TELESCOPING THE TIMES  A New Industrial Age

CHAPTER OVERVIEW  Technological innovations and the growth of the railroad industry help fuel an industrial boom. Some business leaders follow corrupt practices, and workers, suffering harsh working conditions, try to organize.

0 The Expansion of Industry  

**MAIN IDEA**  At the end of the 19th century, natural resources, creative ideas, and growing markets fueled an industrial boom.

As settlement continued in the West, the nation was being transformed by vast changes in technology. Fuel—in the form of kerosene refined from oil or coal—helped spur growth. So did plentiful supplies of iron. Iron became even more useful when the Bessemer process, developed about 1850, allowed workers to efficiently turn it into steel. With the open-hearth method, devised in 1886, even more steel was produced.

Steel came to be used in railroads, in farm tools such as the plow and reaper, and to make cans for preserving food. Engineers also used steel to make the new bridge connecting New York City and Brooklyn and to build skyscrapers.

Thomas Alva Edison established a research laboratory in 1876 in order to develop new inventions. He devised an incandescent light and began to organize power plants to generate electricity. Cities built electric railways, and businesses built factories powered by electricity.

The typewriter (1867) and the telephone (1876) appeared for the first time. These and other inventions changed daily life. More women began to work in offices; by 1910, women were about 40 percent of the clerical work force. The average work week decreased by about ten hours, and people enjoyed more leisure time.

0 The Age of the Railroads  

**MAIN IDEA**  The growth and consolidation of railroads benefited the nation but also led to corruption and required government regulation.

By 1890, rail lines totaled more than 200,000 miles. But building and running the railroads was difficult and dangerous work for thousands of workers. By 1888, more than 2,000 railroad workers had died and another 20,000 had been injured. Workers earned very little—and Asians and African Americans less than white workers.

The railroads helped link the nation. Schedules were difficult to maintain, however, as each community set its own time standard. So, in 1883, the railroads and many towns began using four standard time zones.

Railroads stimulated growth of the iron, steel, coal, lumber, and glass industries. They also helped towns and cities grow. George Pullman built a factory to make railroad sleeping cars. As demand for his cars rose, he built a large town south of Chicago to house the workers he needed. While the housing was of good quality, Pullman tried to control his workers’ lives. They conducted a violent strike in 1894.

Some business practices led to corruption. In the Crédit Mobilier scandal of 1868, some officers of the Union Pacific used trickery to earn millions for themselves. They also gave stock to some government officials to buy silence.

These scandals helped fuel the anger of the Grangers, farmers who wanted to limit rail companies’ power. They persuaded some states to pass laws regulating railroad rates. In 1877, the Supreme Court said government could regulate industry for the public good. Congress passed the Interstate Commerce Act in 1887, but the commission it created was not strong enough to control the railroads.

The depression of 1893 and 1894 changed the industry. Many railroads failed, and a few survivors seized many of the rest. By 1900, seven companies owned most of the nation’s railways.

0 Big Business and Labor  

**MAIN IDEA**  The expansion of industry resulted in the growth of big business and prompted laborers to form unions to better their lives.

Consolidation occurred in other industries as well. Andrew Carnegie built a giant steel-producing firm. Carnegie used cost-saving technology, strict accounting, and effective managers. He bought out competitors and companies that provided raw materials or transportation of his goods.
Studying the success of business leaders like Carnegie helped spur an intellectual movement called Social Darwinism. Drawing on Charles Darwin’s ideas of evolution, Social Darwinists said that government should allow free competition in business to allow the best individuals to succeed. Most ordinary citizens could support this idea. It appealed to their work ethic and sense of personal responsibility.

Business leaders tried to gain control over an industry to ensure rising profits. Some used mergers to acquire other companies. If a firm controlled all the competition in an industry, it held a monopoly and could dictate business practices. J. P. Morgan became the largest steel producer by setting up a holding company. This kind of company bought out the stock of other companies. John D. Rockefeller controlled the oil refining industry by using trusts, in which different companies agreed to work together. Critics called such practices unfair to consumers and labeled business leaders as “robber barons.”

In 1890, Congress decided to act and passed the Sherman Antitrust Act. It outlawed trusts, but the law was difficult to enforce, and the Supreme Court did not support it.

