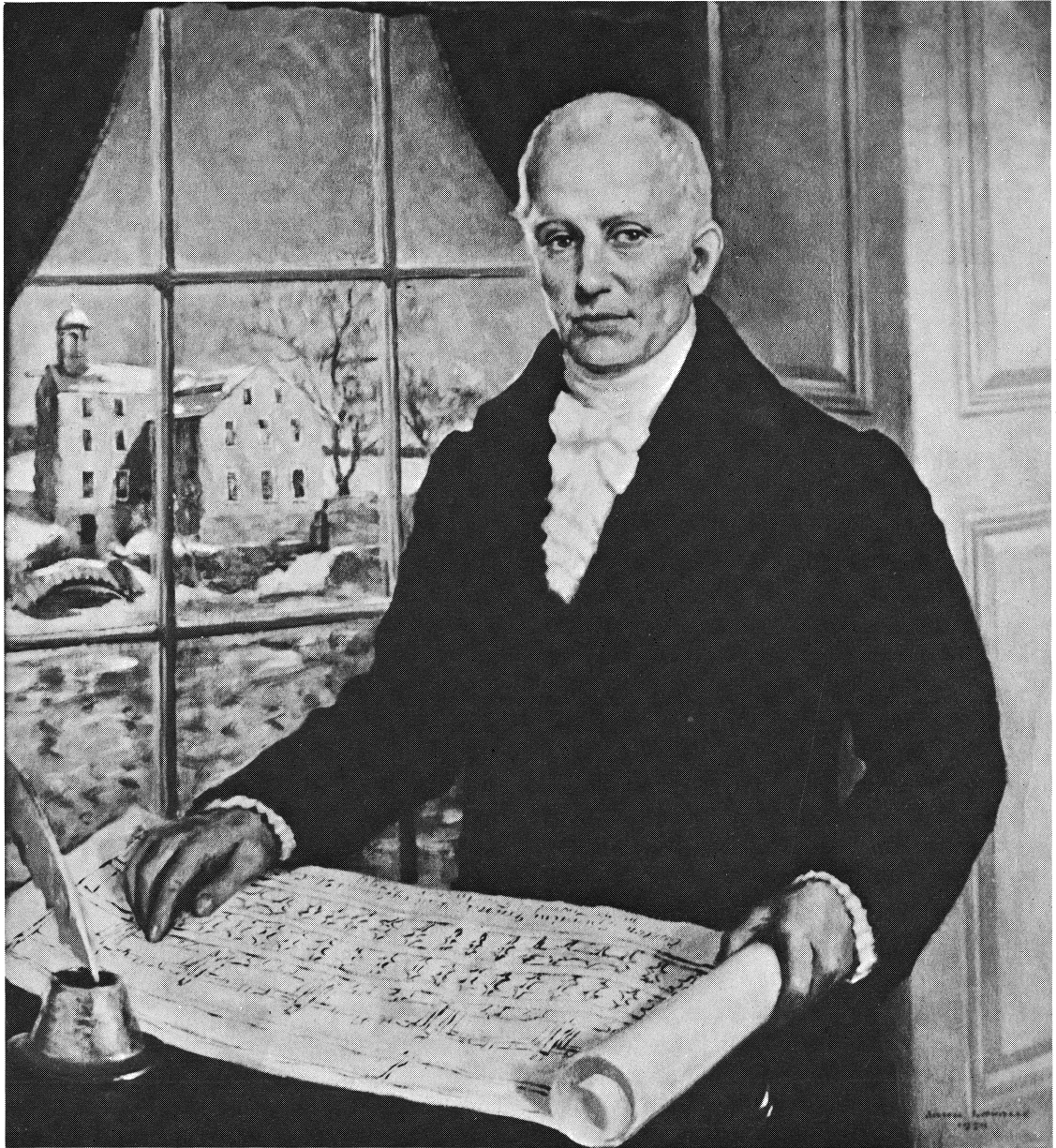


PART NINE

Manufacturing Centers in the Northeast

Chapter 23: A New Way of Life

Chapter 24: Inland Waterways Spread Industry



Old Slater Mill Museum

SAMUEL SLATER
“FATHER OF AMERICAN MANUFACTURES”

In the old Slater Mill, seen through the window, the first water-powered machinery was used to produce cotton yarn. In 1791, the site overlooking the Blackstone River was purchased for 350 Spanish milled dollars. In 1793, Almy Brown and Slater, the owners, began spinning on machines in Pawtucket, Rhode Island. The old mill is now a museum where water-powered machinery is being exhibited in operation to show visitors the crude beginning of the factory system in the United States.

Chapter 23

A New Way of Life

IRON WAS THE FIRST MINERAL INDUSTRY

IN THE TIME of Queen Elizabeth I, laws were passed that trees could not be chopped down for fuel within fourteen miles of the sea or any navigable river; and that nowhere in England could oak, beech, or ash be used for making charcoal. The timber was needed to build ships for the growing commerce of the little island kingdom. Since the British ironmasters depended upon charcoal for smelting iron ore, these laws were a hardship. With interest they read Hariot's report (page 50) of one of the exploring expeditions that Walter Raleigh sent to the Carolina coast. America was a land of forests and "in two places of the countrey" he stated, "wee founde neere the water side the ground to be rockie, which, by the triall of a minerall man, was founde to hold iron richly." The English explorers, like the Spaniards, were looking for gold and did not take back a sample of the iron ore.

After iron was discovered in Virginia, a group of men called the Southampton Adventurers formed a company and sent over skilled workmen and their families to erect the first ironworks in America. The

site chosen was on Falling Creek, sixty-six miles up the river from Jamestown, where iron ore had been found in bogs. On March 22, 1622, when the furnace was fired, Indians attacked. They destroyed everything and killed the workmen and their families. The young son of the superintendent, who escaped by hiding in the woods, made his way back to Jamestown and reported the tragedy. Perhaps the Indians thought the furnace, belching fire and smoke, was a monster that would devour them. The works were not rebuilt because the "adventurers" ran out of money. They had lost all they had invested.

Although a little iron was shipped to England by the London Company, the first really successful ironworks were built by another company of English adventurers. They were built on the Saugus River near Lynn, Massachusetts, where iron, washed down by rains, was fished from swamps and bogs with long tongs. The ironworkers named their village Hammersmith, where one of their houses still stands. Men employed at the ironworks were exempt from paying taxes and were excused from the tiresome chore of watching for Indian attacks. Since the colonists paid for kettles,



United States Steel Corporation

COOKING POT WAS FIRST PRODUCT OF SAUGUS IRONWORKS – 1644

The ironworkers decided their first product would be something useful. Joseph Jenks, a skilled ironworker from England poured molten metal from the furnace into a mold he had made in sand. When the iron was solid, he broke apart the mold and held up this cooking pot, still in existence and cherished by the descendants of the man who sold the land for the ironworks.

anchors, and scythes with beaver pelts, bags of grain, and Indian wampum instead of money, the English adventurers realized little or nothing on their investment. The colonists, however, were provided with cooking utensils and farm tools.

The success of iron encouraged an attempt to make steel from a portion of the output. In 1655 a man living in Southold, Long Island, informed the General Court of New Haven of his “abilitie and intendment to make steele” if certain privileges were granted to him. The court encouraged him by agreeing that his property would not be taxed for ten years.

However, he was warned not to take clay and wood from private grounds without the owner’s permission, as the court was unwilling “to meddle with any man’s proprietie.” It is not known for certain whether or not this man succeeded in making steel. The credit for the first steel manufactured in this country probably belongs to another man from Connecticut. Two smiths declared in writing:

This may certify all concerned that Samuel Higley of this town of Simsbury came to the shop of us, being blacksmiths, some time in June in the year one thousand seven hundred and twenty-five, and desired us to let him have a pound or two of iron. – He desired that we take notice of them that we might know them again, for, said he, I am going to make Steel of this Iron, and I shall in a few days bring them to you to try for steel. Accordingly he brought the same pieces which we let him have, and we proved them and found them good steel, which was the first steel

RESTORATION OF EARLY IRONWORKS, SAUGUS, MASSACHUSETTS

In 1948, the still-existing ironmasters’ house, erected in 1646-1647 on the Saugus River north of Boston, determined the site of the first ironworks in Massachusetts. Where were the works? Digging through layers of earth, the remains of the furnace, the forge, and the slitting mill were discovered. Surprisingly, after 300 years, a section of a wooden water wheel was found buried 22½ feet under the pavement of Central Street. The old ironworks has been restored, and water again splashes over the water wheels as in colonial days.

First Iron Works Association, Inc.



that ever was made in this country that ever we saw or heard of. As witness our hands this 7th day of May, 1728. Timothy Phelps John Drake

William Penn, who owned ironworks in England, looked for ore in his colony and soon found it. Although he tried to induce his colonists to dig the ore and use it, this was not done until two years before his death when a Quaker blacksmith in Berks County made iron in his forge. To satisfy the demand for articles of iron, little forges and furnaces sprang up wherever families settled in new country. Sometimes farmers, who knew something about the iron trade, built small furnaces, where wood was plentiful, to smelt the iron they needed for pots, nails, hinges, hoes, and many items. When neighbors needed these same articles, the farmer left the plow for the furnace. Some large ironworks were started in this way.

