

Inventions and Innovations

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The Invention of the Artificial Leg

The text and image are from "America's Story from America's Library" by the Library of Congress.

The Artificial Leg is Invented

November 4, 1846

Benjamin Franklin Palmer of Meredith, New Hampshire, was not related to founder Benjamin Franklin, but the two shared a talent for invention. On November 4, 1846, Palmer received patent number 4,834 for the artificial leg. The artificial leg uses springs and metal tendons. The springs and tendons act like joints. They allow for bending and flexibility. Do you know what people used before artificial legs?



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Photograph of a 1-legged boy (1909)

Before Palmer invented the artificial leg, people used peg legs like the ones seen in this picture. Do you know anyone with an artificial leg? If so, you would probably see that this invention allows for more normal movement than the peg leg. The artificial leg helps many people to live active lives. Some people with artificial legs compete in athletic events like track and field and marathons. Thankfully, Benjamin Franklin Palmer created and patented his invention, which is still being improved to this day. Do you know what a "patent" is?

A patent is a legal document giving an inventor full rights over his or her own creation. The Patent Act of 1790 created this system. It allows the American government to give patents for new inventions. Anyone who creates something can apply for a patent. Anyone who improves an existing object can also apply for a patent. A patent protects the inventor from being copied. Have you invented anything that no one else has?

John Fitch and the Steamboat

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John Fitch Was Granted a U.S Patent for the Steamboat

August 26, 1791

Have you ever ridden in a motor boat? Do you know what makes them move? Before the invention of the internal combustion engine, steam was used to power ships. On August 26, 1791, John Fitch was granted a United States patent for the steamboat. He first demonstrated his 45-foot craft on the Delaware River in 1787 for delegates from the Constitutional Convention. He went on to build a larger steamboat that carried passengers and freight between Philadelphia, Pennsylvania, and Burlington, New Jersey. The first steamboats were slow by modern standards--certainly not fast enough for water-skiing. However, they opened up a new kind of travel for both cargo and passengers.

In 1814, Robert Fulton and Robert Livingston brought commercial success to steamboating. They offered regular steamboat service between New Orleans, Louisiana, and Natchez, Mississippi. The boats traveled at the breakneck speed of eight miles per hour downstream and three miles per hour upstream. (Three miles per hour is the average walking speed!) In 1816, it took 25 days for the steamboat *Washington* to go from New Orleans to Louisville, Kentucky, but improvements were made. By 1853, that same trip took only four and one-half days.



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Launching party for the steamer Rochester in 1910

Between 1814 and 1834, New Orleans steamboat arrivals increased from 20 to 1,200 a year. Boats carried passengers and all kinds of cargo: cotton, sugar, animals, and later agricultural and industrial supplies. Into the 20th century, steam propulsion became so advanced that you could ride a giant steamer across the ocean. When railroads adopted the technology of steam, they too began to flourish. By the 1870s, they had replaced the steamboats as the major transporter of goods and passengers within the United States. You can still ride a tourist steamboat today. Steam-driven paddleboats are especially popular on the Mississippi.

Mary Kies, the First Woman to Receive a U.S. Patent

The text and images are from "America's Story from America's Library" by the Library of Congress.



Calvert Litho. Co., lithographer. Head-and-Shoulders Image of Brunette Woman, Facing Right, Credit: Wearing Large Blue Hat, 1892. Prints and Photographs Division, Library of Congress. Call Number POS - TH - STO, no. 11 (C size).

Weaving straw and silk, Kies could create fashionable hats of the day--a lot different than today!

Have you ever invented something? If you have, you may want to do what Mary Kies did: patent it. The Patent Act of 1790 opened the door for anyone, male or female, to protect his or her invention with a patent. However, because in many states women could not legally own property independent of their husbands, many women inventors didn't bother to patent their new inventions. Mary Kies broke that pattern on May 5, 1809. She became the first woman to receive a U.S. patent for her method of weaving straw with silk. With her new method, Kies could make and sell beautiful hats such as this one, and, by law, no one else could sell hats just like hers. That's how a patent works.

What if you come up with a great idea for a new invention? The Good-Hair-Day Hairspray, the perfect spiral football, a backpack that flies you to school. To protect your new invention, you would get a patent. A patent is a government grant that gives the inventor the exclusive right to make, use, or sell

an invention, usually for a limited period. Nowadays it's 16 to 20 years in most countries. Patents are granted to new and useful machines, manufactured products, industrial processes--such as Kies's method of weaving--and significant improvements of existing processes. Patents encourage entrepreneurs, like weaver and hat maker Mary Kies, to create new and better products all the time.



Credit: "Mrs. James Madison (Dolley Payne)," ca. 1804-1855. Prints and Photographs Division, Library of Congress. Reproduction Number LC-USZ62-68175.

First Lady Dolley Madison would be amazed at American ingenuity now; in 1999 alone, 169,154 U.S. patents were issued

Mary Kies was not the first American woman to improve hat making. In 1798, New Englander Betsy Metcalf invented a method of braiding straw. Her method became very popular, and she employed many women to make her hats, but she didn't patent her process. When asked why, Metcalf said she didn't want her name being sent to Congress. Kies had a different perspective, and she couldn't have picked a better time to secure her new product, because the U.S. government had stopped importing European goods. (Napolean was at war with many nations of Europe at the time, and one way he tried to win the war was to block trade and hurt his enemies economically. The U.S. did not want to be drawn into this conflict.) President Madison was looking for American industries to replace the lost European goods. First lady Dolley Madison said hats off to Mary Kies for providing just such an opportunity.

Otis and the Elevator Factory

This text is from "America's Story from America's Library" by the Library of Congress.

