

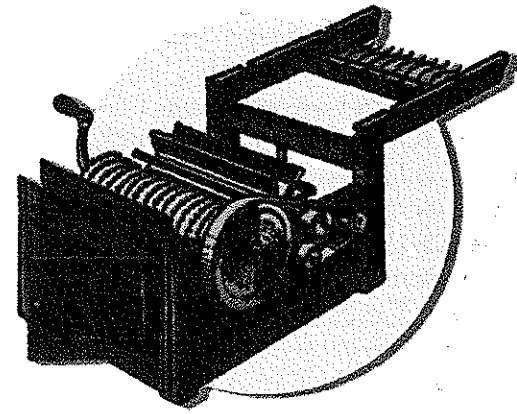
THE INDUSTRIAL REVOLUTION

Not all revolutions are violent. Second only to the War for Independence, the greatest revolution in American history was the Industrial Revolution. This revolution was the change from a farming and handcrafting society to one of industry and machine manufacturing. It began in England in the 1700s and eventually spread to reach much of the world. It began in America, in a small way, late in that same century, but it did not become an important part of American culture until the War of 1812. It was the embargoes and blockades of that war that pushed American manufacturing to begin its spectacular rise.

Textiles. The revolution had its most successful beginning in the textile industry. Britain had developed many of the machines used in the mass production of cloth in the late 1700s. These machines spun several spools of yarn or thread instead of the one at a time that could be done by hand. British inventors had also invented the power loom that allowed cloth to be woven more quickly. These inventions were protected by laws that prohibited plans of the machines or people who knew them from leaving the country.

However, the laws did not stop Samuel Slater, the "Father of the Factory System (in America). Slater was a skilled mechanic familiar with the British textile machines. He memorized the plans for the machines and succeeded in reaching the United States in disguise. In 1791 with the financial backing of Moses Brown, a New England capitalist, Slater opened America's first factory for spinning thread in Rhode Island.

The new factory was opened in time to cash in on the flood of cotton from the South. Eli Whitney invented the cotton gin in 1793, allowing for the cheap production of this textile fiber. The factories of the North were soon busy turning Southern cotton into cotton thread. These same factories began to weave it into cloth when the power loom was added to the American system in 1814. The textile industry received another boost in 1846 when Elias Howe patented the sewing machine. It was further perfected by Isaac Singer who made it popular. It was the first in a long line of labor-saving devices that began to appear in American homes, not just factories. It also allowed the factories to begin mass-producing clothes from their inexpensive



COTTON GIN

thread and cloth.

Most of the factories were located in the northeast for several reasons. The machines were powered at first by water wheels that required fast-moving streams. The steep hills and swift streams of New England were ideal for these kinds of factories. The poor soil of New England encouraged people to try the alternative of manufacturing. Northern seaports provided a ready way to bring in raw material and export finished goods. New England also had a ready supply of capital from its many wealthy shipping entrepreneurs. Moreover, the northeast was the most densely populated part of the nation, providing the factories with needed workers. The West, by contrast, was sparsely populated by poor farmers, and the South was populated by rich plantation owners whose money was in cotton and slaves.

Mass Production. Eli Whitney made very little money on his cotton gin. He obtained a **patent** for the device, but others still produced the simple machine. By the time Whitney had gone through the courts and put the illegal manufacturers out of business, his patent had almost expired, so he had to earn his fortune another way. The way he chose once again revolutionized American manufacturing.

Whitney came up with the idea of mass production of interchangeable parts for guns. Prior to that time, each part of a gun was made by hand and it fit only that particular gun. If a part broke, a new one had to be handmade to replace it. Whitney had the parts made in large groups, each exactly alike. That way, a broken part could be easily and quickly replaced. The guns could be manufactured and maintained at a

lesser cost. Whitney reportedly proved his point by taking ten guns to Washington for government officials to see. He took them apart, scrambled the pieces, and reassembled them into ten working guns!

Mass production of interchangeable parts spread to all areas of manufacturing. The cheap production of many goods brought those goods within reach for more and more people. It also gave the North a vast manufacturing engine that would be vital in the coming war with the South.

Factory Workers. The factory system was very beneficial to the nation by providing new jobs, cheaper goods, and economic prosperity; but it also had a downside. Many factory workers were shamefully exploited. Wages were low and hours were long. Thirteen- or fourteen-hour days, six days a week were common. Unions were considered conspiracies, and strikes for better pay often were broken up by the law. Working conditions were bad and often unsafe. An injured or ill worker had no protection from losing his job.

