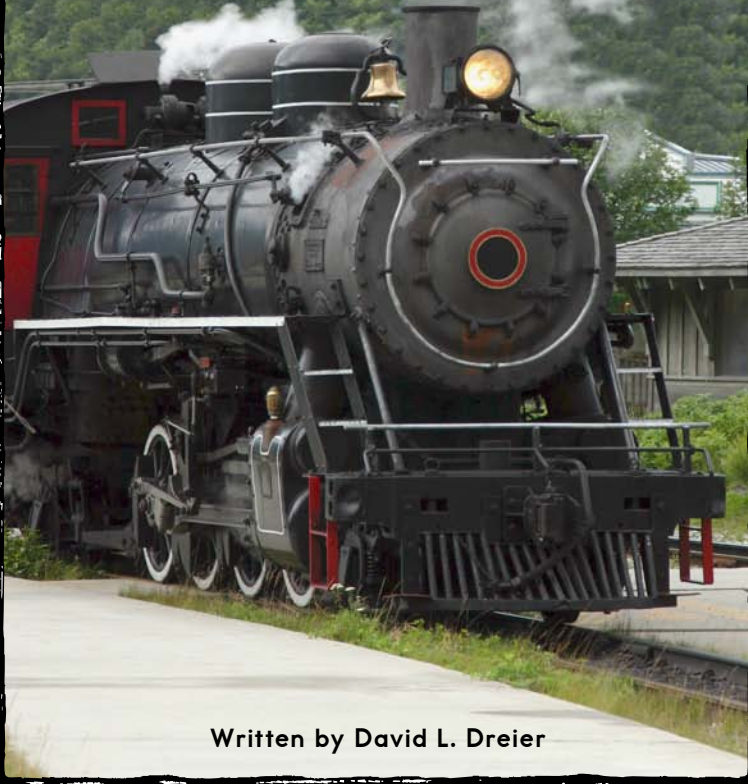


LEVELED BOOK • P

The Steam Engine



Written by David L. Dreier

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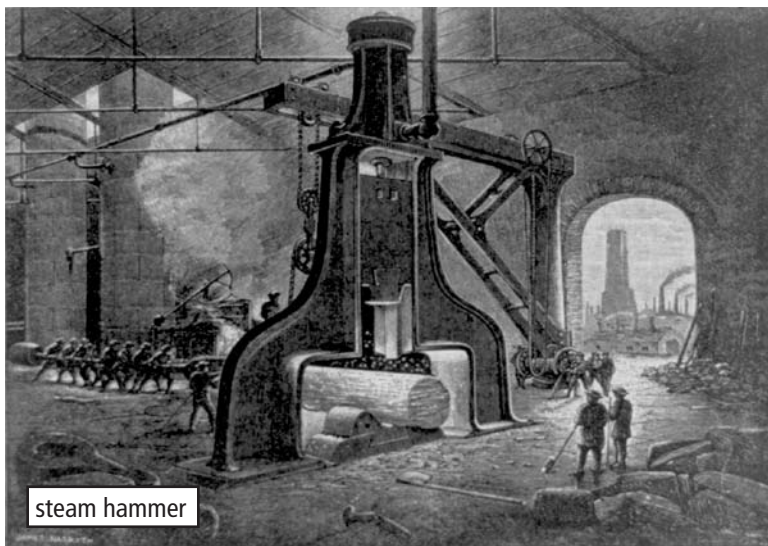


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It wasn't long before steam tractors plowed fields that oxen teams once plowed.

An Invention That Changed the World

For thousands of years, people used their muscles for work. They also used animals to help them. In the 1700s, the **invention** of the **steam engine** changed everything. People began to make fewer goods by hand. Instead, they used machines. Many of those machines were powered by steam.

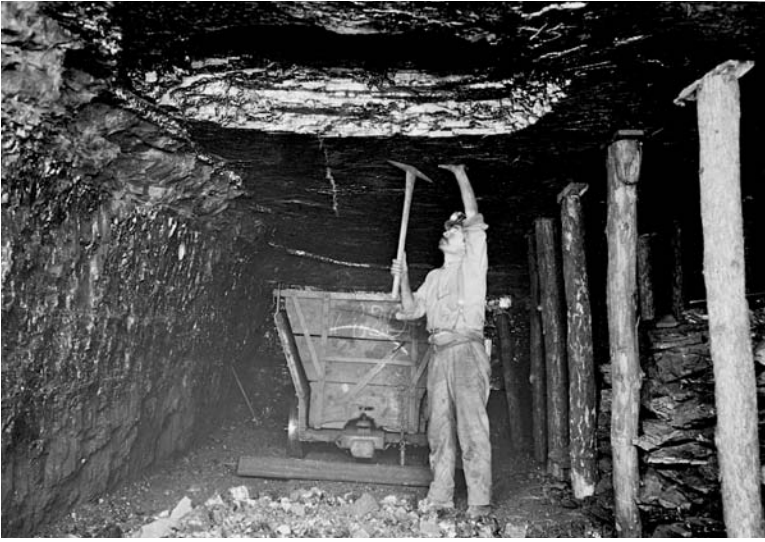
What Is Steam?

