

Scientists and Inventors

7 Articles

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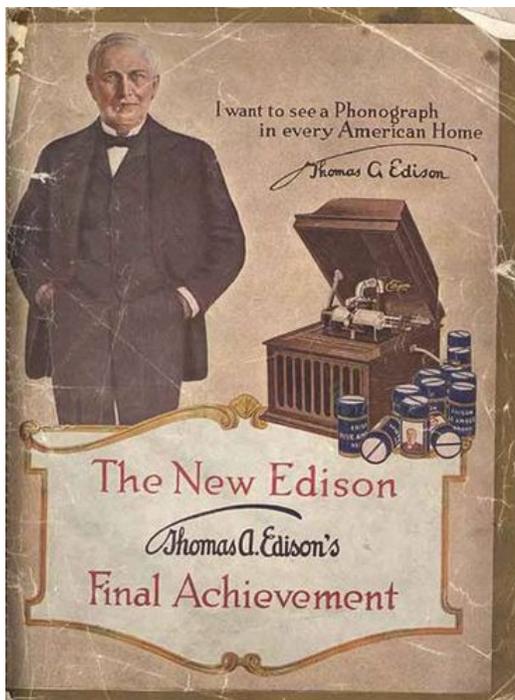
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476 words

Edison Invents the Phonograph

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

Thomas Edison created many inventions, but his favorite was the phonograph. While working on improvements to the telegraph and the telephone, Edison figured out a way to record sound on tinfoil-coated cylinders. In 1877, he created a machine with two needles: one for recording and one for playback. When Edison spoke into the mouthpiece, the sound vibrations of his voice would be indented onto the cylinder by the recording needle. . . .

"Mary had a little lamb" were the first words that Edison recorded on the phonograph, and he was amazed when he heard the machine play them back to him. In 1878, Edison established the Edison Speaking Phonograph Company to sell the new machine.



"Phonograph Catalog/Advertisement: 'I want a phonograph in every home...!'" Edison Manufacturing Co. Inventing Entertainment: The Motion Pictures and Sound Recordings of the Edison Companies, Library of Congress.

Thomas Edison in an ad for the phonograph

of the enormous sacrifice and contribution made by the other allied nations.



Edison, Thomas A.. "Edison with Cylinder Phonograph; Washington, DC; April 18, 1878." 1878. Photo courtesy of U. S. Department of Interior, National Park Service, Edison National Historic Site.

Photo of Edison with cylinder phonograph in 1878

Edison suggested other uses for the phonograph, such as: letter writing and dictation, phonographic books for blind people, a family record (recording family members in their own voices), music boxes and toys, clocks that announce the time, and a connection with the telephone so communications could be recorded. . . .

Many of the uses Edison suggested for the phonograph have become a reality, but there were others he hadn't imagined. For example, the phonograph allowed soldiers to take music off to war with them. In 1917, when the U.S. became involved in World War I, the Edison Company created a special model of the phonograph for the U.S. Army. This basic machine sold for \$60. Many Army units purchased these phonographs because it meant a lot to the soldiers to have music to cheer them and remind them of home. [There] is an audio clip of Edison himself in which he expresses his pride in the soldiers and reminds Americans

