Eli Whitney

Eli Whitney is best known as the inventor of the cotton gin, which revolutionized the American cotton industry. However, his genius for invention yielded another innovation that was at least as important: the concept of interchangeable parts for manufacturing systems. This led to the development of mass production and the Industrial Revolution of the 19th century in America. Whitney's two inventions in the late 18th century made the South a booming cotton-producing region and the North one of the leading manufacturers in the world in the 19th century.

Karl Marx

Germany's Karl Marx was an important figure in 19th-century Europe as a philosopher, economic thinker, and socialist revolutionary, but the influence of his thought and his status as the founder of modern communism has placed him among the most influential people in the history of the modern world.

In the *Communist Manifesto*, Marx argued that class struggle was the essential force driving forward historical progress. At each stage of history, one class exploited another: the bourgeoisie, or capitalists, which owned the wealth and means of production in society, and the working class, or proletariat, members of which worked as virtual slaves for the dominant class. The workers did not share ownership of the means of production, and the bourgeoisie gained profit from the labor of the workers. Because the logic of history demanded it, that struggle would eventually be resolved when the proletariat rose up in revolution and destroyed the basis of their exploitation—private property. Once everyone owned all things in common, class distinctions would be erased, and the class struggle that had marked human history since its beginnings would come to an end.
Jeremy Bentham

A forceful and prodigious writer, Jeremy Bentham exercised an enormous influence on British law, administration, and politics in the early 19th century. Although many of his proposals for reform did not come to fruition during his lifetime, his published works became blueprints for a large number of reforms that followed his death. In particular, his theory of utilitarianism, by which laws were only acceptable as long as they provided the greatest good for the greatest number of people, influenced an entire generation of politicians and reformers in Great Britain.

Jethro Tull

Jethro Tull was an agronomist (scientist who studies crop production) and inventor who lived in England in the 17th and 18th centuries. Influenced by practices he observed on the European Continent, he invented a horse-drawn seed drill that sowed seeds much more effectively and efficiently than the traditional hand-sowing methods. Though his contemporaries attacked his agricultural ideas, they later formed the basis of modern British agriculture.
Thomas Edison

Thomas Edison, despite deafness from an early age and a limited formal education, became one of the United States' most prolific pioneers in the development of electronic inventions that have transformed the lives of people all over the world. He made the incandescent electric bulb a commercial possibility.

Edison organized companies to make and sell his various inventions. These companies were eventually merged into what is now the General Electric Company.

Edison made only one discovery in pure science, the "Edison effect," which he noted and patented in 1883 and which led other workers to discover the vacuum tube, in turn important for radio.

Edison's other successes, often worked out from existing inventions, include the electric dynamo, the storage battery, the dictaphone (Ediphone), the mimeograph, the microphone, the electric locomotive, railway signaling devices, and lighting systems for railway cars and mines.

James Watt

James Watt was an engineer and inventor in Great Britain during the 18th century. He was best known for his invention of the first practical steam engine, which played a major role in the Industrial Revolution during the 19th century. He also made important discoveries in surveying and chemistry. Watt spent the rest of his life doing research on various inventions. In addition to steam engines, he developed several novel mechanical concepts that led later generations of physicists to whole new fields of theoretical mechanics. He was also a civil engineer and surveyor of canal routes, and he modified a telescope to measure distances to nearby objects (that instrument is now called a transit and is still used by surveyors). He was an excellent chemical engineer, as well, and he developed processes to bleach and dye textiles and to produce alkali and other chemicals in commercial quantities. Furthermore, he invented a letter-copying machine, a drawing machine that added perspective to drawings, and an instrument that measured acidity in liquids. In many ways, Watt was the first to adapt scientific principles to solve engineering problems—basically, the first modern engineer.
Robert Fulton

Robert Fulton Jr. was an excellent inventor, engineer, and naval architect. He was recognized for his inventions that substantially improved canals, submarines, naval mines, torpedoes, armored warships, and most famously, steamboats. Fulton made major contributions to the growth of steam power for both commercial and naval ships and vastly improved the fledgling transportation network in the United States.

