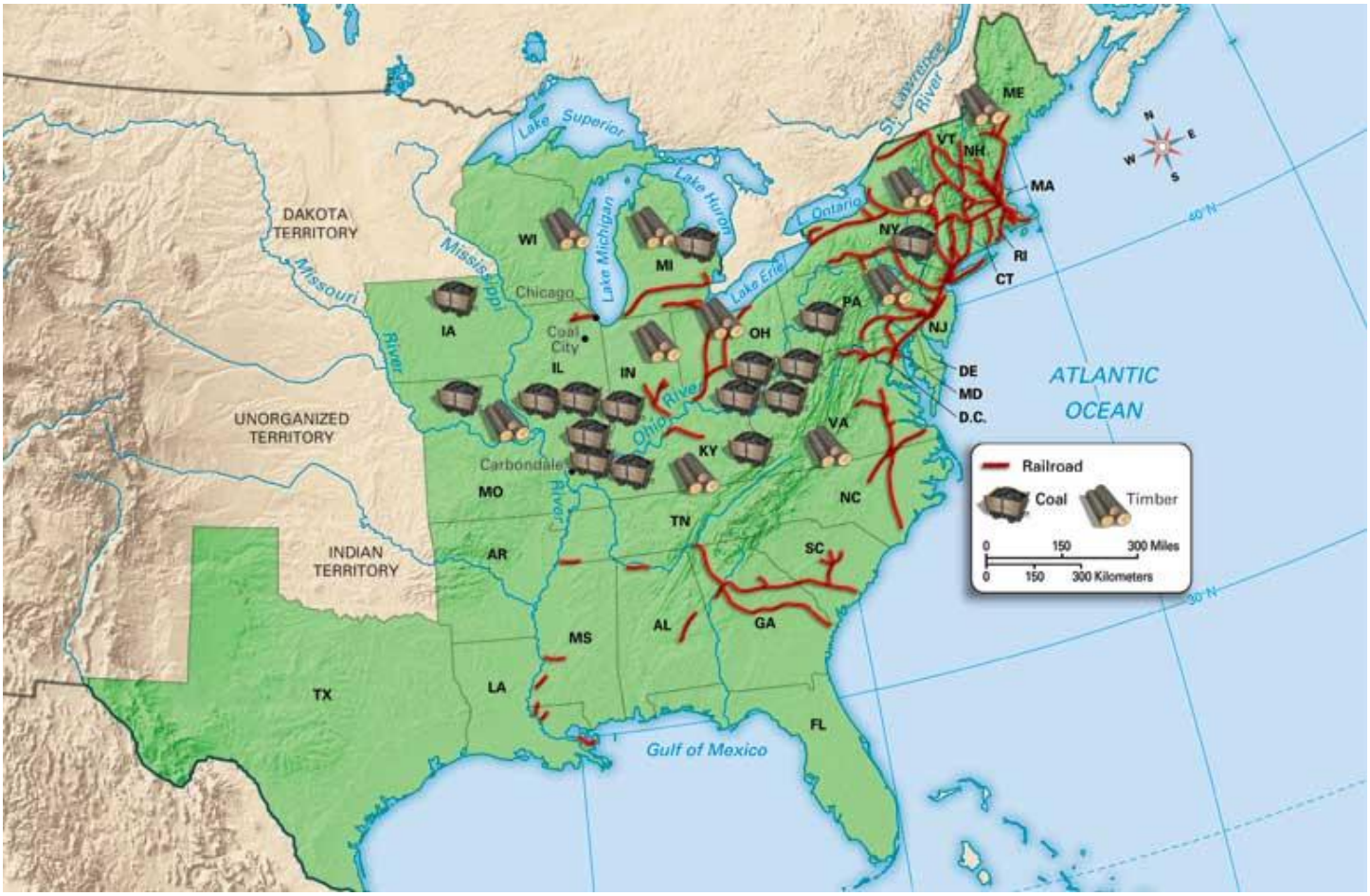
In addition to their tremendous economic impact, the railroads made a powerful impression on the senses of passengers and observers. Trains were the fastest form of transportation most people had ever experienced. While wagons often traveled less than 2 miles per hour, locomotives averaged about 20 miles per hour. Writer George Templeton Strong of New York City described the thrill of a steam train passing by in the night:

> "Whizzing and rattling and panting, with its fiery furnace gleaming in front, its chimney vomiting fiery smoke above, and its long train of cars rushing along behind like the body and tail of a gigantic dragon—…and all darting forward at the rate of twenty miles an hour. Whew!"
>
> —George Templeton Strong, quoted in *The Market Revolution* by Charles Sellers

Riding on the early trains was often an adventure, but it could also be quite dangerous. Engineers trying to stay on time sometimes traveled too fast. English citizen Charles Richard Weld was on a railroad car that flew off the tracks. To his amazement, the other passengers did not complain about the accident. Instead, they praised the engineer for trying to keep on schedule!

