



Innovations and Innovators of the Industrial Revolution

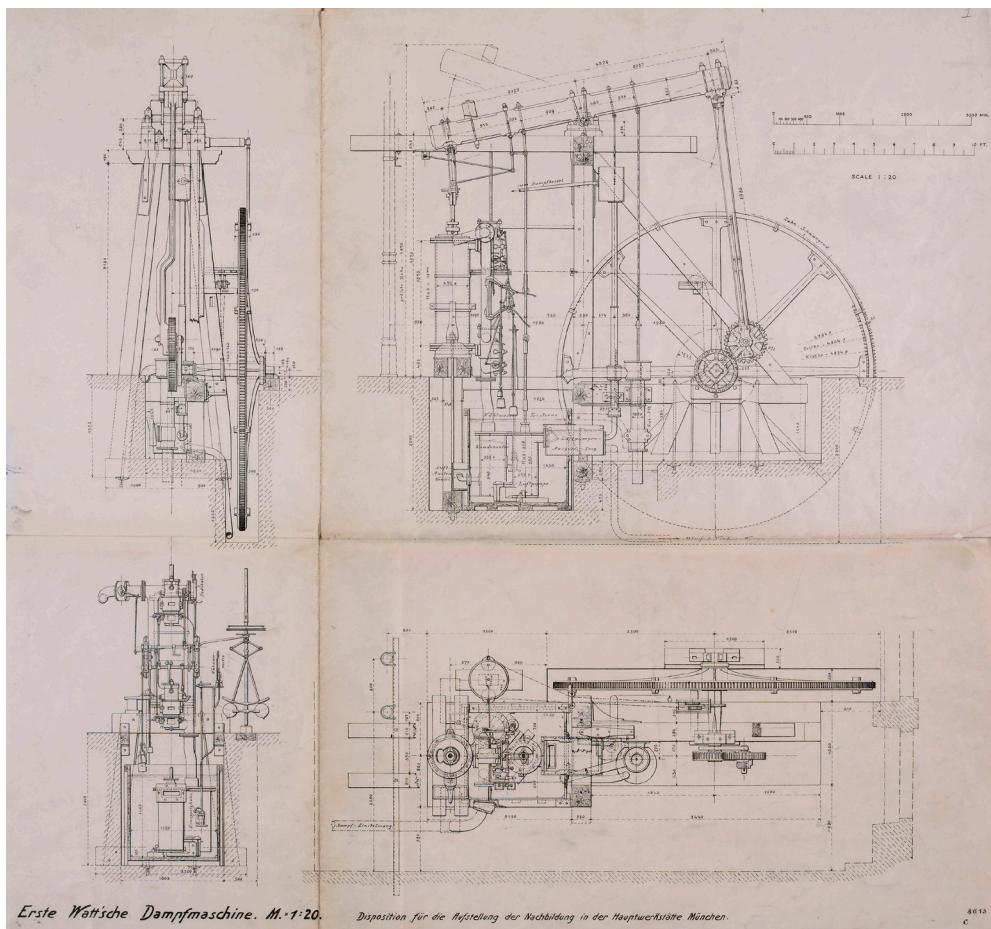
By Malcolm F. Purinton

The Industrial Revolution was about more than inventions. It took the work of millions of laborers to make industrialization possible. The way society was organized had to change too. Still, we can't ignore the inventions that changed the world. Below is an introduction to a few of the most important.

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James Watt and the Watt engine

James Watt grew up in Scotland. Watt worked on a wide range of tools, including compasses and scales. His greatest contribution was the refinement of the steam engine. Early steam engines were very inefficient. They were mostly only used for pumping water from mines. Watt wanted to improve the efficiency of the engine and make it so that it could be used for other things. He completed his first Watt engine in 1774. Over the next 15 years, he kept improving its design. He sold his engines to mines for pumping out water, but also to paper mills, ironworks, and cotton mills. The Watt engine was one of the most important contributions to the Industrial Revolution. It made it possible for factories and mills to use coal and wood instead of relying on water wheels, horses, or wind. Watt's engine helped fuel the Industrial Revolution. The watt, as a unit of power, was named after him.