Have you ever watched someone boil water in a pot on the stove? Sometimes you can see a little cloud above the pot. That's steam. It can only be seen when it hits cooler air. Steam is a gas.

People make steam do work by boiling water. They heat up the water in a gigantic pot called a **boiler**. They make the boiler hot by burning fuel, such as coal. Burning coal becomes hotter than the top of a stove—a lot hotter! The heat boils the water and makes steam.

Steam takes up more room than liquid water. As the steam **expands**, it pushes the moveable parts of a machine. The movement of those parts creates **power**.





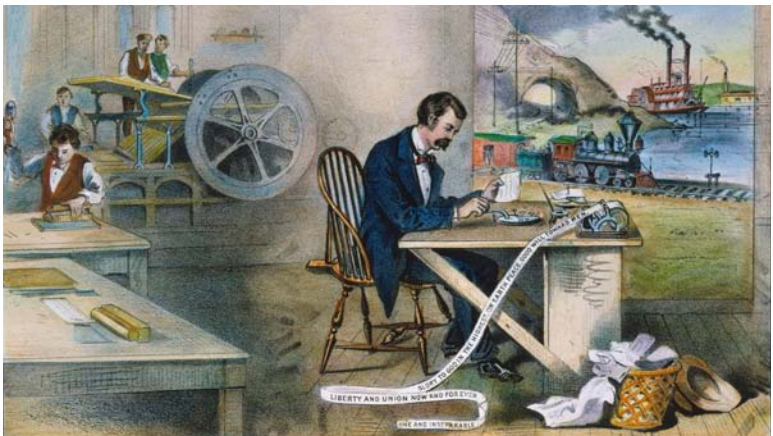
Coal mines such as this one stayed dry thanks to Newcomen's steam engine.

The First Real Steam Engines

Almost 300 years ago, in 1712, Thomas Newcomen built a steam engine. Others had built steam engines, but Newcomen's was the first to work really well. He used his steam engine to run a water pump, which pumped water out of coal mines. Miners could then reach more coal. The engine had one problem. It needed a large amount of coal to do a small amount of work.

Steam Engine Improvements

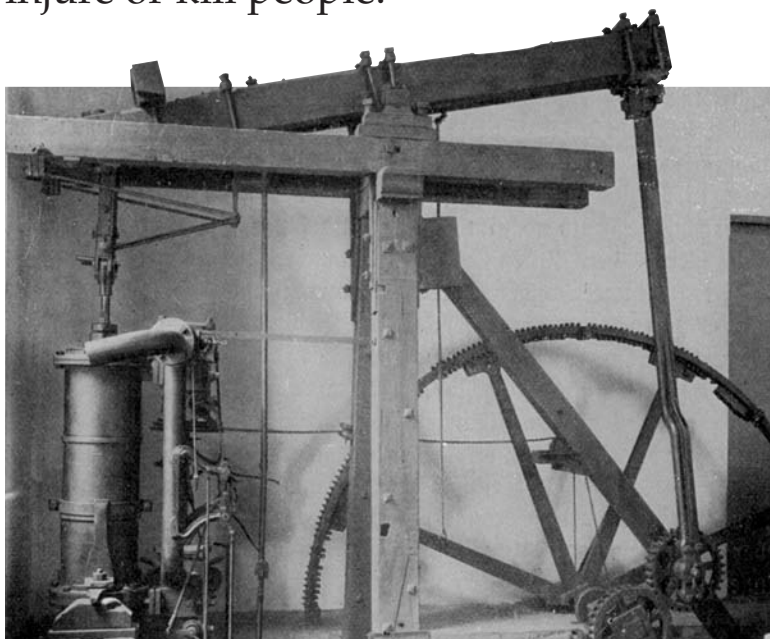
In the 1760s, Scotsman James Watt improved Newcomen's engine. He made the machine work with less coal. Watt also made other kinds of steam engines. He made one called the rotary (circular) steam engine. It could run all kinds of machines. This invention was one event that led to the Industrial Revolution, also known as the Age of Steam. The Age of Steam brought new ways to do work and new ways for people and goods to travel.



These machines all used steam for power at the beginning of the Industrial Revolution.