While industry boomed in the North, the South stayed agriculturally and economically depressed. Only industries such as mining, tobacco, and textiles grew. The devastation of the Civil War, lack of capital, and lack of urban centers were contributing factors.

Workers in these growing industries worked long hours in dangerous conditions for low wages. Wages were so low that all family members, including women and children, had to work. To improve their status, many workers began to organize into unions.

The National Labor Union, formed in 1866, persuaded the government to adopt an eight-hour day in government offices. The Knights of Labor pushed for an eight-hour day and equal pay for women. The American Federation of Labor (AFL) won higher wages and shorter work weeks for its members, skilled workers. Other unions organized unskilled workers. Some included women and African Americans. Japanese and Mexican workers also formed unions in the West.

Industry and government fought the unions. A great strike in 1877 stalled the nation’s railroads for a week. Some cities erupted in riots. President Rutherford B. Hayes ordered the strikers to return to work. Labor organizers continued to try to enlist workers. Then a mass meeting in Chicago’s Haymarket section became a riotous battle between police and workers. Steelworkers in Homestead, Pennsylvania, shut a Carnegie Steel plant until state troops allowed management to reopen the mill with strikebreakers. The strike continued, but eventually the strikers had to give in. A strike at Pullman’s railcar factory in 1894 also resulted in violence and federal troops being brought in. All the workers lost their jobs.

Women labor organizers included Mary Harris “Mother” Jones and Pauline Newman, who organized garment workers. In 1911, a fire broke out in a clothing factory. Almost 150 women workers died, in part because they had been locked inside. The public was outraged and some reforms favoring workers were passed.

Business leaders used many tactics to prevent workers from organizing. They banned union meetings or fired union workers. When strikes did occur, some asked the courts to end them, saying that they violated the Sherman Antitrust Act by harming interstate commerce. By 1910, union membership was down to five percent of workers.

Review
1. What developments fueled industrialization?
2. Describe the growth and development of the rail industry and what impact it had.
3. How did the government try to regulate business? What happened to these efforts?
4. Describe working conditions of the time and union-management relations.
The Expansion of Industry

BEFORE YOU READ
In the last section, you read about the growth of the Populist movement.

In this section, you will read how Americans used their natural resources and technological breakthroughs to begin building an industrialized society.

AS YOU READ
Use this diagram to take notes on the technological breakthroughs during the late 1800s and their impact on society.

<table>
<thead>
<tr>
<th>TECHNOLOGICAL BREAKTHROUGH</th>
<th>IMPACT</th>
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<tbody>
<tr>
<td>electrical power</td>
<td>revolutionized business and daily life</td>
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Natural Resources
Fuel Industrialization (pages 436–438)

What were America's important natural resources?

In the years after the Civil War, advances in technology began to change the nation. There were three causes of these advances: a large supply of natural resources, an explosion of inventions, and a growing city population that wanted the new products.

One of the more important natural resources was oil. In 1840 a Canadian geologist discovered that kerosene could be used to light lamps. Kerosene was produced from oil. This increased Americans’ demand for oil.

In 1859, Edwin L. Drake used a steam engine to drill for oil. This technological breakthrough helped start an oil boom. Oil-refining industries started in Cleveland and Pittsburgh. There, workers turned oil into kerosene.

Oil produced yet another product—gasoline. At first, gasoline was thrown away. However, when the automobile became popular, gasoline was in great demand.

In addition to oil, Americans discovered that their nation was rich in coal and iron. In 1887, explorers found large amounts of iron in Minnesota. At the same time, coal production increased from 33 million tons in 1870 to more than 250 million tons in 1900.

Iron is a strong metal. However, it is heavy and tends to break and rust. Researchers eventually removed the element carbon from iron. This produced a lighter, more flexible metal that does not rust. It became known as steel. The Bessemer
process, named after British manufacturer Henry Bessemer, provided a useful way to turn iron into steel.

Americans quickly found many uses for steel. The railroads, with their thousands of miles of track, bought large amounts of the new metal. Steel was also used to improve farm tools such as the plow and reaper. It also was used to make cans for preserving food. Engineers used steel to build bridges. One of the most remarkable bridges was the Brooklyn Bridge. It connected New York City and Brooklyn. Steel also was used to build skyscrapers, such as the Home Insurance Building in Chicago.