The worst abuse was the employment of children in the factories. Children, often under the age of ten, were put to work tending the machines for pitiful wages. They worked the same hours as the adults, deprived of their childhood and frequently their health by years of labor. Working also meant they could not get an education, and that often meant they would be unskilled laborers for all their lives. This child abuse was one of the blackest marks on the growth of industry in America and would continue for many years.

Gradually, improvements were made. Martin Van Buren set a precedent in 1840 when he limited workers on federal projects to ten hours a day. Slowly, the states began to pass laws limiting working hours. In 1842 the Supreme Court ruled that labor unions were not automatically illegal conspiracies. However, it would be many years before unions could build up the strength to effectively challenge the power of the employers.


Farming. Farming also profited from the Industrial Revolution. The thickly matted soil of the West had been hard on the heavy wooden plows that existed in the 1700s. In 1837 John Deere invented a light, sharp steel plow for western farmers. A few years earlier, Cyrus McCormick had patented a mechanical reaper. This remarkable invention allowed a man to harvest his grain by himself faster than he could with several helpers.



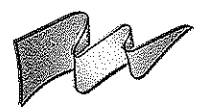
MCCORMICK'S REAPER

The new plow and reaper allowed a farmer to produce substantially more food than he needed for his family. Suddenly, farming was not just a way to survive, it was a way to make a profit!! Fertile western farms began to supply food for cotton-growing southern plantations and cotton-spinning northern factories. The different parts of the country specialized and depended upon the others for what they did not produce themselves.

Communication. The single greatest revolution in the history of communication was the invention of the telegraph by Samuel Morse. Morse invented a way to send messages instantly over a wire using a series of dots and dashes called Morse Code. In 1844 he sent a message from Washington to Baltimore, "What hath God wrought?" opening the era of instant communications! Soon, telegraph wires were all over the nation, allowing news and information to speed across the American expanse. In 1866 after five failures, Cyrus Field succeeded in laying a telegraph cable between Canada and Great Britain. The Old and New World were suddenly just a few seconds apart.

 Match these people. Some answers will be used more than once.

- | | | |
|------|---|--------------------|
| 3.1 | _____ Father of the Factory System | a. Cyrus McCormick |
| 3.2 | _____ cotton gin | b. Cyrus Field |
| 3.3 | _____ interchangeable parts for guns | c. John Deere |
| 3.4 | _____ invented the telegraph | d. Elias Howe |
| 3.5 | _____ opened America's first thread-spinning factory | e. Eli Whitney |
| 3.6 | _____ invented the sewing machine | f. Isaac Singer |
| 3.7 | _____ steel plow | g. Samuel Morse |
| 3.8 | _____ improved and popularized the sewing machine | h. Samuel Slater |
| 3.9 | _____ "What hath God wrought?" | |
| 3.10 | _____ mechanical reaper | |
| 3.11 | _____ memorized British machine plans and came to America | |
| 3.12 | _____ laid a telegraph cable from Europe to North America | |

 Complete these items.

- 3.13 Where did the worldwide Industrial Revolution begin? _____
- 3.14 How did the new farm machines change Western farming?

- 3.15 Name three reasons why factories developed in the Northeast.
- a. _____
- b. _____
- c. _____

3.16 Name four ways the factory system exploited workers.

- a. _____
- b. _____
- c. _____
- d. _____

3.17 What was the Industrial Revolution?

Transportation Needs. Improvements in transportation were a vital part of the Industrial Revolution. At the time of the American Revolution, transportation was very poor. Roads were unpaved, muddy, rutted, and often impassable for wagons. The most reliable transportation was by water, but the rivers did not go to every farm. Since most farms produced only for the needs of the family, it was not a vital concern until the Industrial Revolution. However, before farms could provide food for cities devoted to manufacturing, they needed reliable ways to ship their produce.

Roads. The first improvements in overland transportation came through privately owned turnpikes at the end of the 1700s. The Lancaster Turnpike was a pioneer in this field. It was a wide road with a hard surface and was built by a private company. The company made a substantial profit charging tolls for commerce between Philadelphia and Lancaster, Pennsylvania. Its success encouraged many other companies to invest in these arteries. Commerce flourished along these routes, encouraging more of the same.

The Cumberland Road, also called the National Road, was built with public funds. It ran from Cumberland, Maryland to Vandalia, Illinois (completed in 1852). Connecting roads made it a fairly direct route between Baltimore on Chesapeake Bay, and St. Louis on the Mississippi River. It was a huge stimulant to trade, western migration, and the development of the cities of the frontier.

However, public roads were difficult to build. It was very expensive to build roads in the middle of the wilderness, miles from major sources of supplies, manpower, and food. States' rights

advocates, like the Democrats, objected violently to using federal funds for any project inside one state. Moreover, the Northeast did not want to aid roads that would encourage their population to move west. So additions to the national road that would connect it with major cities in Kentucky, for example, were routinely voted down or vetoed, especially by Andrew Jackson. Nevertheless, with dedicated state spending, the hard-surface roads were gradually expanded.