High-Pressure Steam Engines

At the beginning of the Age of Steam, Watt's steam engines used low-**pressure** steam. His steam engines were big, and they operated, or worked, slowly. Watt knew he could make smaller and faster steam engines. But he would have to use higher-pressure steam. He was against that idea. Higher pressure could cause a boiler to **explode**. An explosion could injure or kill people.



In 1788 Watt's steam engine used steam power to turn wheels to help with work.



The first steam engine trains looked more like horse-drawn buggies than the steam trains seen today.

Many inventors saw the danger of high-pressure steam. They built high-pressure steam engines anyway. They thought that smaller engines could be used to do more things.

In the early 1800s, Richard Trevithick (trev-ITH-ik) built a high-pressure steam engine in England. High-pressure steam engines soon became common. They could be used to power trains.



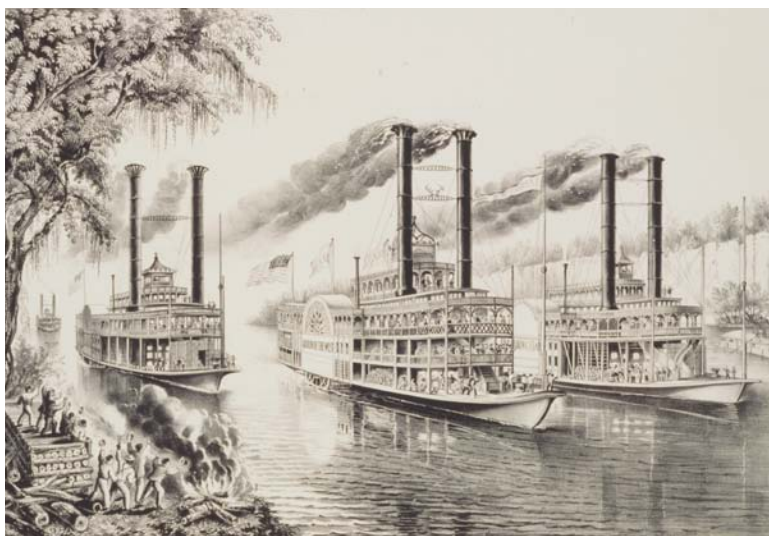
By 1869 steam-powered trains traveled from the East Coast of the United States to the West along the Transcontinental Railroad.

Steam-Powered Transportation

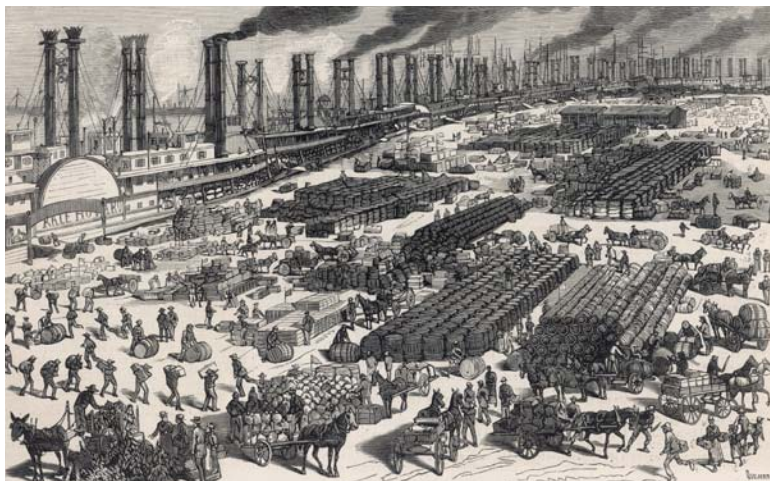
Trevithick built one of the first steam **locomotives**, or trains, in 1804. It hauled coal at a factory. Other people also built train engines. Soon these engines were pulling long lines of cars with passengers or goods. Steam engines helped railroads spread across the world.

In the early 1800s, ships also began to use steam. Some sailed on the oceans. New Yorker Robert Fulton built the first moneymaking river steamboat in 1807. By the mid-1800s, beautiful steamboats traveled up and down American rivers.

River steamboats presented the danger that James Watt had warned about. Steam explosions sometimes happened with locomotives, but they were common with steamboats. Many people were injured or killed in steamboat accidents.

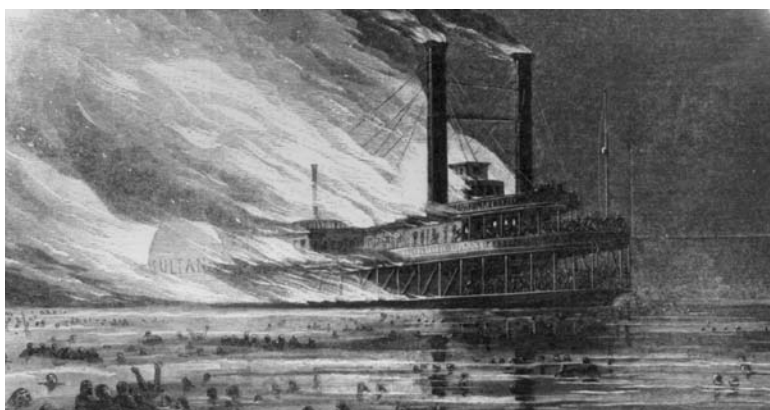


River steamboats race on the Mississippi River in 1866.