Captain Augustine Washington, father of the first President of the United States, was

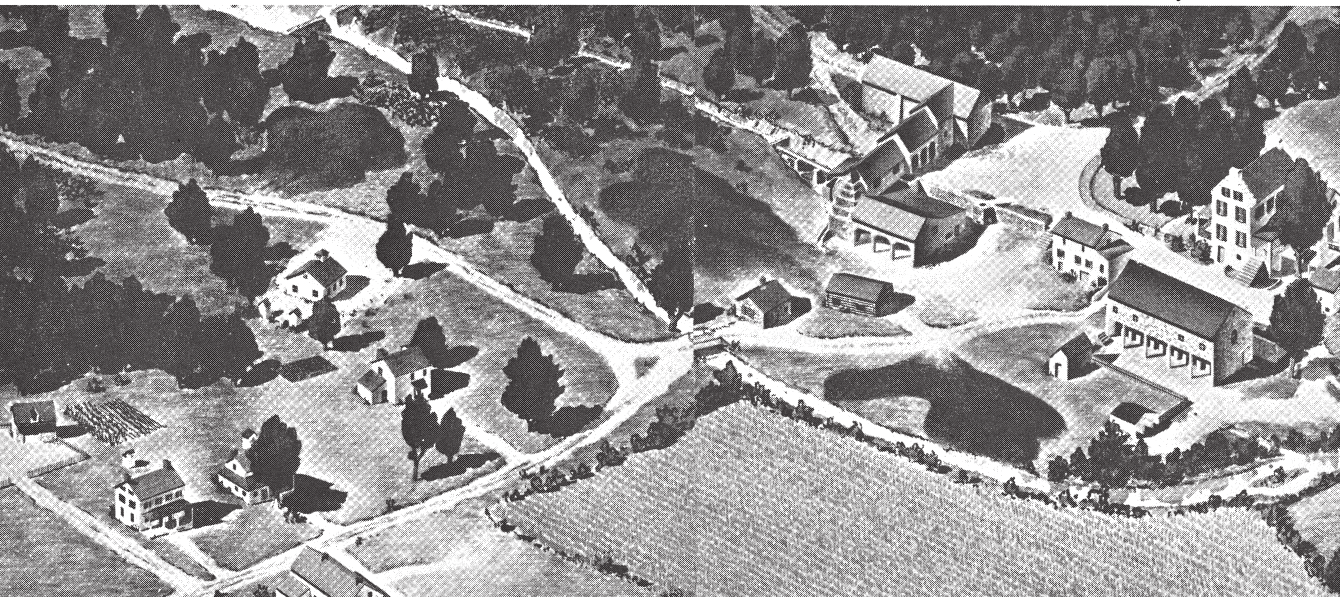
an iron manufacturer as well as a plantation owner when his famous son was born. When iron ore was discovered on one of his big farms along the Potomac River below Mount Vernon, he traded the 1600 acres of land for one-sixth interest in Principio Company. This was the largest ironworks in the colonies. A furnace was built on Washington's plantation and others at the head of Chesapeake Bay. From these ironworks with direct water transportation, bars of the metal were shipped to England. Their products sometimes brought a higher price than Swedish or Russian iron.

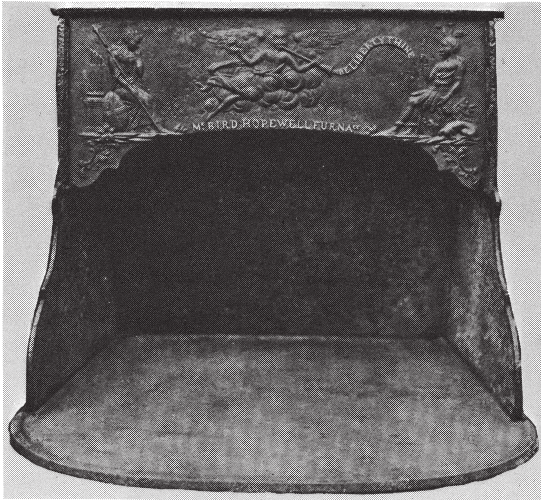
The iron plantations of Pennsylvania were much like the cotton plantations of the old South, except that the laborers were miners, woodchoppers, charcoal burners, and teamsters as well as farmers. These communities were self-supporting, raising their own food and weaving their own cloth. However, most of the labor in the field and at the loom was performed

HOPEWELL IRON PLANTATION NEAR BIRDSBORO, PENNSYLVANIA

Mark Bird, the owner of this iron plantation, outfitted 300 soldiers for Washington's army at his own expense. Products from Hopewell farms and iron from Hopewell's furnaces were generously supplied to fighting men in the Revolutionary War. Since the Continental Congress was unable to pay for all of these goods, Bird went bankrupt, and his iron plantation was sold by the sheriff.

United States Steel Corporation





*The National Society of the Colonial Dames of America
in the Commonwealth of Pennsylvania*

A "LIBERTY" FIREPLACE

This iron fireplace was made on the Hopewell Iron Plantation near Birdsboro, Pennsylvania. The design on the front plate shows an angel blowing a trumpet, announcing "BE LIBERTY THINE."

by the women and children while the men were busy in the woods and the mines. Life centered around the mansion house where the owner lived and the general store where eggs, butter, milk, vegetables, and labor were traded for sugar, molasses, shoes, medicines, and coffins. The woodcutters and charcoal burners greatly outnumbered the miners and ironmasters because one blast furnace, in a single day, consumed all the timber on an acre of ground. Some of these iron plantations, located in heavily forested regions, covered as much as 10,000 acres of land. Others were small, only a few hundred acres, like Valley Forge.

The British Parliament became alarmed at the growth of the iron industry. They were afraid that the colonists would make all the kettles, Dutch ovens, nails, shovels, tongs, anchors, and other articles they

could use and would cease to buy from British merchants. The Act of 1750 of Parliament encouraged the production of American pig iron and bar iron as many British manufacturers preferred it to Swedish iron because it did not rust so quickly. This same act declared that after June 24, 1750, the colonial governors had the duty "to prevent the erection of any mill, or other engine, for slitting or rolling of iron, or any plating-forge to work with a tilt-hammer, or any furnace for making steel in any of the said colonies." Since many ironworks were tucked away in forests, where wood was plentiful for charcoal, this act could not be enforced.

By 1775 when the Revolutionary War broke out, the colonies had more forges and furnaces than England and Wales

MAKING NAILS AT HOME IN COLONIAL DAYS

Neighborhood merchants stocked narrow strips of iron from slitting mills, along with food, clothing, hardware, tools, and anything they could sell to customers in town and country. On long winter evenings, these iron rods were heated in tiny forges in chimney corners and cut in a vise to the proper length. Farm families, including children, pounded broad tops on the warm pieces of iron. These hand-hammered nails were returned to the storekeeper and traded for articles the farmers needed and could not provide for themselves. Manufacturing began at home.

United States Steel Corporation



combined. The colonies were producing fourteen percent of the world's iron. Cannon, muskets, shot, shells, bayonets, axes, camp kettles, and swords were made in 80 blast furnaces and about 175 forges scattered throughout the colonies.

Steel emerged as the metal of war in the struggle for independence. During the Revolutionary War some states offered premiums for steel, needed for swords and bayonets. North Carolina, where the first iron ore had been discovered by Raleigh's explorers, offered the sum of nearly \$500 to the first man who, within eighteen months, succeeded in making steel equal in quality to British steel. A reward of over \$2000 was offered in South Carolina to the first three works producing 500 pounds of steel.

Although men employed in iron and steel works were exempt from military service, so many enlisted in the patriot armies, that it was necessary to use prisoners of war in iron and steel manufacture. Many of the Hessians stayed after the war was over and kept the same jobs they had had as prisoners. Five signers of the Declaration of Independence were in the iron business. Two more became generals, Nathanael Greene from Rhode Island and Daniel Morgan, a charcoal burner for his father's furnace in Pennsylvania. The ironworks making guns and ammunition for the American armies were targets for British attack. Many were burned. A detachment of soldiers from Howe's army, retreating to Philadelphia to spend the winter of 1777-78, burned the Mount Joy Iron Works, better known as Valley Forge. On this iron plantation Washington spent the same winter drilling his ragged Continentals.

COAL COMPETES WITH CHARCOAL

FIVE HUNDRED YEARS before Columbus found the New World, the Hopi Indians of Arizona were using lignite, a variety of coal, to fire their pottery. As far as is known, this was the only use made of the mineral by any tribe except for ornament. The common use was crushing it into powder to blacken their faces for ceremonials.

In North America when trees were plentiful everywhere, wood cooked the food and heated the houses; charcoal fired the forges in the blacksmith shops and smelted the ore in the furnaces of ironworks. Blacksmiths were the first to use mineral coal in place of charcoal. In 1702 a Huguenot living on the James River about fourteen miles above Richmond sent his request to the Colonial Council of Virginia:

David Menestrier a black smith and one of ye french Refugees Inhabiting Luciana Petitions his Excellency that he may have leave to use ye coal mines lately discovered there for his forge.

The request was granted for the French blacksmith "to take what coales he shall want out of ye said coal mine for ye use of his forge."

Coal discovered along the James River above Richmond did reach colonial markets. These mines had the advantage of cheap water transportation. Although explorers noted coal deposits in many places, most of this supply was out of reach because there was no way to get it to market. Both Joliet and La Salle mentioned finding coal along the Illinois River. Dr. Walker wrote frequently about coal in the diary of his journey into Kentucky. When their shoes wore out, Walker and his party were forced to seek shelter in a huge cave

in Rockcastle County while they made new moccasins out of the hide of an elk they had killed. Walker thus describes the cave in his journal:

May 12, 1750 – Under the rock is a soft kind of Stone almost like Allum in taste; below it A Layer of Coal about 12 Inches thick and white clay under that. –

May 13, 1750 – The Sabbath.