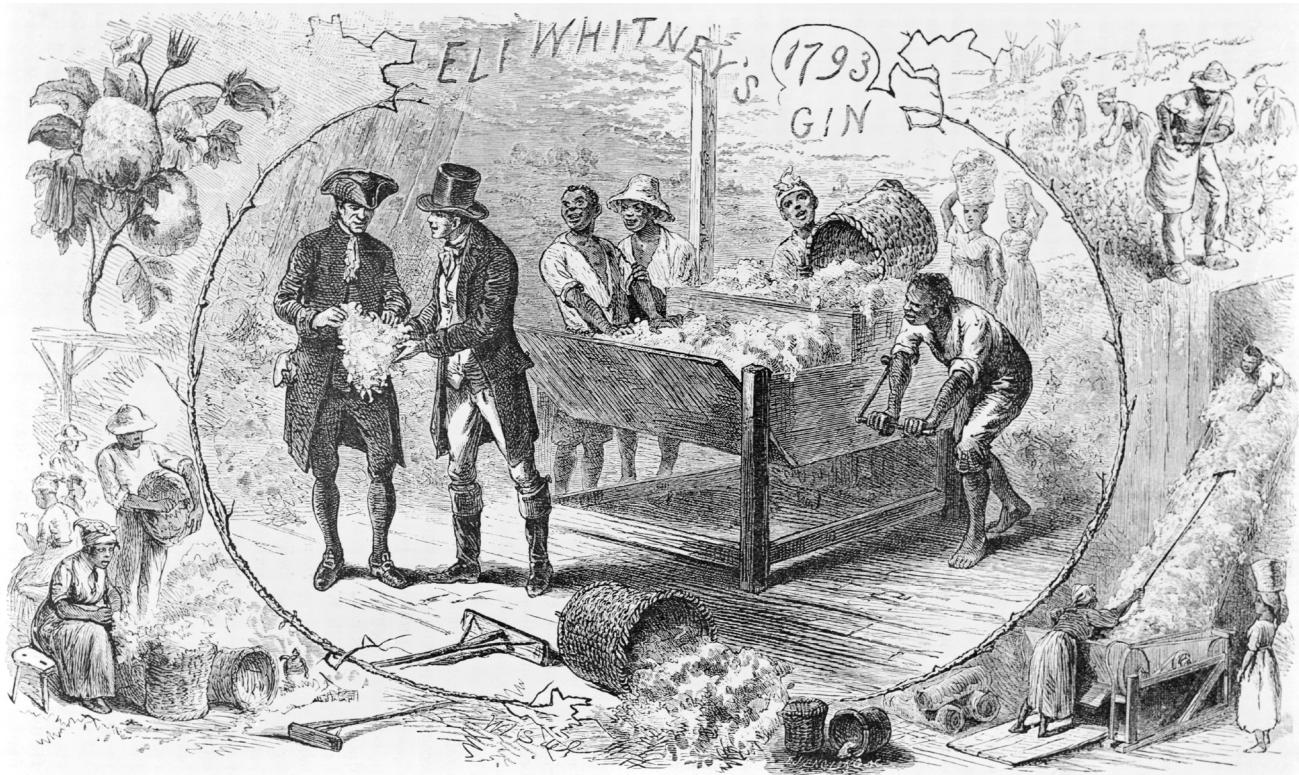


A technical drawing of Watt's steam engine. © Getty Images.

Eli Whitney and the cotton gin

Eli Whitney grew up in Massachusetts. His invention, the cotton gin, was mostly used in the southern part of the United States. Producing cotton was not very profitable in the late eighteenth century. Even after picking it off the plant, you still had to separate seeds from the cotton fibers by hand. In 1794, Eli Whitney designed a machine that could do that second part much more efficiently. It could process more cotton in one hour than several people could in a full day of work. As a result, planters quickly started growing cotton across the South. Yearly cotton production in the United States took off. It went from 73,000 bales in 1800 to 2,136,000 bales in 1850.