Edison's Failed Inventions

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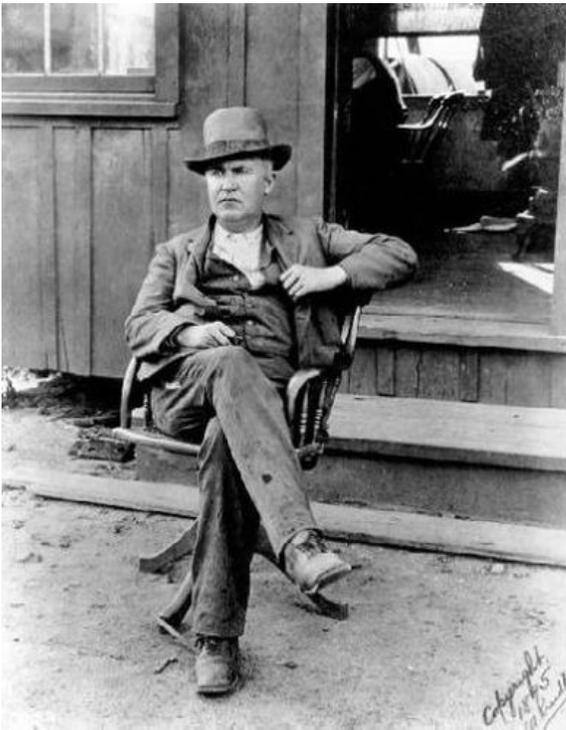
"Thomas Alva Edison, full-length portrait, seated, facing front, between two phonograph cabinets, one of which is made of concrete." 1912. Prints and Photographs Division, Library of Congress.

Edison sits between two phonograph cabinets, one of which is made of concrete, in 1912.

Edison had 1,093 patents for different inventions. Many of them, like the light bulb, the phonograph, and the motion picture camera, were brilliant creations that have a huge influence on our everyday life. However, not everything he created was a success; he also had a few failures.

One concept that never took off was Edison's interest in using cement to build things. He formed the Edison Portland Cement Co. in 1899, and made everything from cabinets (for phonographs) to pianos and houses. Unfortunately, at the time, concrete was too expensive, and the idea was never accepted. Cement wasn't a total failure, though. His company was hired to build Yankee Stadium in the Bronx. . . .

From the beginning of the creation of motion pictures, many people tried to combine film and sound to make "talking" motion pictures. . . . [A]n example of an early film attempting to combine sound with pictures [was] made by Edison's assistant, W.K.L. Dickson.



"Edison Sitting on the grounds of the New Jersey and Pennsylvania Concentrating Works; Ogden, NJ; 1895." 1895. Courtesy of the U.S. Department of the Interior, National Park Service, Edison National Historic Site.

Edison sitting at the door of the ore-milling plant in New Jersey in 1895

By 1895, Edison had created the Kinetophone—a Kinetoscope (peep-hole motion picture viewer) with a phonograph that played inside the cabinet. Sound could be heard through two ear tubes while the viewer watched the images. This creation never really took off, and by 1915 Edison abandoned the idea of sound motion pictures.

The greatest failure of Edison's career was his inability to create a practical way to mine iron ore. He worked on mining methods through the late 1880s and early 1890s to supply the Pennsylvania steel mills' demand for iron ore. In order to finance this work, he sold all his stock in General Electric, but was never able to create a separator that could extract iron from unusable, low-grade ores. Eventually, Edison gave up on the idea, but by then he had lost all the money he'd invested.

Rachel Carson: Writing About the Ocean

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

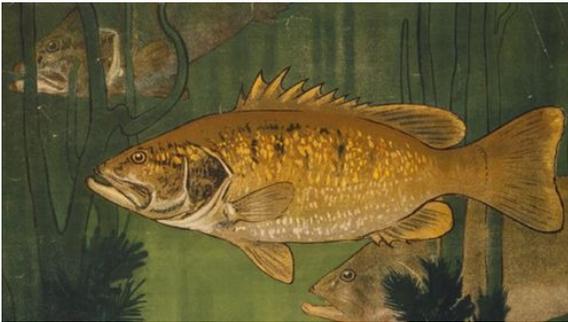
Long before she saw it, Rachel Carson loved the ocean. When Carson was growing up in Pennsylvania, she found fossilized shells around her home, evidence that an ocean had covered the area millions of years before. But it wasn't until Carson was an adult that she finally got to visit the ocean. After she graduated from college in 1929, Carson spent a summer studying at the Woods Hole Marine Biological Laboratory on the coast of Massachusetts. Her fascination with the ocean grew as she learned more about it in graduate school and as an editor for the Fish and Wildlife Service.