May 14, 1750 – We wrote several of our Names with Coal under the Rock, –

Five years before the War for Independence, George Washington trailed through the wilderness to the Ohio River, paddling down that stream in a canoe as far as the mouth of the Kanawha River. He was busy surveying land to pay off the Virginia officers who had served in the French and Indian War. In his journal of this tour Washington mentions coal:

Oct. 14, 1770 – At Captain Crawford's all day. Went to see a coal mine not far from his house on the banks of the river, (Youghiogheny, near Connelsville, Pennsylvania); The coal seemed to be of the very best kind, burning freely, and abundance of it.

The coal seen by Joliet, La Salle, Walker, and Washington was bituminous, or soft coal. Anthracite, or stone coal, was first used in the forge of the Gore Brothers, blacksmiths who settled in Wilkes-Barre, Pennsylvania about 1769. They discovered that the hard coal, so plentiful all around them, made a hotter fire than charcoal and lasted longer. During the Revolutionary War anthracite from this region was floated on barges down the Susquehanna River to Harrisburg. It was taken overland in wagons to stoke the furnaces of the armory at Carlisle where guns were made for Washington's soldiers.

Charcoal continued to be used in the



Bituminous Coal Institute

STRIP MINING THE PITTSBURGH SEAM IN EASTERN OHIO

The Pittsburgh Seam is a layer of coal near the surface, found in Pennsylvania, Ohio, West Virginia and Maryland. In some places, layers of rock and soil must be removed to uncover this rich deposit of bituminous coal. In other places, like this strip mining operation near St. Clairsville, Ohio the seam rises to the top of the ground where the coal can be scooped up in huge buckets, loaded into trucks, and hauled to a preparation plant to be cleaned and sized for sale. Early explorers reported finding coal throughout the Appalachian region.

iron furnaces until the scarcity of trees forced operators to turn to coal. Then for some time buyers favored iron produced in charcoal furnaces. It was the invention of the steam engine that made coal a great commercial product. Coal became the fuel to fire the boilers that created the steam to operate the numerous inventions ushering in the machine age.

MACHINERY AIDS THE GROWTH OF INDUSTRY

WHILE THE COLONISTS in North America were quarreling with England over trade and taxes, industry in the British Isles

was being moved from the home to the factory by the invention of power machinery to do the work of hands. This movement during the latter part of the eighteenth century so changed the pattern of living that it was called the Industrial Revolution. A few inventors led the way.

James Watt was a frail and studious boy who wanted to be an instrument-maker, not for music but for science. His father sent him to school in London where he could learn this trade. At the age of twenty he returned to his home town of Greenock, Scotland, with a kit of tools and a craftsman's skill. A few months later he was employed by the College of Glasgow to clean some instruments, purchased in the West Indies for use in the department of astronomy. Later a professor asked him to repair a model engine that had failed to operate successfully in his classroom. Watt discovered that a waste of steam caused the engine to stop after a few strokes. How could he save this steam to provide the energy to keep the engine going? On a pleasant day in May of 1765 while strolling on the Glasgow Green, the plan suddenly popped into his mind for condensing steam without cooling the cylinder, a principle still in use today in steam turbines. Watt's invention of the separate condenser so improved the steam engine that it soon was used to pump water from British mines and to operate machinery in British mills.

Meanwhile the invention of textile machinery in England was creating a future market for the improved steam engine. James Hargreaves, a poor weaver in Lancashire, invented a machine with a number of spindles placed upright, side by side, all spinning at the same time. He tried to keep it a secret, but the news leaked out that he was operating a spinning machine in

his own home. Fearing this device, neighbors, who depended upon hand work to earn a living, broke into the inventor's house and smashed his spinning jenny. Hargreaves managed to make a few of these machines privately and sell them for enough money to buy clothes for his many children and the family fled to Nottingham.

At about the same time Richard Arkwright, a barber and hair dyer with a knack for tinkering, was also at work on a spinning machine. The youngest of thirteen children in a poor family, Richard had little schooling. He could barely write but he was a natural mechanic. Fearing that mobs would destroy his invention, Arkwright also fled from his home town to Nottingham. There, two bankers advanced the money to manufacture his machines for a share of the profits. Samuel Need, a partner of the ingenious farmer, Jedediah Strutt, joined the bankers in business. Strutt had perfected a frame for making ribbed stockings.

In Derbyshire they built a mill where the wheels were turned by water. Ever after, Arkwright's spinning machine was called the "water frame." Since Hargreaves' jenny made a soft thread for woof and Arkwright's frame spun a hard thread for warp, British manufacturers used both inventions and other labor-saving devices. With the new machinery the British could make cloth faster and sell it cheaper, and so increased their sales everywhere. Therefore, every effort was made to keep other countries from copying the machines; but the new inventions crossed the Atlantic.

William Slater, an independent farmer who owned his land, was a neighbor of Jedediah Strutt in Derbyshire, England. He helped the three manufacturers to find

and purchase the land with water privileges on which they erected the mill. Strutt offered to accept Slater's oldest son as an apprentice and to teach him the cotton spinning trade. The father suggested that he take Samuel, his fifth son, who had a "mechanical turn, and was good at figures." The lad was not quite fourteen. During this probation the boy's father fell from a load of hay and died soon after the accident. Since Samuel's work had been satisfactory, Strutt accepted the fatherless lad as an apprentice in his factory and took him into his own home to live with his family.

In the paper of indenture Samuel Slater promised to serve his master for six and a half years. He agreed not to:

contract matrimony within the said term, play at cards, dice, or any unlawful games, haunt taverns or play houses, nor absent himself from his master's service day or night unlawfully, but in all things as a faithful apprentice to behave himself toward his master during the said term.

Jedediah Strutt signed the indenture, agreeing:

in consideration of the true and faithful service of the said Samuel Slater, his apprentice in the art of cotton spinning, — to teach and instruct him, — finding unto the said apprentice sufficient meat, drink, washing and lodging during the said term.

Offers of prizes by some American manufacturing societies and state governments to inventors and machinists encouraged the young apprentice to seek his fortune in the New World when he had learned his trade. He told the secret to no one, not even his mother and older brothers. When Samuel had completed his apprenticeship of six years and six months, his master was so pleased with his progress that he hired him to oversee

the construction of a new mill. When it was completed, the young man decided to go to the United States and enter into business for himself. How could he get out of England?

Early in September, 1789, Samuel Slater, then twenty-one years of age, asked his mother to pack his clothes as he was leaving on the stagecoach for London. Because he had worked with the Arkwright machines, he dared tell no one that he was bound for the United States. Export of the new inventions in whole or in part and drawings of them were forbidden by law. Machinists who operated them could not leave the country. Every ship and every passenger on board was searched before sailing from a British port. Fortunately Samuel Slater was a country boy and looked like a farmer. Disguised as a field hand he took nothing to identify him as a machinist except his indenture, which he hid in his old work clothes. The searchers did not find it. Just before the vessel sailed, he mailed a letter to his mother with the news that he was going to try his luck in the New World.

After a voyage of sixty-six days he arrived in New York and went to work in a small factory. He stayed there only three weeks because the machines were poor and the neighborhood did not have a single stream to furnish water power. During this time Slater chanced to meet the captain of a sloop carrying cargo between Providence and New York. From him he learned that Moses Brown, a manufacturer in Rhode Island, was looking for a factory manager. Slater wrote a letter to Brown, explaining that he could build the Arkwright machines. Brown had tried water power unsuccessfully and was

using horse power. He answered Slater's letter in his Quaker way, offering the young man a share of the profits, "if thou wilt come." Slater went to Pawtucket where he began building the Arkwright water frames entirely from memory. He put into operation the first successful water mill in the United States. For this achievement he earned the title, "Father of American Cotton Manufacture."

As in England the introduction of power machinery began to change the way of life in the United States. Laborers were moved from homes to factories where machines did the work of hands.

Soon after the new machines were introduced by Slater, the water wheels of cotton mills were turning in the short, swift rivers of New Hampshire, Connecticut, and Massachusetts. At first these factories produced cotton yarn, which was sold to weavers in the neighborhood to be woven into cloth on their hand looms at home. Gradually new items were manufactured. One day Samuel Slater showed his wife some unusually fine smooth yarn spun from long staple cotton in his mill. She twisted it into thread on an old fashioned spinning wheel. Testing it on seams, she found it to be stronger than the linen thread she had been using. In the mill of Almy, Brown and Slater the first cotton sewing thread was made.

The industrial revolution moved more slowly in the United States than in England. For years after carding and spinning were done in factories with machinery, weaving continued to be done in homes by hand. Farmhouses of New England were miniature mills. When a single machine could produce more in a day than many hands, the home manufacturer could no longer compete with the mill

owner. Weaving moved into the factory.

Lowell, Massachusetts, became one of the first factory towns. Before the English had settled on the shores of Massachusetts, the site of Lowell at the junction of the Concord and the Merrimac Rivers was called Wamesit. It was the capital of the Pawtucket Indians who gathered there to catch salmon, shad, and many kinds of fish in the waters around the Pawtucket Falls. About eight years before the Pilgrims landed, a mysterious epidemic almost annihilated the tribes living in that part of the country. Daniel Gookin, a magistrate of the Massachusetts Bay Colony, in charge of Indian affairs, wrote in his history of the New England tribes:

I have discoursed with some old Indians that were then youths, who say that the bodies were exceeding yellow, describing it by a yellow garment they wore, both before they died and afterward.