George Stephenson

George Stephenson was a self-taught English engineer and the principal inventor of the railroad locomotive. When a competition was held for construction of a locomotive for the new Liverpool-Manchester line, Stephenson’s new engine, the Rocket, which he built with his son, won with a speed of 36 miles per hour. It was a model for later steam locomotives. When the Liverpool-Manchester line opened on September 15, 1830, all eight locomotives on the line had been built in Stephenson’s Newcastle company, Robert Stephenson & Company. Railroad building then spread rapidly to Great Britain, Europe, and North America. Afterward, Stephenson acted as consultant on many railroad projects at home and abroad. With the wealth from his inventions and locomotive factory, he became a philanthropist. His night schools for miners and libraries, music clubs, recreation rooms, and schools for miners’ children were as revolutionary in his day as his inventions.
**William Wilberforce**
In the late 18th and early 19th centuries, William Wilberforce, an elected member of the British House of Commons, advocated the abolition of the British slave trade and later the abolition of the practice of slavery worldwide. He also supported many other humanitarian causes in Great Britain.

**Marie Curie**
Marie Curie was a Polish-born physicist who studied and worked in France at the turn of the century. Along with her husband Pierre and fellow physicist Henri Becquerel, Curie is credited with the discovery of radioactivity. All three won the Nobel Prize for physics in 1903, and Marie Curie was awarded a Nobel Prize in chemistry in 1911. Until recently, she was the only person to be awarded two Nobel Prizes in different fields.
Richard Arkwright

An enterprising textile manufacturer, Richard Arkwright has been hailed as the founder of the modern factory system. With his spinning machine invention, Arkwright revolutionized the manufacturing of cotton in Great Britain in the 18th century and laid the groundwork for the country to become the cradle of the Industrial Revolution in the 19th century. Arkwright’s invention dramatically transformed the spinning process. Known originally as the spinning frame and then as the water frame, Arkwright’s creation produced stronger, hardier yarn that could also serve as warp, thus allowing cloth to be manufactured solely from cotton for the first time in British history. The innovation would have a profound impact on Britain’s textile industry, which would be the backbone of the country’s industrial development of the following century.

Henry Bessemer

English inventor Sir Henry Bessemer created a process that made it possible to produce steel, the essential material of the Industrial Revolution in the 19th century, more cheaply and quickly. It took Bessemer many tries to perfect his process, and several others were in use both before and after his inventions. His methods became most popular in places like the United States, where the beginnings of the steel industry coincided with his inventions.
Michael Faraday

English chemist and physicist Michael Faraday was one of the world's greatest experimental scientists. At a time when electricity was understood only partially, his curiosity about the interaction between chemistry and electricity produced knowledge that helped to bring electricity under the control of humans and opened up new practical applications for electrical power.

Louis Pasteur

France's Louis Pasteur was a 19th-century scientist who is credited with founding the field of microbiology. His research into bacteria and disease revolutionized contemporary understanding of microorganisms. His discoveries also led to improvements in the health of the general populace: he proposed a means of killing bacteria in such liquids as milk, wine, and beer, while his research into pathology led to vaccinations against two deadly diseases—anthrax and rabies. Louis Pasteur devised brilliant experiments to prove and illustrate the role of living microorganisms in souring milk, fermenting wine, and causing disease. He demonstrated that life came only from life and could not be spontaneously generated. As a practical scientist, he developed the process of pasteurization to keep milk from souring and to improve wine-making.
Joseph Lister

Until mid-century, surgeons had taken pride in their filthy, bloody coats and often went directly from the autopsy room to surgery. Joseph Lister, a surgeon in Scotland, put Pasteur's theories to work in the operating room in 1865, using carbolic acid as an antiseptic and insisting on cleanliness in the hands and clothing of medical personnel. In 1865, the mortality rate in Lister's Male Accident Ward was 45%. After four years of his antiseptic practices, the mortality rate fell to 15%, providing a convincing demonstration of the efficacy of antisepsis.

Adam Smith

The father of the science of political economy, Adam Smith presented an ordered explanation for the market forces of 18th-century Great Britain. A true Enlightenment thinker, the Scotsman synthesized a wide array of intellectual thought in regard to the interaction between society, the economy, and the ultimate quest for worldwide prosperity in his landmark book, *The Wealth of Nations*. Though Smith's book was published before the advent of industrialism, it became the benchmark for all future political economists and had a deep impact on the philosophers of the 19th century, who grappled with the challenges of the Industrial Revolution.