Passengers accepted such risks because the railroads reduced travel time dramatically. Railroads also helped tie communities together. In 1847 Senator Daniel Webster spoke for many people in the United States when he declared that the railroad towers above all other inventions of this or the preceding age.

Transportation Routes, 1850



By 1850 the United States already had about 9,000 miles of railroad track. Timber was needed for railroad ties, cars, and bridges and as fuel for steam locomotives.

Transportation Revolution Brings Changes

The Transportation Revolution brought many changes to America. Steamboats and railroads made getting goods to distant markets much easier and less costly. People in all areas of the nation now had access to products made and grown far away. More than ever before, there was a national economy. The wealth, however, was centered in the North.

Railroads contributed to the expansion of the borders of the nation and guided population growth. Towns sprang up at railroad junctions. Those towns that did not have railroads nearby suffered. Cities grew as trains brought new residents and raw materials for industry and construction. The growing prosperity of the nation, especially in the North, encouraged Americans to take pride in their country.

A New Fuel

The Transportation Revolution also increased the use of certain natural resources that had not been important until then. Throughout the early Transportation Revolution, wood was the primary source of fuel for trains and steamboats, as well as for cooking, light, and heat. As faster locomotives were built, coal replaced wood as the main source of power. A half ton of coal produces as much energy as two tons of wood but at half the cost. Coal also became popular for heating homes. Railroads transported the coal from mines to towns and cities.

As the demand for coal increased, a coalmining industry developed in many states, including Pennsylvania, western Virginia, and Illinois. Coal mining changed the landscape in a number of ways. New towns, such as

Coal City and Carbondale in Illinois, sprang up in places where coal deposits could be mined. Miners made deep gashes in the earth removing the coal.

Later, in the 1870s, the demand for coal increased as the demand for steel grew. Steel is made through a smelting process—heating iron ore to very high temperatures. Coal was used to fire the furnaces. Steel, which is much stronger than iron, was increasingly used to build factories and the machines they produced. Steel was also used to make the rails that trains ride on.

The growing market for steel helped fuel the need for more railroads. Railroads transported steel to places where new factories were being built. Railroads also brought new steel farming tools and machines to farmers in the Midwest. Using the new equipment, farmers produced more crops. Railroads then transported their harvests to markets.

Effects of Railroads

The railroads also played a role in the growth of other businesses as well. The logging industry expanded as people in the growing towns and cities needed wood for houses and furniture. As newspaper publishing increased, demand for paper grew. Lumber items became the primary product of New England. Settlers spreading out across the Midwest cut down trees and plowed up prairies to make farmland. Deforestation, or cutting down and removing trees, took place on a large scale.

Railroads also caused cities to grow. Some cities became transportation hubs. Chicago was one such city. Its location on Lake Michigan made it an ideal transportation hub, linking the Midwest to the East and South.

SUMMARY AND PREVIEW The Transportation Revolution changed the way business was done. In the next section you will learn about more technological advances.

Section 4
More Technological Advances

If YOU were there...

You own a small shop in Chicago, Illinois, in the 1850s. You sell ladies' hats and gowns. When you need more hats, you send a letter to the manufacturer in New York. Sometimes it takes weeks for the letter to get there. One day, the owner of the shop next door tells you about a wonderful new machine. It can send orders from Chicago to New York in just minutes!

How would a machine like this change your business?

BUILDING BACKGROUND The Industrial and Transportation Revolutions had far-reaching effects on Americans' lives. They led to still more innovations in technology. Some of the new machines and devices speeded up processes for business owners. Others made life easier for people at home.

Telegraph Speeds Communication

In 1832 **Samuel F. B. Morse** perfected the **telegraph**—**a device that could send information over wires across great distances.** To develop the telegraph, Morse studied electricity and magnetism.