The Steamboat. The mighty rivers of America, especially the Mississippi, were major trade routes. However, prior to 1807 they were basically one-way streets. Shipping goods downstream from a farm in Illinois to New Orleans, for example, was slow but simple. A farmer only had to build a raft and float it carefully down the river. However, going upstream carrying cargo of any bulk was incredibly difficult and too expensive to be very profitable.

That all changed in 1807 when Robert Fulton built a workable steamboat. It used a steam engine (which had been invented by other people) to drive a paddle wheel on the side of the ship. Fulton's ship, the *Clermont*, was called "Fulton's Folly" by his detractors. No one was laughing, however, when the ship steamed up the Hudson River from New York City to Albany in 32 hours—an unheard-of feat!

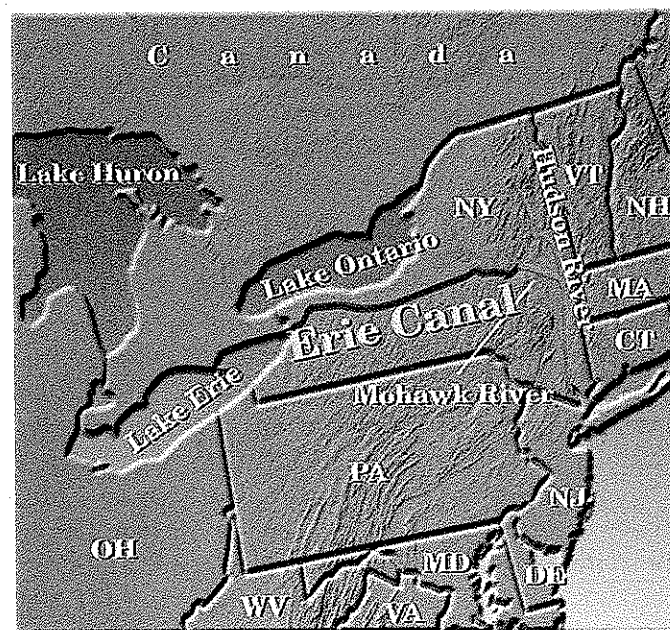
The steamboats rapidly spread to all the navigable rivers of the nation. They especially came to dominate trade on the Mississippi where a thousand or more people were working by 1860. Cities along the upper reaches of the river flourished as trade expanded. The Supreme Court decision of *Gibbons v. Odgen* in 1824 prohibited the states from controlling interstate trade on

these rivers. That opened up these vital routes to healthy competition and rapid expansion.

Canal Craze. Even with better roads, water transportation was still better for large quantities of bulky cargo, but the rivers did not connect many of the vital inland water routes. This problem was corrected by a surge of canal building in the early 1800s.

The most famous and most successful of the internal canals was the Erie Canal in New York State. The Erie Canal connected Lake Erie with the Atlantic Ocean through the Mohawk and Hudson Rivers. It was promoted by New York Governor DeWitt Clinton. The federal government would not contribute any funds, so the difficult project was built entirely with New York money. Clinton's opponents called it "Clinton's Ditch." The determined governor persevered from 1817 until 1825, when the canal finally opened.

The canal was an unprecedented success. The time required to ship a ton of grain from Buffalo to New York City fell from twenty days to six days, and the cost dropped from \$100 to \$5! The Erie Canal connected New York City to the entire Midwest by the Great Lakes. The city quickly became the premier port on the eastern seaboard because of the influx of produce from the West. Land values along the canal shot up. Industry flourished with a ready source of raw materials and a cheap method for shipping out finished goods. "Clinton's Ditch" was New York's gold mine!



Other states observed the success and tried to copy it. A flurry of canal construction occurred in the 1820s and '30s. Several canals were built to connect the Mississippi and the Great Lakes. This also benefitted the trade going into New York City via the Erie Canal. One of the most unusual canals connected the Susquehanna River above Chesapeake Bay to the Ohio River; it used a special railroad to lift the barges over the Allegheny Mountains. Many of these canals were a commercial success for a short time, but none rivaled the economic impact of the Erie Canal.

Ocean Trade. The steamboats and canals brought American products to seaports for trade with the world. America led the world in the mid-1800s in the development of a new ocean vessel, the clipper ship. Clipper ships were streamlined vessels built with a huge collection of sails. They were built for speed, not bulk, to carry valuable cargoes quickly. They quickly took over the tea trade to the Far East and were the vessel of choice for the impatient thousands heading to the California gold fields.

