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 and changes in the organization of society to make industrialization possible. Still, we can’t ignore the innovations—and innovators—that changed the world. Below is an introduction to a few of the major inventions and their inventors.
James Watt and the Watt engine

James Watt grew up in Scotland. He attended the University of Glasgow, where he studied instrument making. He worked on a wide range of tools, including compasses and scales, but his greatest contribution was the refinement of the steam engine. Steam engines, like the Newcomen steam engine, were very inefficient at first. They were mostly only used for pumping water from mines. In 1765, Watt decided to try to improve the engine so it would be more efficient and could be used for other things. He came up with his design in 1766, but he wouldn’t build his first engine until 1774. Watt needed skilled ironworkers who could make the parts he needed for his engine to work, so he partnered with a manufacturer names Michael Boulton. Over the next 15 years, Watt kept improving and selling Watt engines, not only 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, making it possible for factories and mills to use coal and wood instead of relying on water wheels, horses, or wind. In effect, James Watt’s engine helped fuel the Industrial Revolution.

The watt, as a unit of power, was named after James Watt for his contributions to science and industry.

A technical drawing of Watt’s steam engine. © Getty Images.
Eli Whitney and the cotton gin
Eli Whitney was born and raised in Massachusetts, but his invention, the cotton gin, saw its greatest use 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 patented 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. Annual cotton production in the United States 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. But the expansion of the cotton industry created a demand for more workers for the non-mechanized part of the process—picking the cotton. The number of enslaved people working the fields in the American South increased. Though Whitney’s invention had made processing cotton much more efficient, it led to the demand for more people to plant and harvest the crops. Cotton became so important that it was known as “King Cotton” in the southern states, and the United States became the largest producer in the world.

Henry Bessemer and steel
In 1856, English inventor Henry Bessemer patented a new process that would help purify iron to make high-quality steel. Prior to 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 iron by blowing oxygen through it. This process, known as oxidation, 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 double success because 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, girders in skyscrapers, 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 ingest sugar and convert it into alcohol and carbon dioxide. This meant that fermentation, as this conversion process is known, was actually a biological process, and not 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 and keeps many substances, including milk and beer, from spoiling quickly. This innovation helped 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 animal diseases, including anthrax—which had been devastating to local sheep and cattle herds—as well as chicken cholera and rabies.
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. Eventually, Edison made his way to Boston where he worked at the Western Union telegraph office and worked on his own inventions. In 1869, he patented a design for an electric voting machine. He was just 21 years old.

Edison moved to New York City and began inventing new improvements to the telegraph and to Alexander Graham Bell’s telephone. He eventually developed an automatic telegraph machine. Those experiments led to his invention of the phonograph in 1877. Edison then focused on electric light systems, inventing and marketing a long-lasting light bulb in 1879. Soon after, in 1882, lower Manhattan had its own electric light system. Edison founded several companies to produce and sell electric lights and light systems.

In the late 1880s, Edison worked on inventing an early movie camera called a Kinetograph and a viewer called a Kinetoscope. Kinetoscope parlors opened in several American cities during the 1890s. They were essentially the ancestors of today’s modern movie theaters. Overall, Edison’s numerous inventions and improvements to technology make him one of the most successful and important American inventors in history.

These are just a few of the many inventors and their innovations that made the Industrial Revolution possible. Around them, the work of millions of laborers and changes in the organization of society made their work possible.
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Sources

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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.
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/