The telegraph sent pulses, or surges, of electric current through a wire. The telegraph operator tapped a bar, called a telegraph key, that controlled the length of each pulse. At the other end of the wire, these pulses were changed into clicking sounds. A short click was called a dot. A long click was called a dash. Morse's partner, Alfred Lewis Vail, developed a system known as **Morse code**—**different combinations of dots and dashes that represent each letter of the alphabet.** For example, *dot dot dot, dash dash dash, dot dot dot* is the distress signal called SOS. Skilled telegraph operators could send and receive many words per minute.

Several years passed before Morse was able to connect two locations with telegraph wires. Despite that achievement, people doubted his machine. Some people did not think that he was reading messages sent from miles away. They claimed that he was making lucky guesses.

Morse's break came during the 1844 Democratic National Convention in Baltimore, Maryland. A telegraph wired news of the presidential candidate's nomination to politicians in Washington. The waiting politicians responded, "Three cheers for the telegraph!" Telegraphs were soon sending and receiving information for businesses, the government, newspapers, and private citizens.

Biography

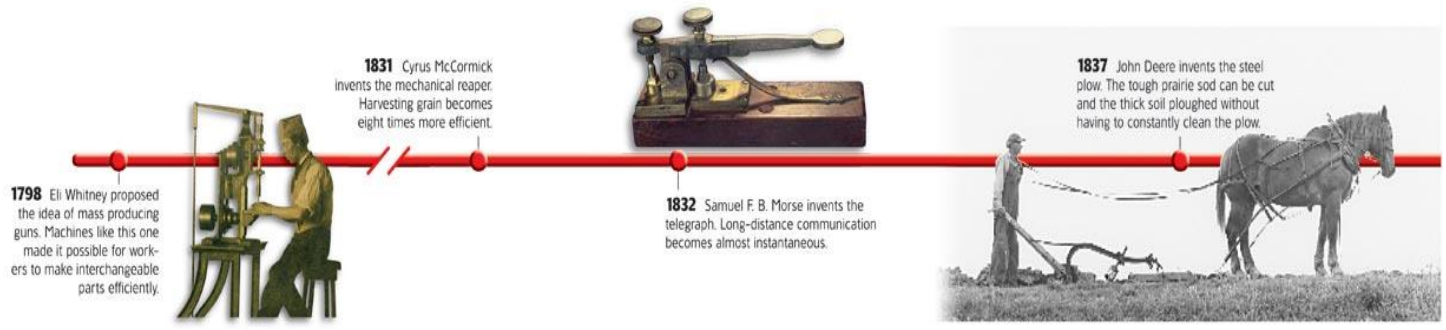
Samuel F. B. Morse
(1791–1872)

Like steamboat creator Robert Fulton, Samuel F. B. Morse began his career as a painter rather than as an inventor. In 1832 Morse was a widower struggling to raise his three children alone. He became interested in the idea of sending messages electrically. Morse hoped he could invent a device that would earn him enough money to support his family. Eventually, earnings from the telegraph made Morse extremely wealthy.

The telegraph grew with the railroad. Telegraph companies strung their wires on poles along railroads across the country. They established telegraph offices in many train stations. Thousands of miles of telegraph line were added every year in the 1850s. The first transcontinental line was finished in 1861. By the time he died in 1872, Morse was famous across the United States.

Time Line

American Inventions



Steam Power and New Factories

At the start of the Industrial Revolution, most factories ran on waterpower. In time, however, factory owners began using steam power. This shift brought major changes to the nation's industries. Water-powered factories had to be built near streams or waterfalls. In contrast, steam power allowed business owners to build factories almost anywhere. Yet the Northeast was still home to most of the nation's industry. By 1860 New England alone had as many factories as the entire South did.

Some companies decided to build their factories closer to cities and transportation centers. This provided easier access to workers, allowing businesses to lower wages. Being closer to cities also reduced shipping costs. Cities soon became the center of industrial growth. People from rural areas as well as foreign countries flocked to the cities for factory jobs.

Factory workers improved the designs of many kinds of machines. Mechanics invented tools that could cut and shape metal, stone, and wood with great precision. By the 1840s this new machinery was able to produce interchangeable parts. Within a short period of time, the growing machine-tool industry was even making customized equipment.