Otis Opened Elevator Factory

September 20, 1853

Skyscrapers could not have been built without Elisha Graves Otis's invention. Any guesses as to what that was? Otis opened a small factory on the banks of the Hudson River in Yonkers, New York, on September 20, 1853, to make elevators, fully equipped with his newly invented automatic safety device. Having received an order for two freight elevators with the new device, Otis abandoned his plans to join the California Gold Rush. But after six months, he hadn't received a second order. What do you think he did?

Otis staged a public demonstration. He climbed on top of his elevator in New York's Crystal Palace exhibition, and while hoisted to the ceiling, ordered the rope cut. Seeing how his safety brake kept him from falling, people realized the importance of his invention. Though in 1856, Otis's sales totaled just 27 elevators, his performance launched the passenger elevator industry. The world's first safety elevator for passengers, installed in 1857 in a New York store, rose at a speed of 40 feet per minute. How does that compare to today's elevators?

Today the elevators in Chicago's 1,127-foot John Hancock Center soar upward at 1,800 feet per minute! With the introduction of steel frame construction, the skyscraper became possible. The 10-story Home Insurance Building in Chicago, built in 1885, was considered the world's first tall building, requiring four elevators. The 1913 Woolworth Building (792 feet) boasted 26 elevators; the 1931 Empire State Building (1,250 feet) required 58. With new and taller buildings, business at the Otis Elevator Company, later run by Otis's sons, rose steadily.

The First American Cotton Mill

The text and image are from "America's Story from America's Library" by the Library of Congress.

The First American Cotton Mill Began Operation

December 20, 1790

Do you ever look at your clothes and wonder how they were made? How does a cotton T-shirt go from a fluffy little ball of cotton full of seeds to the shirt on your back? A large part of the process happens in a cotton mill. The first American cotton mill began operation on December 20, 1790. The mill in Pawtucket, Rhode Island, had water-powered machinery for carding and spinning cotton. A machine cards cotton by combing and untangling fibers while removing short undesirable fibers. In the spinning process, the fibers are drawn out, twisted and wound to create thread or yarn. That thread can then be dyed and woven into fabrics in the next phase of the process. Can you imagine that all this used to be done by hand before there were machines?



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A Georgia mill worker making fabric from cotton

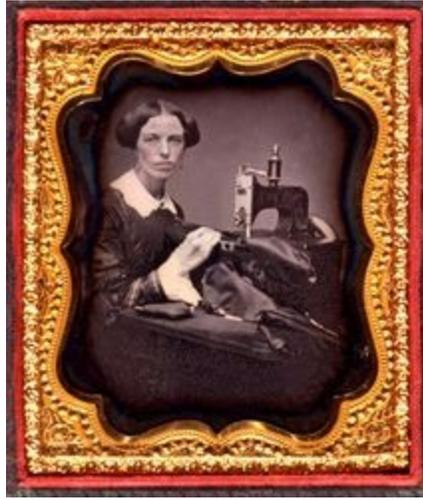
Samuel Slater built that first American mill in Pawtucket based on designs of English inventor Richard Arkwright. Though it was against British law to leave the country if you were a textile worker, Slater fled anyway in order to seek his fortune in America. Considered the father of the United States textile industry, he eventually built several successful cotton mills in New England and established the town of Slatersville, Rhode Island. Before the Civil War, textile manufacture was the most important industry in America and there were rapid advances in mill technology.

The first American power loom was constructed in 1813. This machine weaves thread or yarn into sheets of fabric. Daughters of local farmers often did the spinning and weaving in the mills. In later years, immigrants became mill "hands." By the 1920s, the South took over textile production from New England. Mills in the South were closer to raw material and offered jobs to Southern laborers desperate for work. Entire families labored together in the textile mills of Georgia and the Carolinas.

Your T-shirt probably left a mill as a sheet of fabric. Next, the material went to a factory to be cut and sewn. It may have been decorated somewhere else before being shipped to a warehouse and then to the store where it was purchased. That's quite a process for a little fluffy ball of cotton.

Inventor Elias Howe

The text and images are from "America's Story from America's Library" by the Library of Congress.



Credit: Occupational portrait of a woman working at a sewing machine, 1853. Prints and Photographs Division, Library of Congress. Reproduction Number LC-USZC4-3598 DLC.

"Now I can sew my clothes in half the time!"

Inventor Elias Howe Was Born July 9, 1819

In the early 1800s, most people didn't have the money, not to mention a choice of stores in which to buy clothes for themselves and their families. At that time, everything was made by hand. Families sewed their pants, shirts, and dresses using a needle and thread. But Elias Howe changed all that. Born on July 9, 1819, Howe came up with another way to make clothes. He patented the first practical American sewing machine in 1846. Maybe you thought the inventor was someone named Singer?



Credit: Richmond & Backus Co. sewing room, Detroit, 1900-1910. Prints and Photographs Division, Library of Congress. Reproduction Number LC-D423-40189.

Turn of the century sewing in Detroit, Michigan

At 250 stitches a minute, Howe's machine could out sew the fastest of hand sewers. Despite its

speed, though, Howe's invention did not sell very well. It wasn't until Isaac Singer (1811-1875) and Allen Wilson (1824-1888) each added their own new features to the machine that it became more popular. Singer invented the up-and-down motion mechanism, and Wilson created a rotary hook shuttle. (A sewing machine uses two spools of thread. The shuttle holds the lower thread and carries this thread through a loop of the upper thread, resulting in a stitch.) Howe, Singer, and Wilson put their inventions together, and soon sewing machines were built and sold to garment factories all over the United States.

In 1889, an electric sewing machine for use in the home was designed and marketed by Singer. By 1905, Americans all over the country were beginning to sew with electrically powered machines. Today sewing machines in manufacturing plants use computer technology to create customized clothing with little human intervention. Have you ever used a sewing machine?