Only about one-tenth of the 3000 men in the Pawtucket tribe survived the fatal sickness. The small number of survivors were unable to resist the English settlement of their lands. Thirty-three years after the arrival of the Pilgrims, about forty settlers in Woburn and Concord sent a petition to the General Court of Massachusetts. They asked for a land grant extending six miles along the Merrimac River and six miles along the Concord River, near the junction of these two streams. This area of thirty-six square miles included Wamesit, the ancient capital of the Pawtuckets. Rev. John Eliot, defending the tribe, sent another petition to the court, asking that the land lying around Pawtucket and Wamesit Falls be reserved for his "praying Indians" whose wigwams stood on the site. The Massachusetts court

settled the dispute with a compromise. The court gave the settlers the land they wanted except for 2500 acres along the river banks near the falls where the Indians lived.

However, as more and more settlers came to fish in the rivers and to cut timber from the forests, the Pawtuckets were crowded out of their old home. The big demand for ship timber in England and in the colonies made lumbering profitable for the early settlers. Rafts of logs cut from the forests along the Merrimac were floated down the river to Newburyport on the seacoast. The logs were used in shipbuilding there or sent across the sea.

In 1792 during Washington's term as President, a company was formed to dig a canal around the falls. Five hundred shares of stock were sold at \$100 a share to raise the sum of \$50,000 to dig a canal a mile and a half long. The canal started at a spot above Pawtucket Falls and dropped thirty-two feet through four locks to flow into the Concord River. Five years later a big crowd gathered to see the first boat pass through the first canal to be opened in the new United States. When the boat entered the canal which was jammed on both sides with sightseers, the sides caved in. The spectators plunged into the canal and doused the passengers on board the boat. No one was drowned.

After the Middlesex Canal was opened in 1804, connecting the Merrimac River with the Charles River in Boston, lumbermen floated their rafts to that town. Business dwindled on the Pawtucket Canal. Although it was a poor investment for the stockholders, the old canal inspired the founding of the first big manufacturing city in the United States – Lowell, Massachusetts.

In 1810 Francis Cabot Lowell took a voyage to England for his health. Because

he was a manufacturer he visited mills in England to observe new machinery being used in producing cotton cloth, especially the power loom operated by steam. Although the steam engine was invented by a number of men, James Watt is generally credited with making many improvements that made it practical in cotton manufacture. In 1785 the Rev. Cartwright of Kent invented a power loom to be operated by steam. Many improvements were necessary before the machine came into general use in British mills.

The growth of cotton manufacture was slow until Lowell returned from England shortly before the War of 1812. As in the case of Hargreaves' jenny and Arkwright's water frame, the secret of Cartwright's power loom was guarded by the British Government. Like Slater, Lowell depended upon his memory.

When the War of 1812 cut off British imports, Americans were forced to manufacture goods to supply their own needs. Lowell discussed the idea of starting a cotton mill with a relative, Patrick Tracy Jackson, who was familiar with the process in the Slater mills. Needing power looms for weaving, they bought an ordinary loom and began to experiment. Lowell had a knack for mechanics and finally succeeded in building a power loom much like the Cartwright model he had seen in England. Then Lowell and Jackson asked their friends to invest money in a company to make cotton cloth. The two men raised a capital of \$100,000, purchased water power at Waltham, Massachusetts, and hired a skilled mechanic and inventor to install the machinery. The mechanic found it necessary to invent a number of devices to make the power looms work. Then, when the power looms were put into

operation, the yarn purchased from spinning mills could not be used on the new looms. They sold the yarn to hand weavers in the neighborhood and constructed special spinning machines in their own mill.

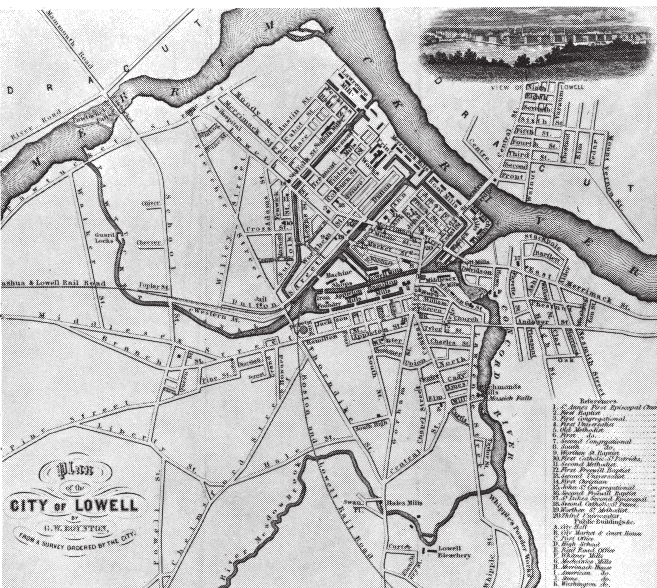
Before the new factory had produced a single yard of cloth for sale, the War of 1812 ended. The \$100,000 had been spent. After the peace was signed, cheap cotton yardage from England and India flooded the American market, forcing factories to close their doors. Mechanics out of work went West beyond the mountains, to seek farms in the Ohio Valley where they could raise enough produce to feed their families. Yet, in spite of the loss, another \$100,000 was invested in the Waltham mills. Lowell spent much time in Washington where he pleaded with Congressmen to pass a tariff law, placing a duty on imported goods, and thus save American manufacture from ruin. He convinced John C. Calhoun of South Carolina that a protective tariff would enable the southern planter to sell his cotton to northern mills for cash to purchase his manufactured goods in this country. This would keep American dollars at home for American prosperity. The Tariff of 1816 placing a duty on foreign goods was passed. This law increased employment in the mills and slowed down the westward march that was draining off the population of New England. The following year Lowell died, leaving the responsibility of the Waltham factories to his partner, Jackson.

One day in 1820 Ezra Worthen from Amesbury called on Jackson to suggest that the Waltham Company start factories in a new place and put him in charge. Jackson was willing to consider the proposition if good water power could be found. As a boy Worthen had fished at Pawtucket

Falls and he knew the country well. With a piece of chalk he sketched a map of the location on the floor, convincing his friend that the old canal could furnish the water power for many mills. Jackson sent his superintendent with Worthen to examine the land at the junction of the Concord and Merrimac Rivers. The site was chosen for a new manufacturing town.

The Waltham Company bought the 500 shares of canal stock and nearly 400 acres of farm land for about \$100,000. Five hundred men were employed to widen the mile and a half long canal to sixty feet and to deepen it to eight feet at a cost of \$120,000. In 1822 on the bank of the river the foundation was laid for the first cotton mill, the Merrimack Manufacturing Company. Ezra Worthen was made superintendent. As more and more manufacturers came, lateral canals were dug to provide water power for their mills. In 1826 the little village of factories was incorporated as the town of Lowell in honor of the man who had done much to establish manufacturing in New England. Ten years later Lowell was the "Spindle City" where 9,000,000 pounds of cotton were turned into 30,000,000 yards of cloth by six mills.

When manufacturing moved from the home to the factory, home laborers sought employment in the mills. Since most of these operators were country girls skilled in handicraft, they soon learned to handle machinery. The labor of young men, however, was scarce. With land cheap and plentiful in unsettled country, the young men went West. Few returned to marry the girls they had left behind. The American urge to own land slowed down the industrial revolution in the United



Boynton

EARLY MAP OF LOWELL, MASSACHUSETTS – CITY OF MILLS

This map shows how an industrial city was laid out when factories depended upon water power. Mills were huddled along the Merrimack and Concord Rivers, and along the branches of the main Pawtucket Canal.

The sketch in the upper right hand corner shows the boarding houses where the mill girls lived. Twenty churches are listed in the lower right hand corner. Church attendance was required by mill owners, as a rule.

Lowell, Massachusetts, built for the textile industry, became known as the “Spindle City.”

States, where many preferred profits in agriculture to wages in manufacturing.

In Lowell the mill girls lived in three story brick boarding houses, provided by their employers and managed by a house mother who supervised the care of the girls. Everyone had to be in by ten o'clock at night when the doors were locked. This type of boarding house was a unique institution that did not become the living pattern in other factory towns. In 1845 the matron of a boarding house

for the Merrimack Manufacturing Company made this report in a survey:

Kept house on Merrimack six years; twenty-eight boarders now; two hundred in all; seventy-five have been married, having kept account; two have died; four gone home sick; three dismissed for bad conduct; very little sickness.

The efforts of both employers and employees to make Lowell a model factory town drew visitors from all over the United States and from foreign countries. Many praised the place as a model industrial community and others criticized it. There were thirty-three churches in Lowell when the population was under 30,000. The town had thirty-three mills. To get operators for machines, manufacturers found it necessary to assure parents that their daughters would be provided with both religious and educational opportunities. Rules like the following were posted in the mills:

All persons are required to be constant in attendance on public worship, at one of the regular places of worship in this place. Persons who do not comply with the above regulations will not be employed by the company.

Labor was scarce during the summer when many girls went home to help on the farm. Since the work day was from daylight to dark, as a rule, they returned in the winter when the days were shorter to attend the evening schools provided by the churches. Out of 300 illiterate employees in one factory, all but 30 learned to read in these evening schools. There were lectures at the Lowell Institute where great men, including Ralph W. Emerson, spoke. Girls formed clubs to study languages, literature, and music. One of these “Improvement Circles” published a magazine called “The Lowell Offering” in which stories, poems,

and articles written by the mill girls were printed. Some of the best stories were published in a book, *Mind Amongst The Spindles*. The editors of this magazine favored laws for a ten-hour day. They suggested that the employees save to buy stock in the companies where they worked. The hours of labor drew the most criticism from visitors. The running time of the mills throughout the year averaged twelve hours and ten minutes, with time out for meals.