Improved Farm Equipment

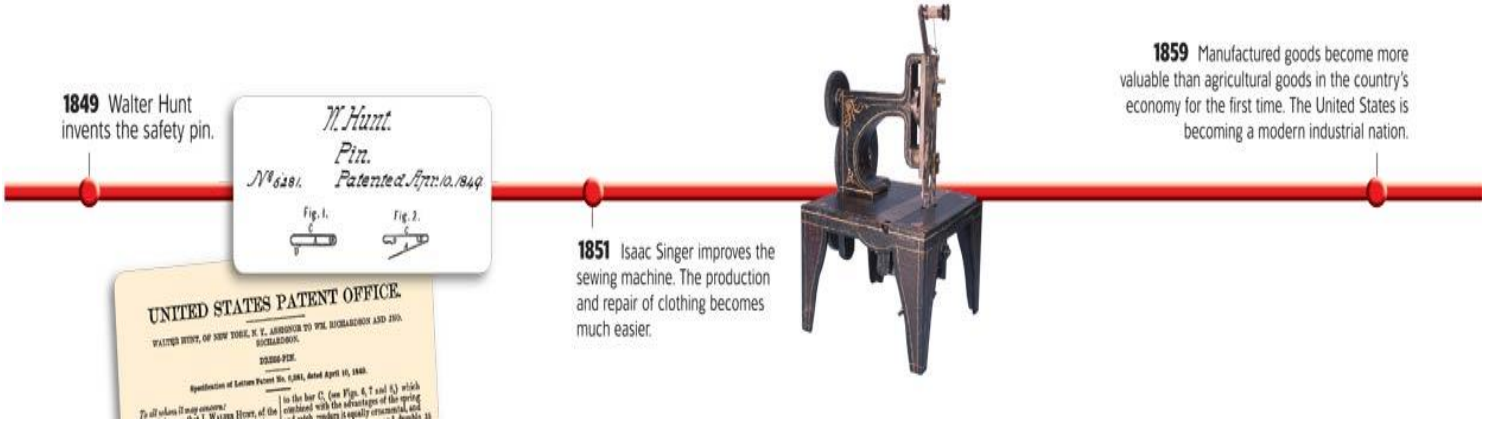
During the 1830s, technology began transforming the farm as well as the factory. In 1837 blacksmith **John Deere** saw that friends in Illinois had difficulty plowing thick soil with iron plows. He thought a steel blade might work better. His design for a steel plow was a success. By 1846 Deere was selling 1,000 plows per year.

In 1831 **Cyrus McCormick** developed a new harvesting machine, the mechanical reaper, which quickly and efficiently cut down wheat. He began mass producing his reapers in a Chicago factory. McCormick used new methods to encourage sales. His company advertised, gave demonstrations, and provided a repair and spare parts department. He also let customers buy on credit.

The combination of Deere's plow and McCormick's reaper allowed Midwestern farmers to plant and harvest huge crop fields. By 1860, U.S. farmers were producing more than 170 million bushels of wheat and more than 800 million bushels of corn per year.

Time Line

American Inventions (continued)



Changing Life at Home

Many inventions of the Industrial Revolution simply made life easier. The Impact Today When Alexis de Tocqueville of France visited the United States in the early 1830s, he identified what he called a very American quality.

> "[Americans want] to be always making life more comfortable and convenient, to avoid trouble, and to satisfy the smallest wants [desires] without effort and almost without cost."
>
> —Alexis de Tocqueville, from *Democracy in America*

The sewing machine, first invented by Elias Howe, a factory apprentice in Lowell, Massachusetts, first invented it. **Isaac Singer** then made improvements to Howe's design. Like McCormick, Singer allowed customers to buy his machines on credit and provided service. By 1860 Singer's company was the world's largest maker of sewing machines.

Other advances improved on everyday items. In the 1830s, iceboxes cooled by large blocks of ice became available. Iceboxes stored fresh food safely for longer periods. Iron cookstoves began replacing cooking fires and stone hearths.

Companies also began to mass produce earlier inventions. This allowed many families to buy household items, such as clocks, that they could not afford in the past. For example, a clock that cost $50 in 1800 was selling for only $1.50 by the 1850s. Additional useful items created during this period include matches introduced in the 1830s, and the safety pin, invented in 1849. All of these inventions helped make life at home more convenient for an increasing number of Americans.

SUMMARY AND PREVIEW New machines and inventions changed the way Americans lived and did business in the early 1800s. In the next chapter you will learn how agricultural changes affected the South.