1. Name two ways Americans used steel.

Inventions Promote Change (pages 438–439)

How did the new inventions change Americans’ way of life?

Beginning in the late 1800s, inventors produced items that changed the way people lived and worked. In 1876, Thomas Alva Edison established the world’s first research laboratory in Menlo Park, New Jersey. He used the lab to develop new inventions. Edison perfected an early light bulb there. He then worked to establish power plants to generate electricity.

Another inventor, George Westinghouse, developed ways to make electricity safer and less expensive.

The use of electricity changed America. By 1890, electricity ran machines such as fans and printing presses. Electricity soon became available in homes. This led to the invention of many appliances. Cities built electric streetcars. They made travel cheaper and easier.

In 1867, Christopher Sholes invented the typewriter. This led to dramatic changes in the workplace. Almost ten years later, in 1876, Alexander Graham Bell and Thomas Watson invented the telephone.

The wave of inventions during the late 1800s helped change Americans’ daily life. More women began to work in offices. By 1910, women made up about 40 percent of the nation’s office work force. In addition, work that had been done at home—such as sewing clothes—was now done in factories. Unfortunately, many factory employees worked long hours in unhealthy conditions.

Inventions had several positive effects. Machines allowed employees to work faster. This led to a shorter work week. As a result, people had more leisure time. In addition, citizens enjoyed new products such as phonographs, bicycles, and cameras.

2. Name two ways in which electricity changed people’s life.

Geography Skillbuilder

Use the map to answer the questions.

1. Along what feature are all the mills located?

2. What does this map say about the steel industry during the late 1800s and early 1900s?
The Age of the Railroads

BEFORE YOU READ
In the last section you read about how Americans used their natural resources and numerous inventions to begin transforming society.

In this section you will read about the growth of the nation's railroad industry and its effect on the nation.

AS YOU READ
Use this diagram to take notes on the effects of the rapid growth of railroads.

Railroads Span Time and Space
(pages 442–443)

How did the railroads change the way Americans told time?

Before and after the Civil War, railroads were built to span the entire United States. In 1869, the nation completed work on its first transcontinental railroad—a railroad that crossed the entire continent.

In the years that followed, railroad tracks spread throughout the country. By 1890, more than 200,000 miles of rail lines zigzagged across the United States.

Railroads made long-distance travel a possibility for many Americans. However, building and running the railroads was difficult and dangerous work. Those who did most of the work were Chinese and Irish immigrants and desperate out-of-work Civil War veterans. Accidents and diseases affected thousands of railroad builders each year. By 1888, more than 2,000 workers had died. Another 20,000 workers had been injured.

Railroads eventually linked the many different regions of the United States. However, railroad schedules proved hard to keep. This was because each community set its own times—based mainly on the movement of the sun. The time in Boston, for example, was almost 12 minutes later than the time in New York.
To fix this problem, officials devised a plan in 1870 to divide the earth into 24 time zones, one for each hour of the day. Under this plan, the United States would contain four time zones: Eastern, Central, Mountain, and Pacific. Everyone living in a particular zone would follow the same time. The railroad companies supported this plan. Many communities also supported it.

1. How did time zones first come about?

Opportunities and Opportunists
(pages 443–444)

**How did the growth of the railroads affect the nation?**

Railroads made it easier for people to travel long distances. They also helped many industries grow. The iron, steel, coal, lumber, and glass industries all grew partly because the railroads needed their products. Railroads also increased trade among cities, towns, and settlements. This allowed many communities to grow and prosper.

Railroads led to the creation of new towns. In 1880, George M. Pullman built a factory on the prairie outside Chicago. There, workers made the sleeping cars he invented for trains. As demand for his sleeping cars rose, Pullman built a large town to house the workers he needed. Pullman created quality housing for his workers. But he tried to control many aspects of their lives. Eventually, his workers rebelled.