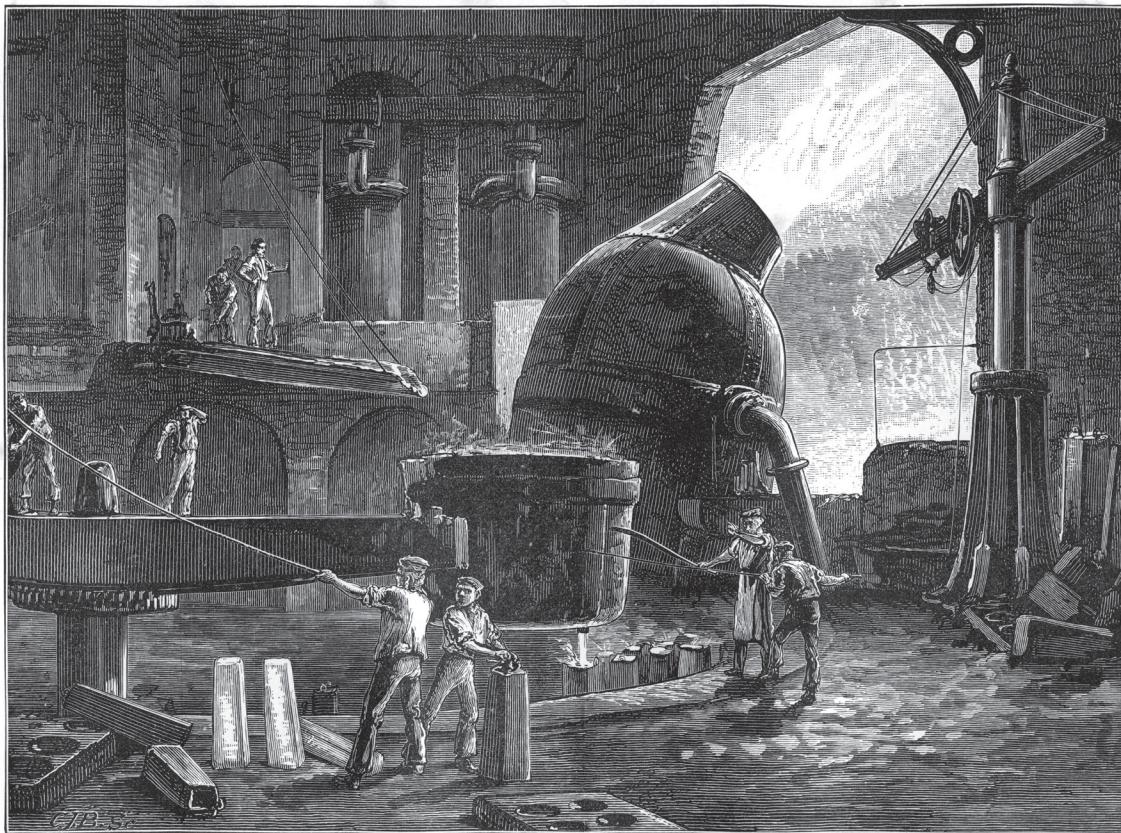
With the introduction of the cotton gin, growing cotton became very profitable. However, the expansion of the cotton industry created a demand for more workers for the non-mechanized part of the process: picking the cotton. As a result, the number of enslaved people working the fields in the American South increased. The United States soon became the largest cotton producer in the world.



Eli Whitney's first cotton gin, 1794. © Getty Images.

Henry Bessemer and steel

In 1856, English inventor Henry Bessemer patented a new process that would help purify iron to make high-quality steel. Before this, it was very difficult to make strong steel that would not break. Bessemer developed an inexpensive and rapid process to produce high-quality steel. The Bessemer process removed all of the impurities in molten (liquid) iron. It did this by blowing oxygen through the molten iron. This process is known as oxidation. It raises the temperature of the iron so high that it burns off all the impurities, like carbon and phosphorus. The steel that was created was a success. It was very high quality, and it could be produced much faster. By the 1870s, Andrew Carnegie was using the Bessemer process to create steel in his steel mills in the United States. This high-quality, mass-produced steel was used for miles of railroad tracks, machine parts, farm equipment, and much more.