"Coolidge's [i.e. Coolidge] Point, Magnolia, Mass.."
c[between 1905 and 1915]. Touring Turn-of-the-Century America: Photographs from the Detroit Publishing Company, 1880-1920 from the Library of Congress.

ocean on the coast of Massachusetts in 1929

When Carson decided to write a book, the topic was no surprise. She called her first book *Under the Sea-Wind*. It told stories about creatures that lived in and near the ocean, including birds, mackerels, and eels. Although it got good reviews, *Under the Sea-Wind* didn't sell well when it was first published, probably due to a lack of publicity and the fact that World War II was underway. Carson was disappointed, but not discouraged. Several years later she decided to write a second book. This one would be about the ocean itself.



Bull, Charles Livingston, artist. "Save the products of the land--Eat more fish--they feed themselves United States Food Administration // Charles Livingston Bull ; Heywood Strasser & Voigt Litho. Co. N.Y." [1917] Library of Congress.

poster of fish swimming among seaweed

Carson's second book, *The Sea Around Us*, was a biography of the ocean. It was unlike any other book at the time. Today we know so much about the ocean, but in the late 1940s when Carson was writing, average people knew very little about it. Carson made the ocean come to life. Using the most current scientific information, she poetically described places and creatures that most people had never seen or even imagined. Carson hoped *The Sea Around Us* would "be read and enjoyed by everyone who has ever seen [the ocean] or who has felt its fascination even before standing on its shores."

. . . Carson was an ecologist, which means that she studied how all living things and their environments are part of the ecosystem. This way of thinking may seem obvious today, but Carson helped make it popular by

writing books like *The Sea Around Us* where she described how marine life and the ocean environment were interconnected. In fact, Carson believed the ocean was essential to all life. She wrote, "The very form and nature of our world has been shaped and modified by the sea. . . . All life everywhere carries with it the impress of its marine origin."

Carson changed how people thought about the environment. She helped teach people that humans, like all other living things, are part of the ecosystem; humans can affect it and be affected by it. Carson was concerned about pollution in the ocean. People had dumped radioactive waste into the deepest parts of the ocean because they thought it couldn't do any harm there. After reading Carson's books, however, many people were convinced that the environment, including the ocean, should be protected.

The Sea Around Us was published in 1951 and was an instant success. It was number one on national best-seller lists for 39 weeks. In eleven years *The Sea Around Us* was translated into 30 languages. People all over the world read it. Soon Carson had enough money to quit her job at the Fish and Wildlife Service. She wanted to spend her time writing, caring for her family, and enjoying her beloved ocean. After the success of *The Sea Around Us*, she decided to re-release her first book, *Under the Sea-Wind*. Soon it was a best seller too.



"[Surf at Norman's Woe, Magnolia, Mass.]." 1905?
Touring Turn-of-the-Century America: Photographs
from the Detroit Publishing Company, 1880-1920
from the Library of Congress.

Maine coast

Edison Invents Motion Pictures

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

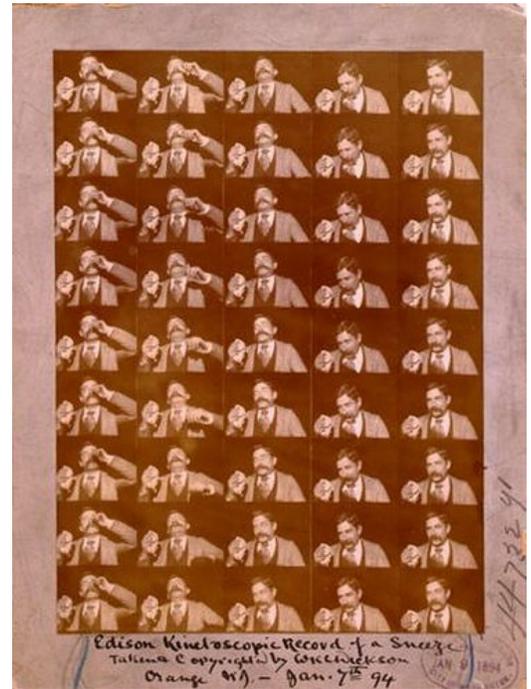
. . . [T]wo sisters in a boxing act . . . played all over the East [Coast]? They were the Gordon Sisters, Bessie and Minnie, who claimed to be the first female boxing act. In the early years of motion pictures, there was such a demand for motion pictures that Thomas Edison's company filmed all sorts of things. This film of the sparring sisters was made in 1901. The Edison Manufacturing Company was able to shoot "Gordon Sisters Boxing" and many others only after Edison and his employee W.K.L Dickson had spent years inventing the motion picture camera.