The overseers and officials were men with families for whom the manufacturing companies provided houses at reasonable rentals if they did not own their own homes. To this permanent but small population were added the immigrants who lived with their families and not in the boarding houses. A discharge book of one of the factories contains a report of a typical immigrant girl working in the cotton mills of Lowell and other New England towns:

Oct. 14, 1844 – Mary – , worked nine years, discharged to go on Lowell Corporation. She and her sister, who left a short time since to be married, had worked for us over ten years. They are Irish. Their father died about nine years ago. They have since entirely supported their mother, having built her a house costing \$600, in which they have kept house together. They own a pew which cost them \$125, and they have from \$100 to \$200 each at interest.

In this way the mill towns of New England became centers of foreign populations and the way of life changed. In Lowell the mansion of one manufacturer was converted into a hospital where sick employees received medical care at their company's expense, if they could not pay the fees. One corporation donated the land and others the hall, where the Middlesex Mechanics Association met and discussed

the problems of the mill hands. The experiment at Lowell, based on the Waltham system, was a preview of a dawning industrial society with its problems in hours, wages, health, housing, and employment. With freedom of opportunity gained through a political rebellion, the nation met the challenge of an industrial revolution.

COAL BECOMES A COMMERCIAL PRODUCT

AFTER THE Revolutionary War more deposits of glassy anthracite were discovered in eastern Pennsylvania. In 1791, a hunter accidentally found a rich bed of coal near Mauch Chunk (Bear Mountain) in the Lehigh Valley. He tells the story:

One day, after a poor season, when we were on short allowance, I had unusually bad luck and was on my way home, empty-handed and disheartened, tired and wet with the rain – when I struck my foot against a stone. It was nearly dusk, but light enough remained to show me that it was black and shiny. – When I saw the black rock I knew it must be stone coal. On looking round, I discovered black dirt and a great many pieces of stone coal under the roots of a tree that had been blown down. I took pieces of this coal home with me, and the next day carried them to Colonel Jacob Weiss at Fort Allen.

Shortly afterwards, the Lehigh Coal Mine Company was formed. Digging began in an open-cut mine on the top of Summit Hill, near the spot where the hunter had stumbled over the chunk of anthracite. Eastern Pennsylvania was rich in coal, but how could it reach the markets? The only transportation was on the Susquehanna, Lehigh, and Schuylkill Rivers when the streams were swollen with rains and

navigable for many miles. Who would buy the coal? Anthracite had a hard time winning the favor of a public that had been using bituminous coal in both homes and factories.

A nail manufacturer experimented with anthracite in his factory and in his home. For his fireplace he fashioned a grate from hickory wood and had a blacksmith copy it in iron. With proper drafts he succeeded in burning anthracite in this grate in his fireplace. When he invited his neighbors to witness the feat, only a few came. They could not believe it. Those who basked in the warmth of his grate fire on that cold night in February, 1808, spread the news that "stone coal" was better for heating than wood.

Four months before, two brothers had gone down the Susquehanna River as far as Columbia. No one would buy the black rocks so they dumped their load. After seeing "stone coal" burning in a grate, the brothers tried again the following spring. This time they took along an iron grate to prove to customers that the shiny black stones would heat their homes. Today the main use of anthracite is to furnish fuel.

When the War of 1812 broke out, delaying shipments of bituminous coal from the James River fields in Virginia, an enterprising mine owner in Pottsville, Pennsylvania, started for Philadelphia with nine wagonloads of anthracite. On the way he sold one load to the proprietors of a rolling mill. The foreman complained that the stones would not burn in the furnace. The mining man persuaded one of the millowners, who was a mechanic, to go with him early the next morning to fire a furnace before the workmen arrived. The two men kindled a fire with wood and piled the black stones on top. Anthracite

burns slowly; so when the fire was started, the mining man closed the furnace doors and suggested to his partner that they leave to eat breakfast. When they returned, the furnace glowed with a white heat. Workmen put in iron ore, watched it heat more quickly than usual, and pass through the rolls with greater ease. All were convinced.

On hearing of this success, a wire and nail manufacturer bought a wagon load and tried it in his furnace. The miner from Pottsville made no profits, having sold the coal for the cost of transportation. Hoping for better luck, he went on to Philadelphia with the seven remaining loads. Here and there he sold a few bushels to blacksmiths, but gave away most of his coal to persons who said they would try it. Not only was his business venture almost a total loss, but a writ was secured for his arrest as a swindler, selling black stones for coal.

During the War of 1812 more and more manufacturers tried "stone coal" because it was near at hand. The demand grew for the product. The big problem was transportation. To transport the coal to customers on schedule, rivers were dredged and a network of canals was built all over eastern Pennsylvania and north into the state of New York. One of the first navigation companies was organized by Josiah White, the wire and nail manufacturer at the falls of the Schuylkill who had purchased a wagon load of coal from the Pottsville miner. This company undertook to make the Lehigh River navigable for barges of coal from Mauch Chunk to the Delaware. In the early days of industry the proprietors were often skilled mechanics, themselves, and did hard labor by the side of the men they employed. White directed the work in the difficult spot at the Schuylkill Falls. He wrote in his memoirs:

As our work was generally in the water seven or eight months in the year, and my portion of it being to lay out the walls and channels in the river, pile stones as marks, etc., I dressed in clothes suitable — a red flannel shirt, roundabout coat, cap, strong shoes with holes cut in the toes to let out the water; our clothing being made of a coarse cloth and buckskin tanned in oil to turn the water. In the summer, during the day I was as much in the water as out of it, for three seasons, allowing the clothing to dry on my back, — sleeping at night in one of our boats in a bunk, in the same manner as the workmen.

With this improved navigation 365 tons of anthracite came down the Lehigh River in 1820. The coal business began in earnest. Twenty years later a million tons of anthracite went to market over a network of canals and rivers, large and small. Long after railroads were built, coal barges slipped quietly through this maze of waterways, supplying fuel for homes, factories and mills. However, the great bituminous deposits of the Appalachian Mountains, and not the beds of anthracite in eastern Pennsylvania, put the crown on “Ole King Coal.” Anthracite was scarce but the United States had enough bituminous coal to last 3000 years. The market for coal increased as steam engines furnished the power for operating machinery, especially in the field of transportation. Then the fur-trading posts, located on navigable rivers in the coal land, soon began to feel the throb of industry.

HOW COAL CHANGED LIFE IN PENNSYLVANIA

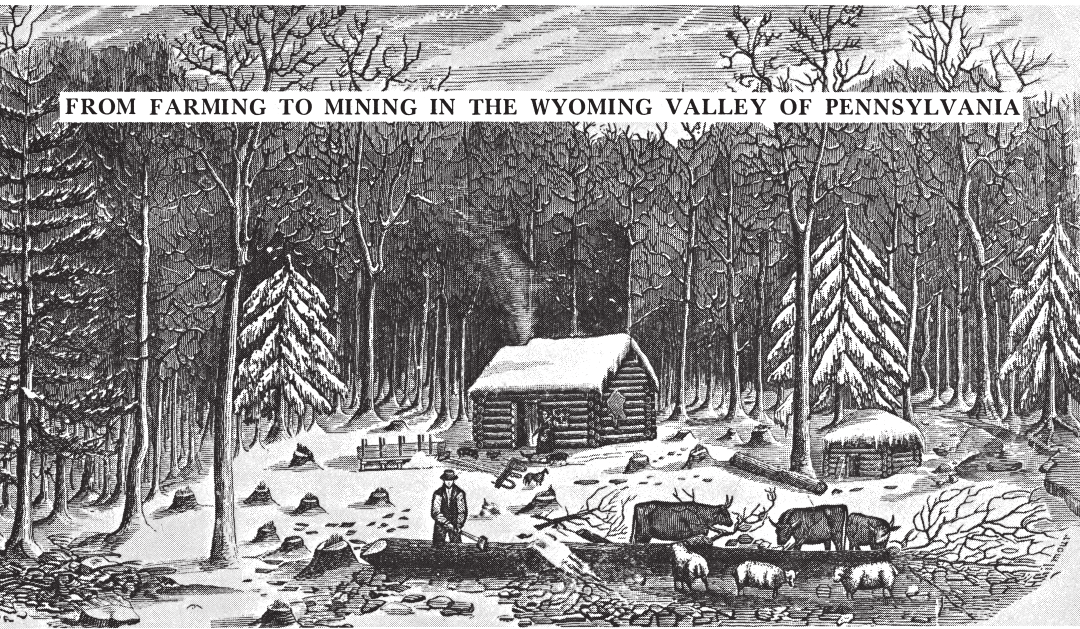
DURING THE Revolutionary War Jonathan and Ruth Slocum, with their seven sons and three daughters, moved west from Rhode Island to the Wyoming Valley

in northeastern Pennsylvania. Shortly after the family settled on land where the city of Wilkes-Barre now stands, the father was killed in an Indian raid, known as the Wyoming Valley Massacre. Later, two of the Slocum brothers, Ebenezer and Benjamin, settled in a bowl-shaped valley a little north of Wilkes-Barre where they built a forge, a grist mill, and a saw mill to supply new settlers with iron, grain, and lumber. After an early, cold winter when crops had frozen, a Dutch blacksmith employed at the forge named the little settlement Slocum’s Hollow, because he said, only a Slocum would have the courage to seek a living in such a poor place. Slocum’s Hollow is now part of the industrial city of Scranton. The name of Slocum Hollow was changed to honor George W. Scranton who moved there from New Jersey in 1840 and erected new furnaces to burn anthracite coal. However, bituminous coal rather than anthracite promoted the great iron and steel industry of the Appalachian region. The rise of manufacturing made coal a valuable product. As factories bought more and more coal to operate the increasing number of steam-driven machines, mining grew into a big industry.