However, the majestic clippers were put out of business by the development of ocean-going steamships. These unlovely, slower ships were reliable and could carry much more cargo. By the time of the Civil War, the beautiful clippers were losing their cargoes to the cheaper transport of the smoke-belching steamers.

Railroad. The success of the canals was quickly ended by the incredible story of the railroads. These speedy monsters could go anywhere tracks could be laid. They were not dependent upon waterways or limited by hills and mountains. Railroads could carry bulky cargo even to cities that had no nearby river or lake.

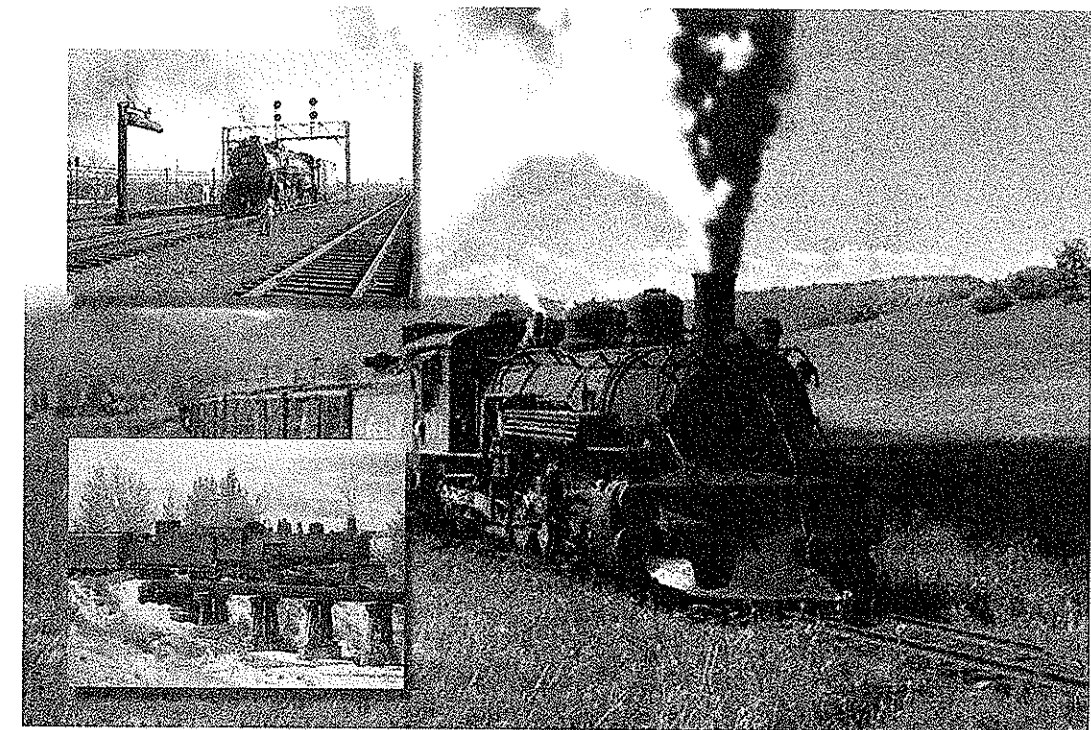
Rail lines were used in the early 1800s to connect major cities using horse-drawn coaches. It was in Britain that the newly developed steam engine was first adapted to pull these coaches. It was also in Britain that the standard gauge (rail separation) of 4 feet 8 1/2 inches was set. (This was the standard width for wagon axles in Britain because the deep ruts in the old Roman roads were that distance apart. It had been the width of Roman chariot axles and became the railroad width in Britain, Canada, and the United States!)

The first American company to try the new technology was the Baltimore and Ohio Company which began service in 1830 with thirteen miles

of track. That same year the B&O publicized its new venture by staging a race between a horse-drawn rail coach and one drawn by the *Tom Thumb*, an American-built locomotive. The *Tom Thumb* was winning until it broke down and the horse crossed the finish line first. It did not matter—the railroad had arrived.

The railroad expanded rapidly and quickly took up a vital role in the nation. From the thirteen miles set up by the B&O in 1830, the

rail lines grew to about 30,000 miles by 1860! Most of these tracks were in the industrial North and the rapidly expanding West around the Great Lakes. The railroad gave the farmers of Ohio, Illinois, and Indiana direct access to the markets of the northeast. This vital river of iron replaced the Mississippi as the main trade route of the West. That stopped the South from choking off the West by their control of the Mississippi seaports during the Civil War.



EARLY STEAM LOCOMOTIVES

▶▶▶ Answer these questions.

3.18 Why was better transportation needed for the Industrial Revolution?

3.19 Why didn't the federal government build more roads?

3.20 Why was the railroad important to the West in the Civil War?