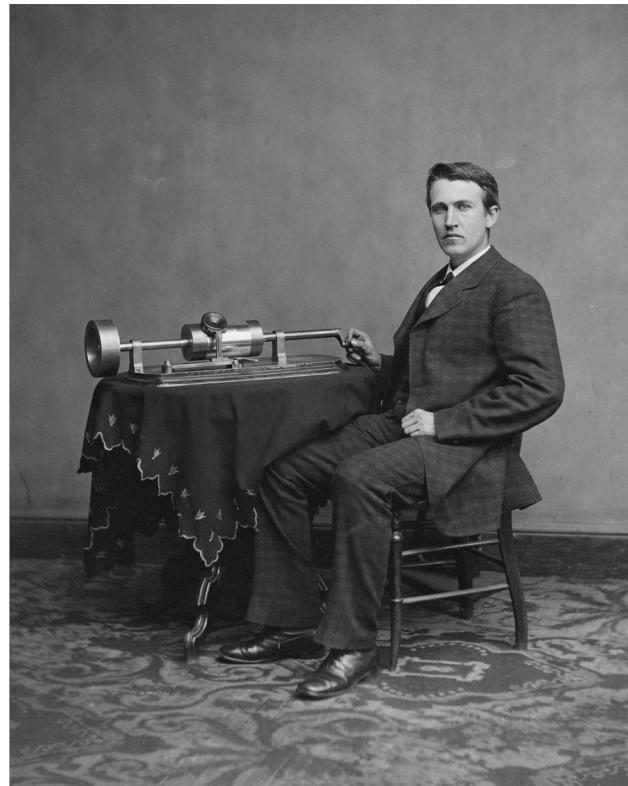
Here we see an illustration of the furnaces that would be used for the Bessemer process for making high-quality steel. Notice how large they are in comparison to the workers. © Getty Images.

Louis Pasteur

Louis Pasteur helped lay the groundwork for how we think of and treat diseases today. In the late 1850s, the French scientist discovered that alcohol was produced by single-celled microorganisms known as yeast. He found that the yeast cells would take in sugar and convert it into alcohol and carbon dioxide. This process is known as fermentation. Pasteur discovered that it was actually a biological process, not just a purely chemical one.

Pasteur built on this knowledge. Through experimentation, he learned that by heating substances like milk and beer very quickly he could kill these microorganisms and sterilize the liquids. This process is now called *pasteurization*. It keeps many substances, including milk and beer, from spoiling quickly. Pasteurization helped make it possible to safely feed the growing population of industrial workers.

In the 1870s, Pasteur continued to study how microorganisms can affect substances and people. This led him to develop his germ theory of disease. He developed vaccines for several deadly diseases that were killing off farm animals. These diseases include anthrax, chicken cholera, and rabies.



Left: A painting of Louis Pasteur in his laboratory in 1885. © Getty Images. Right: [Thomas Edison](#) sitting with an early version of his phonograph that could record voices and play them back. Courtesy of the Library of Congress. Public domain.

Thomas Edison— Lights, camera, inventions!

Thomas Edison was one of the most important inventors of his time. His impact is felt even today. His early life in the 1860s was spent working to help improve the telegraph, a new form of long-distance communication. He eventually invented an automatic telegraph machine. In 1869, he developed an automatic voting machine. He eventually invented the phonograph in 1877. Edison then focused on electric light systems. In 1879, he invented a long-lasting light bulb. By 1882, lower Manhattan had its own electric light system using Edison's new bulbs.

In the late 1880s, Edison invented an early movie camera called a Kinetograph and a viewer called a Kinetoscope. Kinetoscope parlors opened in several American cities during the 1890s. These were the ancestors of today's modern movie theaters. Overall, Edison's numerous inventions make him one of America's most successful and important inventors.

Sources

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A technical drawing of Watt's steam engine. © SSPL / Getty Images.

Eli Whitney's first cotton gin, 1794. © Bettmann / Getty Images.

Here we see an illustration of the furnaces that would be used for the Bessemer process for making high-quality steel. Notice how large they are in comparison to the workers. © The Print Collector / Getty Images.

A painting of Louis Pasteur in his laboratory in 1885 by Albert Edelfelt. Musée d'Orsay, Paris. © DeAgostini / Getty Images.

Thomas Edison sitting with an early version of his phonograph that could record voices and play them back. Courtesy of the Library of Congress. Public domain. <https://www.loc.gov/pictures/item/2021654094/>



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