PITTSBURGH PROFITS FROM A STRATEGIC LOCATION

SETTLEMENT AND INDUSTRIAL growth in the United States depended upon transportation to carry pioneers to western lands and to haul their products to market. However, both occupation and business began in the days of pack horses, wagon freight, and river flatboats. The trader went first and settlers followed

FROM FARMING TO MINING IN THE WYOMING VALLEY OF PENNSYLVANIA



FIRST CLEARING IN THE WILDERNESS

In 1762, about 200 sturdy New Englanders, mostly from Connecticut, settled in the Wyoming Valley of northeastern Pennsylvania. Mothers and little children rode in ox carts with chicken crates and farm tools. Fathers and older sons drove a few cattle, sheep, and hogs to provide milk, wool, and meat. On the way, some of the animals were devoured by wolves.

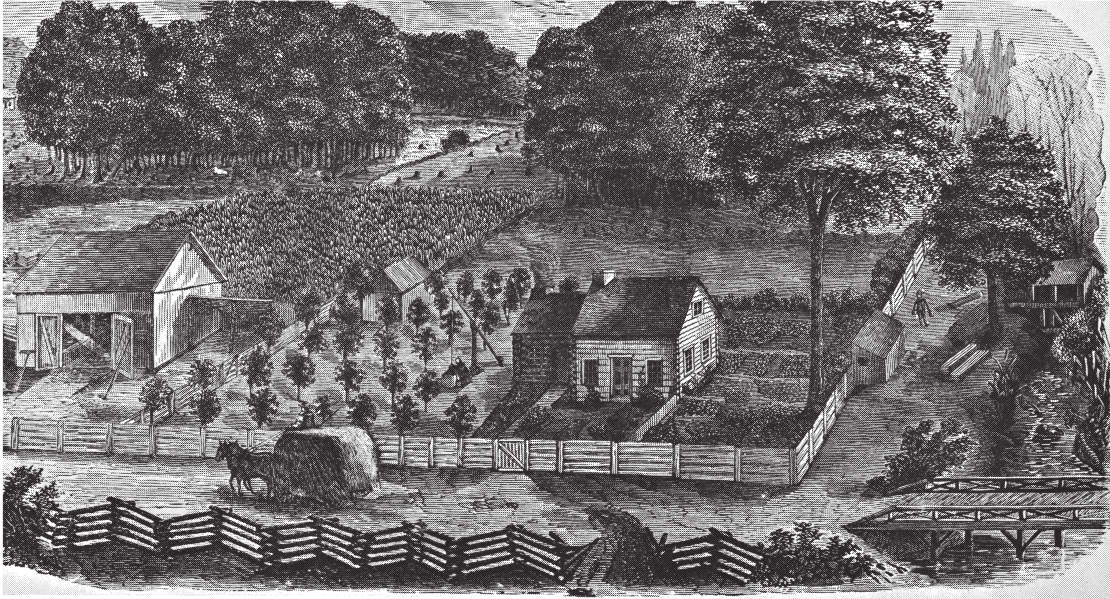
In the sketch above, the chimney of the log cabin is a hole in the roof; the door is a hide or two; and the window may not be glass. The barn is a crude log shelter with a brush roof. Although snow covers the ground and the brook is frozen over, the pioneer is busy chopping down trees, enlarging the clearing for the spring planting.

THE SAME PLACE — A FEW YEARS LATER

The clearing is larger. Corn, potatoes, and pumpkins are growing among the tree stumps. The lone settler now has neighbors who are helping him to pile logs for future use. The log cabin has a chimney plastered with mud, a plank door with wooden hinges, and a window with four panes of glass. Vines shade the doorway, a "worm" fence protects the house and garden, and a log bridge spans the creek.

Wyoming Valley was a land of trees which the pioneer had to chop down before he could plant a crop. The logs were used for houses, barns, bridges, fences, furniture, and for cooking and heating in fireplaces. On the frontier, neighbors helped one another in the hard labor of settlement in a wilderness.





THE SAME CLEARING A GENERATION LATER

The settler's son, now the owner, hauls a load of hay to the barn. His daughter dips a bucket of water from the well in the orchard. His son walks down the lane carrying a bucket in each hand.

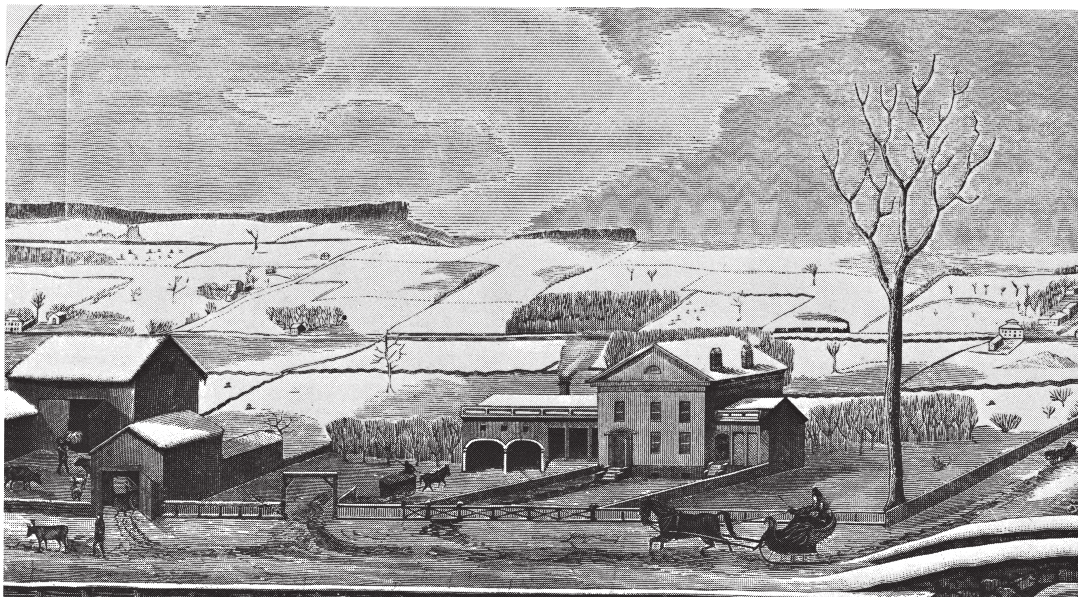
The original log cabin is now a wing of the new house built of squared logs shaped in the farmer's sawmill a little distance upstream. Paneling on the front door, shingles on the roof, boards in the barn, lumber in the straight fence, and planks on the bridge are products of the sawmill.

More land has been cleared, and more crops are growing, and a garden flourishes in the side yard. Beyond a grove of trees stands the one-room schoolhouse where children living on farms study the three R's — "readin', 'ritin', 'rithmetic."

THE OLD HOMESTEAD

At the dawn of the industrial era, a big house stands on the spot where the first settler built his log cabin in a wilderness. A few trees on the hilltops are all that remain after farmers had cleared the land for planting. The landscape is a network of fields and orchards, with a village where the farmers sell their produce and buy the things they need. Gone are the "worm" fences, the wooden bridge, and the tree stumps.

Smoke streaming from the funnel of a railroad engine is an omen of the future when the quiet countryside will hum with industry. Coal will take the place of corn as shiny beds of anthracite lure more and more miners into the river valleys of eastern Pennsylvania.



close behind. The triangle formed by the junction of the Allegheny and Monongahela Rivers to form the Ohio was a strategic location for a settlement. Pittsburgh began as a frontier post for the Indian trade and grew up to be a large industrial center, the celebrated city of steel.

In December, 1758, a merchant in Philadelphia had wagons loaded with lead, shot, powder, knives, hatchets, cloth, saddles, kettles, pipes, and tobacco. He was enroute to Pitt's Borough where he hoped to trade the articles for valuable furs brought in by the Indians. At Cumberland the merchandise was transferred from wagons to pack horses — 34 in all — for the journey over Braddock's Road to the frontier post. When icy streams were too deep for fording, the bundles were ferried across in canoes while the horses swam to the opposite shore. The leader of the pack train was a Quaker. In his diary he tells of the hardships of this mid-winter journey across the mountains:

My horse lame & ye snow balling his feet made his passing something doubtful, but I lead him along & got safe across, but in swimming ye creek ye water got into my boots & saddle-bags. I emptied ye bags & walked until I was warm. — It being late, and about four or five miles further (to a farmer's house), I began to look for a lodging place, which I found under ye side of a great mountain in a hollow stump. After I cleared ye snow out & made a floor of bark & a great fire at ye door, I lodged with more comfort than I expected & slept some.

At night, wolves chewed the hide tongs that tied his bundles of goods; a keg of knives fell into a stream and the leader had to scour off the rust and oil them; dried apples and hard biscuit were soaked with water; rolls of wet blankets were spread out to dry; horses strayed at night, were lost or

stolen, and some died on the way. On the last day of April after a trip lasting five months, the merchandise reached Pittsburgh. During the summer Indians wandered into the settlement with pelts to trade for these articles. Finding Colonel Mercer and 280 men in the fort disturbed the Indians. They feared the soldiers would be the advance guard of white settlers who would occupy their lands.

The settlers followed upon the heels of the traders. On the way back to Philadelphia in the early autumn with 9000 pounds of valuable furs, the trader met others going west, as related in his diary:

Sept. 14, 1759

Ye South Branch of Pottomock people are in droves along ye road, going to Pittsburgh, some with flower and some with corn, oats, butter, cheese, etc. The day I overtook ye wagons, I met Col. Burd of Pennsylvania & a party with wagons and pack horses going to ye mouth of Redstone Creek to build some storehouses, in order to have ye carriage on this road to go from thence down ye Monongahela to Pittsburgh.