The railroad industry offered people the chance to become rich. The industry attracted many corrupt individuals. One of the most well-known cases of corruption was the Crédit Mobilier scandal. In 1868, some officers of the Union Pacific railroad formed a construction company called Crédit Mobilier. They gave their company contracts to lay railroad track at two to three times the actual cost. They kept all profits. To prevent the government from interfering, they paid off members of Congress. Eventually, authorities uncovered the scheme.

2. What was one positive and negative effect of the growth of railroads?

The Grange and the Railroads
(pages 444–446)

**Why did the farmers fight the railroads?**

One group angered by corruption in the railroad industry were farmers. Farmers were upset for a number of reasons. First, they claimed that railroads sold government land grants to businesses rather than to families. They also accused the railroad industry of setting high shipping prices to keep farmers in debt.

In response to these abuses, the Grangers took political action. They convinced some states to pass laws regulating railroad activity. Members of the railroad companies challenged the states’ rights to regulate them.

The battle reached the Supreme Court in 1877. In the case of Munn v. Illinois, the Court declared that government could regulate private industries in order to protect the public interest. The railroads had lost their fight.

A decade later, Congress passed the Interstate Commerce Act. The act gave the federal government even more power over the railroads. The railroad companies, however, continued to resist all government intervention.

Beginning in 1893, an economic depression struck the country. It affected numerous institutions—including the railroads. Many railroad companies failed. As a result, they were taken over by financial firms. By 1900, seven companies owned most of the nation’s railways.

3. Give two reasons why farmers were upset with the railroad companies.
Big Business and Labor

BEFORE YOU READ
In the last section, you read about the growth of the railroad industry in the United States. In this section you will read about the growth and power of big business in America and how workers united to improve conditions in the nation’s growing industries.

AS YOU READ
Use the diagram below to take notes on the growth of big business and labor.

<table>
<thead>
<tr>
<th>PERSON</th>
<th>BUSINESS OR LABOR</th>
<th>ACHIEVEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carnegie</td>
<td>vertical and horizontal integration</td>
<td></td>
</tr>
</tbody>
</table>

Carnegie’s Innovations; Social Darwinism and Business
(pages 447–449)

How did Carnegie take control of the steel industry?

Andrew Carnegie attempted to control the entire steel industry. Through **vertical integration** he bought companies that supplied his **raw materials** such as iron and coal, and railroads needed to transport the steel. He used **horizontal integration** by buying out or **merging** with other steel companies.

Carnegie’s success helped popularize the theory of **Social Darwinism**. This theory, based on the ideas of biologist Charles Darwin, said that “**natural selection**” enabled the best-suited people to survive and succeed. Social Darwinism supported the ideas of competition, hard work, and responsibility.

1. Describe two ways in which Carnegie tried to control the steel industry.
Fewer Control More; Labor Unions Emerge  
(pages 449–451)

How did entrepreneurs try to control competition?

Most entrepreneurs tried to control competition. Their goal was to form a *monopoly* by buying out competitors or driving them out of business. **John D. Rockefeller** used the Standard Oil trust to almost completely control the oil industry. Rockefeller’s ruthless business practices earned him huge profits, but caused people to label him a *robber baron*. In 1890, the *Sherman Antitrust Act* made it illegal to form a trust, but many companies were able to avoid prosecution under the law. The business boom in the United States bypassed the South which continued to suffer economic stagnation.

Workers responded to business consolidation by forming labor unions. Many workers worked long hours under dangerous conditions for low wages. Women, children, and workers in *sweatshops* worked under especially harsh conditions. The National Labor Union (NLU) was an early labor union that persuaded Congress to legalize an eight-hour day for government workers in 1868. The NLU excluded African-American workers who formed the Colored National Labor Union (CNLU). The Knights of Labor also enjoyed success but declined after the failure of a series of strikes.

2. Why did entrepreneurs form trusts?

Union Movements Diverge; Strikes Turn Violent  
(pages 451–455)

What were the two major types of unions?

Two major types of unions made great gains. One was craft unions. **Samuel Gompers** formed the *American Federation of Labor* (AFL) in 1886. Gompers used strikes and *collective bargaining*—negotiations between labor and management to win higher wages and shorter workweeks. **Eugene V. Debs** believed in industrial unionism—a union of all workers, both skilled and unskilled in a single industry. He formed the American Railway Union (ARU). Debs and other workers turned to socialism. In 1905, a union of radicals and socialists was formed called the *Industrial Workers of the World* (IWW) or the Wobblies. In the West, Japanese and Mexican farm workers formed a union to improve conditions.