Steamboats traveled up and down the Mississippi River carrying goods and people from Minnesota to Louisiana.

One of the worst disasters in American history took place on April 27, 1865. The boiler on the crowded steamboat *Sultana* exploded. The ship burned. More than 1,700 people died.



The *Sultana* disaster

The Age of Steam Draws to a Close

By the early 1900s, people had found ways to replace steam power. In factories, electricity now ran most machines.

Electric engines did not produce steam or smoke. Electric engines made subways and streetcars easy for everyday use. It became easier to travel around a city.

The **diesel** engine also doomed the steam engine. It ran better and could go farther faster. Steam locomotives ran in the United States until the 1960s. By then, almost all locomotives had diesel engines.

Modern diesel locomotive



Modern Uses of Steam

Although the Age of Steam is long over, steam is still important. For instance, power plants use it to produce electricity. It powers your lights and your television.



How Much Coal per Family

Power plants burn thousands of pounds of coal every year to provide power for just one U.S. household.

<u>Appliance</u>	<u>Pounds of Coal</u>
Water heater.....	3,375
Electric Stove	560
Television	256
Lights.....	4,380

Source: Mineral Information Institute and www.coaleducation.org



A man walks across a field of solar panels that use the Sun's energy to produce heat and make steam.

Some people believe there is still a need for steam power. Steam power, they say, costs less than diesel fuel for trains. Steam power can also be generated using solar panels, which do not use fossil fuels like coal to make electricity. That makes steam power better for the environment than it is now. Steam power is useful and will probably have a place in the modern world.

Glossary

boiler (<i>n.</i>)	a large tank used to store heated water (p. 5)
diesel (<i>adj.</i>)	relating to a heavy petroleum product used as fuel in large vehicles such as trucks and buses (p. 13)
expands (<i>v.</i>)	becomes larger in size, amount, or volume (p. 5)
explode (<i>v.</i>)	to blow up or burst with a sudden release of energy (p. 8)
invention (<i>n.</i>)	a new device or process (p. 4)
locomotives (<i>n.</i>)	vehicles that act as large engines to pull or push railroad cars along tracks (p. 10)
power (<i>n.</i>)	energy that can be used to do work (p. 5)
pressure (<i>n.</i>)	physical force placed on an object (p. 8)
steam engine (<i>n.</i>)	a type of machine with moving parts that uses steam power to create motion (p. 4)

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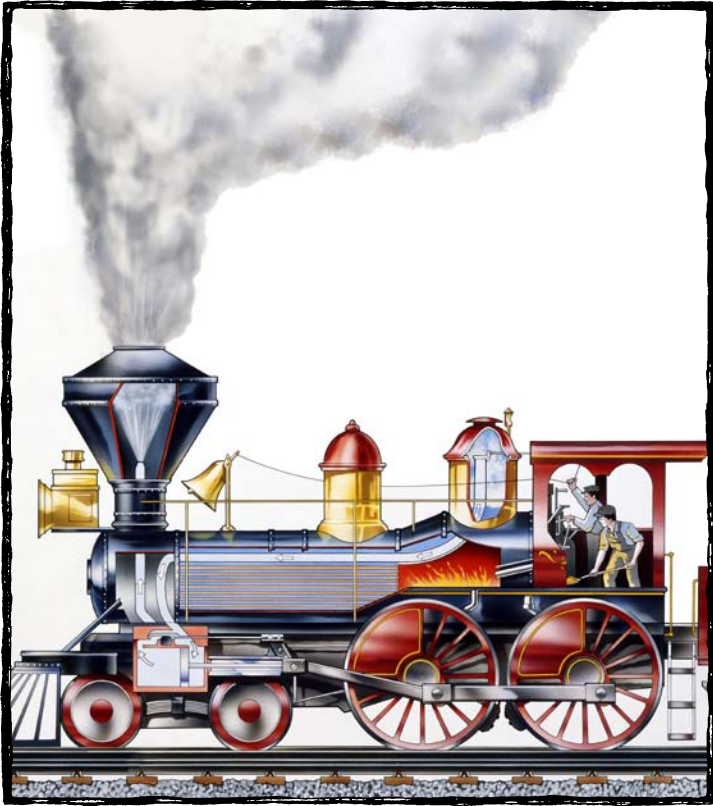
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