EARLY PITTSBURGH A FRONTIER SETTLEMENT

This small village at the junction of the Allegheny and Monongahela Rivers became the supply center for settlers traveling down the Ohio River to settle in the Northwest Territory. With coal, iron, and water transportation, Pittsburgh became the "City of Steel."

Chamber of Commerce of Pittsburgh



The early storekeepers of Pittsburgh lived in constant fear of Indian raids. They were kept busy moving their goods in and out of the protected enclosure of Fort Pitt. In 1763 Pontiac, the brilliant chief of the Ottawas, organized the Indian tribes from Lake Superior to the Gulf of Mexico in an all-out attempt to prevent the British from settling the country in the Ohio Valley.

After a year of savage war Pontiac's conspiracy failed. White men crossed the mountain barrier to build their cabins and plant their corn in the western country. The first written description of the village of Pittsburgh appeared in the journal kept by Washington of his trip down the Ohio to the Kanawha River. Washington wrote in 1770:

We lodged in what is called the town, distant about three hundred yards from the fort. The houses, which are built of logs, and ranged in streets, are on the Monongahela, and I supposed may be about twenty in number and inhabited by Indian traders.

During the Revolutionary War soldiers had been stationed at Fort Pitt. Carpenters and sawyers had been sent there to build six boats, each one carrying a cannon, to aid the garrison in defending the place. The soldiers were sometimes hungry and cold because the hunters and woodchoppers were easy targets for Indians and Frenchmen who lurked in the woods. When the garrison complained of freezing, with tons of coal only half a mile away, the commander of the western district ordered that "the coal pit be occupied by turns day and night," while some kept guard.

After the War for Independence ended, the United States gained territory to the Mississippi River. The frontier village at the headwaters of the Ohio began to grow.

When the Ordinance of 1787 opened up the Northwest Territory for settlement, Pittsburgh became the supply center for western emigrants going down the Ohio River to settle in Kentucky, Tennessee, Ohio, Indiana, and Illinois. It was a dangerous route. Slow-moving keel and flatboats were easy targets for attack by Indians still trying to hold the country against the inroads of settlers.

General Rufus Putnam, who had served in both the French and Indian War and the War for Independence, took out the first emigrants of the Ohio Company to found the first permanent settlement in the Northwest Territory. After crossing the mountains in winter, when it was sometimes necessary to haul their belongings on sleds because the snow was too deep for wagons, Putnam's party of New Englanders reached the Youghiogheny River. At Simrall's Ferry, about thirty miles above Pittsburgh, the emigrants built the *Mayflower*, a galley 45 feet long and 12 feet wide, with a roof over part of the deck. To carry all the baggage of the party, it was necessary to build a flatboat and three canoes, also. On a spring day the little flotilla pushed out into the Youghiogheny, dodging sand bars and shallow water. It then drifted down the wider and deeper Monongahela to Pittsburgh.

The frontier town of log houses and about 400 to 500 inhabitants looked like a city to the New Englanders who had spent weeks in a wilderness. They enjoyed shopping in the stores for clothing and tools to take to their new homes. On April 7, 1788, Putnam's party arrived at the mouth of the Muskingum River, unloaded the boards they had brought along, and began to erect the first crude huts in a little town they named Marietta, after the Queen of France.

A month later Colonel May from Boston, another Revolutionary officer, arrived in Pittsburgh where he was delayed seventeen days waiting for a boat down the Ohio to the colony on the Muskingum River. He, too, did some shopping in Pittsburgh. In a letter to his wife, dated May 1, 1788, he wrote:

I dined today on bacon that was good which I bought by the quantity. – I have laid in four barrels of excellent flour.

During his stay in Pittsburgh, Colonel May purchased many useful items, including a grindstone, axes, hoes, and tools. To his food supply he added a bushel of salt and two bushels of potatoes. Enroute down the Ohio with twenty-seven men on board, two cows, two calves, seven hogs, nine dogs, and eight tons of baggage, he bought more supplies from farmers living along the shore. May's purchases included 300 pounds of smoked hams, more seed corn, potatoes, butter, a barrel

of pickled pork, young plants and trees, and as many cows with calves as he could crowd on board the boat.

Revolutionary officers of the Society of Cincinnati and soldiers from the ranks settled in Belpre, Cincinnati, and other places where streams flowed down through fertile valleys to empty into the Ohio River. Forts had been erected to protect them. Fort Harmar was at the mouth of the Muskingum River and Fort Washington was near the Miami in Ohio, opposite the Licking River in Kentucky. However, the area protected by these forts was small because the Indians fought desperately to hold their farms and their hunting grounds. Boatloads of immigrants were captured, scalped, and carried away into captivity; farmers were shot from ambush while plowing in their fields; frontier cabins were burned to the ground and the torch was applied to crops of corn. After General St. Clair, the first governor of the Northwest Territory, had been defeated in Indian warfare, Major General Anthony

MARIETTA, OHIO IN 1792

Marietta, oldest town in Ohio, was founded in 1788 at point where the Muskingum River flows into the Ohio.



Wayne, known as "Mad Anthony," took over the campaign against the Indians.

After the Indians were defeated in the Battle of Fallen Timbers, near Fort Miami, in 1794, their power was broken. In straggling bands, dispossessed and disheartened, the tribes of the Northwest Territory began the westward trek to prairie lands beyond the Mississippi. Among them were Shawnees and other tribes who had lived near the Atlantic seaboard before the white man came to North America.

Freed from big Indian raids, the settlers came in ever-increasing numbers. With them came industry, boatbuilding, forges, furnaces, saw mills, grist mills, and factories to make the many articles needed by emigrants in a new country. Coal, plentiful in and around Pittsburgh, was delivered to the doors of homes and factories for five and six cents a bushel. In 1807 about 200,000 bushels of coal were burned in Pittsburgh. Travelers called it the "Smoky City."

When the use of steam made river travel safe and profitable, Pittsburgh became an inland port. Since early industrial growth in this country depended largely upon water transportation to carry the goods to market, inventors began to experiment with steam engines to propel boats. Robert Fulton visioned a future with steamboats hauling the products of farms and factories on the western rivers and, he was willing to invest money in a steamboat on the Mississippi River. In 1809 two years after the *Clermont* steamed up the Hudson to Albany, Nicholas J. Roosevelt and his bride journeyed overland to Pittsburgh to investigate the possibilities of steamboat navigation on the western rivers. They were to report to Fulton and Livingston in New York.

Upon arrival in Pittsburgh, Roosevelt had a flat-bottom boat built with two small houses on top, like boxes, one for himself and his wife, and the other, for the crew, which included the cook who prepared the meals with the aid of a fireplace. This flatboat was home for six months while Roosevelt tested the current and measured the depth of the Ohio and Mississippi Rivers from Pittsburgh to the Gulf of Mexico. From New Orleans the Roosevelts took a ship home, arriving in New York after an absence of nine months. Fulton and Livingston were so pleased with Roosevelt's report that they agreed to furnish the money for him to build a steamboat at Pittsburgh and test it on a river trip.

On a September day in 1811 the residents of Pittsburgh lined the banks of the Monongahela River and shouted farewells as the first steamboat chugged down the stream on its epoch-making voyage. On board the *New Orleans* were the builder and his wife, a captain, a pilot, an engineer, six hired hands, two women servants, a waiter, a cook, and a big Newfoundland dog, named Tiger. At a speed of about ten miles an hour, the steamboat reached Cincinnati on the second day. The whole town turned out to see it. The hardy river men who had poled the flatboats and the keelboats down the Ohio shook their heads in doubt. The steamer would never get back against the current of the Mississippi River.

At the Falls of the Ohio, opposite Louisville, Kentucky, the *New Orleans* had to wait for the river to rise enough to carry the boat across the rocky barrier. On the way down in the flatboat, Roosevelt had taken time to explore along the banks, searching for coal lands. He had found

some deposits on the lower Ohio. He had coal dug and piled on the bank of the river to burn in case he returned in the steamboat. This fuel came in handy. When all he loaded had been used, the steamboat was forced to tie up along the bank once every day while the crew cut wood to fire the boiler. At about that time there had been an earthquake which shook the region where the Ohio River empties into the Mississippi. Many Indians were afraid of the "fire canoe," and thought the paddles stirring the water had caused the earth to tremble under their feet. Well might the Indians fear the "fire canoe" as it was to bring both settlers and industry westward to drive them from their hunting grounds along the inland waterways.

The *New Orleans* reached Natchez in safety where it served for years carrying passengers and freight back and forth between that town and New Orleans. It cost about \$38,000 to build. The boat was designed, built, and delivered by Nicholas Roosevelt, the grand-uncle of a future President, Theodore Roosevelt, and a distant relative of a later President, Franklin D. Roosevelt. Thus began that colorful and romantic period of American history, known as the Steamboat Era, which developed the river ports of Pittsburgh, Cincinnati, Louisville, St. Louis, Memphis, Vicksburg, Natchez, and New Orleans into centers of trade and manufacture.

In 1824, a famous decision by the Supreme Court promoted steamboat traffic on the rivers all over the country. The legislature of the State of New York had granted Robert R. Livingston and Robert R. Fulton special rights of navigation on the Hudson River. John Marshall, Chief Justice, stated that navigation on the

Hudson River involved interstate commerce that only Congress had the power to regulate, according to the Constitution. This decision made all rivers free to all boatowners who obeyed the laws passed for navigation.