Unions used strikes to improve conditions. In 1877, workers for the Baltimore and Ohio railroad went out on strike. The strike was broken up when the railroad president persuaded President Rutherford B. Hayes to bring in federal troops to end the strike.

Later strikes turned violent. The Haymarket Affair took place in 1886. A bomb exploded at a demonstration in Chicago’s Haymarket Square in support of striking workers. Several people were killed. Labor leaders were charged with inciting a riot and four were hanged although no one knows who actually set off the bomb. In 1892, steel workers and Pinkerton Guards fought a battle at Homestead, Pennsylvania, near Pittsburgh, that left dead on both sides. Two years later a strike against the Pullman Company led by Eugene Debs and his American Railway Union turned violent when federal troops were called out to break the strike.

**Mary Harris Jones**, known as Mother Jones, gained fame as an organizer for the United Mine Workers. The unions’ struggle for better conditions was hurt by government intervening on the side of management. Courts used the Sherman Antitrust Act against the workers. Despite the pressures of government action, unions continued to grow.

3. What were the two types of unions?
Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>collective bargaining</td>
<td>Negotiations between labor and management</td>
</tr>
<tr>
<td>corrupt</td>
<td>Immoral or dishonest</td>
</tr>
<tr>
<td>geologist</td>
<td>Someone who studies the origin, history, and structure of the earth</td>
</tr>
<tr>
<td>kerosene</td>
<td>A thin oil used as a fuel</td>
</tr>
<tr>
<td>leisure</td>
<td>Freedom from duties or responsibilities</td>
</tr>
<tr>
<td>merge</td>
<td>To join together</td>
</tr>
<tr>
<td>monopoly</td>
<td>Complete control over an industry</td>
</tr>
<tr>
<td>preserve</td>
<td>To protect from injury</td>
</tr>
<tr>
<td>raw materials</td>
<td>Unprocessed natural products</td>
</tr>
<tr>
<td>robber baron</td>
<td>Industrial leader of great wealth</td>
</tr>
<tr>
<td>scheme</td>
<td>A plan, usually secret</td>
</tr>
<tr>
<td>sweatshop</td>
<td>A small factory with poor working conditions</td>
</tr>
</tbody>
</table>

**AFTER YOU READ**

**Terms and Names**

**A.** If the statement is true, write “true” on the line. If it is false, change the underlined word or words to make it true.

1. _______ The Bessemer process was a useful way of turning iron into steel.
2. _______ Edwin L. Drake invented the telephone.
3. _______ The Interstate Commerce Act increased the federal government’s power over the railroads.
4. _______ A business firm that controls all the competition in an industry holds a trust over the industry.
5. _______ In the late 1800s some unions looked to collective bargaining to reach agreements between workers and employers.

**B.** Write the letter of the name or term that matches the description.

| a. Andrew Carnegie         | ____ 1. Developed the light bulb and a research laboratory in Menlo Park, New Jersey |
| b. Knights of Labor        | ____ 2. The court ruling that won states the right to regulate the railroads |
| c. Munn v. Illinois        | ____ 3. Millionaire businessman who gained control of the steel industry |
| d. Industrial Workers of the World | ____ 4. Union organized by a group of radical union members and socialists. |
| e. Thomas Alva Edison      | ____ 5. Activist who helped lead the United Mine Workers of America |
| f. Mary Harris Jones       |                                                                                   |
Main Ideas

1. In what ways did natural resources and inventions help change the nation in the years after the Civil War?

2. How did the growth of the railroad industry affect the development of other industries?

3. Who benefited more from the ideas of Social Darwinism, business leaders or workers?

4. How successful was the Sherman Anti-Trust Act in accomplishing its goals?

5. What role did the government take in the conflict between unions and management?

Think Critically

Answer the following questions on a separate sheet of paper.

1. Which invention do you consider more important, the telephone or electricity? Explain.

2. Do you think workers today can benefit from unions? Why or why not?