The South Americans, too, were interested in steamboat navigation for their rivers. In the late 1820's a German immigrant tried to establish a steamship line on the Magdalena River, the highway of commerce in Colombia. The Magdalena, winding through a tropical country, was a treacherous river with a strong current, shifting channels, and deep and shallow water according to seasons. Although Simon Bolivar rode on one of the German's steamboats, and encouraged the project, it was not a success. Revolutions that upset the government and natives who refused to cut wood hindered the operation of the line. Natives who were employed to paddle canoes in the Magdalena River, some carrying as much as eighteen tons of freight, were not anxious to cut down trees to fuel a steam engine that would take away their jobs.

Soon after steamships were tried on rivers, the commander of the *Clermont* took the first steamship out into the ocean on a voyage from New York to the Delaware River. Later he was captain of the *Savannah*, the first steamboat to venture across the Atlantic Ocean, but not without the aid of sails. On May 22, 1819, this vessel steamed out of the port of Savannah, Georgia, arriving in Liverpool twenty-six days later, but much of the voyage was under sail. The first vessel to cross the Atlantic under steam power only was the *Royal William*, built in Canada in 1833. This steamship made the voyage from Quebec to the Isle of Wight in nineteen and

a half days, "with seven passengers, a box of stuffed birds, some household furniture, 254 chaldrons of coal (a chaldron being at that time 3456 pounds), and a crew of 36 men." In London the *Royal William* was chartered to the Portuguese Government for a transport. Later it was sold to Spain for a war vessel, as it was the first steamship from which a hostile gun was fired. Pittsburgh, Cincinnati, and Louisville became the building centers for steamboats navigating the western rivers, and New York, Philadelphia, and Baltimore for ocean-going steamers.

Some ocean-going vessels were built in Pittsburgh and loaded with cargoes for foreign countries. The town boasted of being a world port. In the House of Representatives, Henry Clay of Kentucky told an amusing anecdote. When a boat from Pittsburgh arrived at Leghorn (Livorno), Italy, the captain presented his papers to the custom house officer, who refused to accept them.

"Sir, your papers are forged," the Italian said. "There is no such place as Pittsburgh in the world! Your vessel must be confiscated."

The captain laid a map of the United States before the customs officer. Beginning at the Gulf of Mexico, he traced with his finger the Mississippi River to the Ohio, and thence up that stream to Pittsburgh.

"There, Sir, is the port whence my vessel cleared out," the captain claimed with pride.

Pittsburgh soon acquired two rivals for the Ohio River trade, the towns of Louisville, Kentucky, and Cincinnati, Ohio.

In 1815 Cincinnati was manufacturing the same articles as Pittsburgh, except some made of iron. The town early acquired a large number of skilled craftsmen who

made clocks, jewelry, pottery, carriages, and fine furniture. Hides brought up the Mississippi and Ohio on boats were tanned and manufactured into saddles, boots, and shoes. Lead was imported from the Missouri Territory and Cincinnati became well-known for white lead products. From surrounding farms, grains and fruits for which there was not a market, were made into liquors that were shipped in barrels to New Orleans. However, flour was the chief article of export from the Miami country. A book, published in Cincinnati in 1815, lists the exports of this river port:

After flour follow pork, bacon, and lard; whiskey, peach brandy, beer and porter; pot and pearl ash, cheese, soap, and candles; hemp and spun yarn; walnut, cherry, and blue ash boards; cabinet furniture and chairs; to which might be advantageously added, kiln dried Indian meal for the West Indies.

Five years later when steamboats were plying the inland waterways, a merchant from Cuba wrote a letter to the editor of *The Cincinnati Directory*, suggesting that the people of the Ohio country ship their produce to his country, direct, "receiving in return the coffee, sugar and other articles common to the Island of Cuba."

At this time revolts were brewing in the Spanish colonies, seeking their independence from Spain. The westerners, whose market was New Orleans, wanted the trade of the Latin American countries. Rifles, cannon, shot and shell, made in the little iron furnaces and lead factories of the Ohio Valley, were shipped down the Mississippi and smuggled into the southern countries to aid the revolutionaries. The friendship between the westerners and the insurgents in Spanish America resulted in trade gains when the colonies became independent nations,

according to a dispatch in a Pittsburgh newspaper in 1845:

Four Mexican gentlemen arrived in our city yesterday, by the Steamer *Bertrand*. They brought with them over \$40,000, the greater portion of which they will leave in our city, for articles of Pittsburgh Manufacture. The value of our trade with Mexico is very considerable. Every spring and fall, large orders are furnished to our mechanics and Manufacturers for Iron and Glass Wares, Harness, Saddlery, Wagons, Ploughs, etc. These articles are mostly taken by the Santa Fe route, from whence they are distributed over the Northern Provinces of Mexico.

Steamboats carried merchandise to the Missouri frontier, where it was loaded into covered-wagon freighters and was strapped on to pack saddles for the trek over the prairie to Santa Fe, the trade center of northern Mexico. As markets were extended westward, towns on the inland waterways began to grow in size and importance, with the combined aid of coal, iron, and steam.

Before the steam engine came into general use, factories were erected near streams where falls and rapids furnished water power to operate the machinery. Then the manufacturers were forced to lay out a town and to build houses for their employees, as was the case in Lowell, Massachusetts. Real estate agents selling business sites in Pittsburgh proudly advertised the advantages offered to manufacturers in the town where mechanics had settled and workmen provided their own living quarters. Where coal was so plentiful, steam power was cheap, and one could start a little factory with a small amount of money. Markets were assured because Pittsburgh was the supply center for western emigrants. Steamboats plied the inland waterways of

C. & O. O. EVANS,
FOUNDERS,
Plough Manufacturers and Millers,
Stone Steam Mill, Water Street,
2 squares west of Market st.
PITTSBURGH,

Respectfully inform their friends and Correspondents, that having re-built their Foundry and Works, are now prepared to fill orders to any extent for

Crane Ploughs,—Cotton Ploughs—Wood's Ploughs—Prairie Ploughs, large and heavy ploughs expressly made for breaking up *prairies, new clearings, roads, &c.*—Hill-side Ploughs, for ploughing on sides of hills, throwing the furrow all one way, True American Ploughs, Half Patent Ploughs, Peacock's Ploughs,—Eagle Ploughs,—Miller's Ploughs,—Shovel Ploughs, and Cultivators; and Trucks for Stores and Steam Boats.

Their much approved *Farmers' Mill*, for grinding Grain, Corn in the Cob, Plaster, &c. propelled by the most modern and simply constructed horse power in use, which can also be applied to Threshing, Straw Cutting Machines, &c.

Corn Shellers, Threshing and Straw Cutting machines, Mill Irons, Wagon Boxes and Castings of all kinds.

They are also making arrangements for manufacturing *Stoves*; the patterns selected will be of the newest and most approved kind.

They also have just received the following Eastern Manufactured articles, so indispensable to Farmers:
Hand mills, for grinding Grain, Coffee, Spices, &c.; Hay Knives of different descriptions; Corn Cutters, for taking stalks from grain fields; manure forks, made from plate steel, and other kinds; and Grain Shovels.—Also, the following Pruning Implements: Pruners, Handled Slide; Gentlemen's Pruning Knives and Saw Cases; Heavy Bill Hooks, Fancy Slide Pruners, &c.; Edging Knives, &c. &c.

☞ *Fresh Family Flour always on hand.* ☞

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**ADVERTISEMENT FROM HARRIS'
PITTSBURGH DIRECTORY FOR 1837**

the Ohio River and its tributaries, carrying the products made in Pittsburgh to river towns all the way to New Orleans, and thence to foreign ports.

With the coming of railroads the steamboat gained a rival in the steam locomotive. In less than twenty-five years after the first boats were propelled by steam, the first steam locomotive in the Western Hemisphere actually ran over three miles of track at Honesdale, Pennsylvania.



Baltimore and Ohio Railroad

FIRST STONE OF BALTIMORE AND OHIO RAILROAD

To restore western trade taken from Baltimore by canals and toll roads, a group of business men decided to invest money in a railroad. On July 4, 1828, in Baltimore, Charles Carroll of Carrollton, last living signer of the Declaration of Independence, took part in laying the cornerstone of the first railroad to the Ohio River.

The engine was called the "Stourbridge Lion" because it had been built in Stourbridge, England, and had the head of a lion painted in red on the front of the boiler. The rails had been laid and the engine imported by the Delaware and Hudson Canal Company to haul anthracite

coal sixteen and a half miles from their mines at Carbondale to the head of their canal at Honesdale. The same man who had gone to England to buy the engine was the passenger, the engineer, the brakeman, the fireman, and the conductor when the little engine chugged around a curve on a rickety

trestle crossing Lackawaxan Creek and disappeared in the woods beyond. On the eighth day of August in 1828, this brief run of the "Stourbridge Lion" opened the railroad era. In August of the following year, the first American-made steam locomotive, the "Tom Thumb," hauled thirty-six passengers in a coach a distance of thirteen miles on the Baltimore and Ohio Railroad. Although the engine broke down on the return trip in a race with a horse, and the gray steed won, the trial of Tom Thumb was a success.

Railroads could penetrate regions of rich coal and farm lands in the hilly country where canals could not be dug, and operate in winter when the canals were frozen lanes of ice. The directors of the Baltimore and Ohio Railroad offered a

prize of \$4000 for the best coal-burning locomotive delivered to them by June 1, 1831. A man from New York won the money. Although wood was long burned in locomotives hauling cars of coal from mines to markets, coal became the railroad fuel. In both steamboats and locomotives, bituminous coal could be used in engines made to burn wood. Special engines had to be built for anthracite.

Little country villages dreamed of a future with factories, population, and payrolls when a rail line passed through. No longer were the river towns the only locations for industrial plants when rails streaked across the country hauling products to market. The railroad era increased "the grand results" of the "mighty age of steam."