In 1888, after Edison invented the phonograph, he turned his attention to motion pictures. "I am experimenting upon an instrument which does for the eye what the phonograph does for the ear," he said. The result of his experiments was the Kinetograph (a motion picture camera) and the Kinetoscope (a peephole motion picture viewer).

[. . .]

Edison built a motion picture production studio in New Jersey. The studio had a roof that could be opened to let in daylight, and the entire building was constructed so that it could be moved to stay in line with the sun. The "Boxing Gordon Sisters" was not the only boxing film Edison's company made. Can you imagine boxing cats? One of the Edison Manufacturing Company's earliest films shows two cats fighting in a boxing ring. Other films starred well-known performers such as Annie Oakley and Native American dancers from Buffalo Bill's "Wild West Show."

Edison's films were so popular that he needed a way to show them to large groups of people. C. Francis Jenkins and Thomas Armat invented a film projector called the Vitascope. Jenkins and Armat competed against Edison and licensed a version of their projector to the Columbia Phonograph Company. Eventually, the Edison Company developed its own projector, known as the Projectoscope. The first films shown in a "movie theater" in America were presented to audiences on April 23, 1896, in New York City.



Dickson, W.K.L. "Edison Kinetoscopic Record of a Sneeze." Jan. 9 1894. Prints and Photographs Division, Library of Congress.

The first film ever copyrighted, "Edison Kinetoscopic Record of a Sneeze"



Metropolitan Print Company. "Edison's Greatest Marvel - The Vitascope." 1896. Prints and Photographs Division, Library of Congress.

Edison's greatest marvel-The Vitascope

Benjamin Franklin and Electricity

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

Electricity was on people's minds in the 1740s, but not in the way we think about it today. People used electricity for magic tricks by creating sparks and shocks. Scientists conducted experiments with electricity, but scientific thinking about electricity had not changed much in hundreds of years. Electricity wasn't "useful" yet.

Benjamin Franklin was interested in electricity. Being a curious and inventive thinker, Franklin wanted to know more than just the popular tricks. He kept thinking about electricity and came up with a very important idea.

His idea was about electricity and lightning. Franklin noticed several similarities between the two: They both created light, made loud crashes when they exploded, were attracted to metal, had a particular smell, and more.

Based on these observations, Franklin thought electricity and lightning were the same thing. A few people shared his belief, but no one had ever tested it.

Franklin wrote up his thoughts on electricity in several letters to a fellow scientist who lived in London. This scientist and other scientists in London thought Franklin's letters contained valuable information, so in 1751 they published them in a little book, *Experiments and Observations on Electricity*.

One of the letters contained Franklin's plan for how to prove that electricity and lightning were the same. His plan required something tall, like a hill or a tall building, but Philadelphia had neither at the time. While Franklin was waiting for a tall building to be built, he came up with another plan. This one involved a key and a kite.



Currier & Ives. "Franklin's experiment, June 1752: Demonstrating the identity of lightning and electricity, from which he invented the lightning rod." Prints and Photographs Division of the Library of Congress.

A drawing of Franklin's kite experiment

Franklin needed something to get close enough to the clouds to attract the lightning. He couldn't get up there since Philadelphia didn't have any hills or tall buildings. He did have a silk handkerchief, a couple of sticks and some string, so instead of getting himself up near the lightning, he flew a kite up to it. And it worked! Franklin and a few other scientists in Europe (who did their own experiments) proved that lightning and electricity were the same thing.

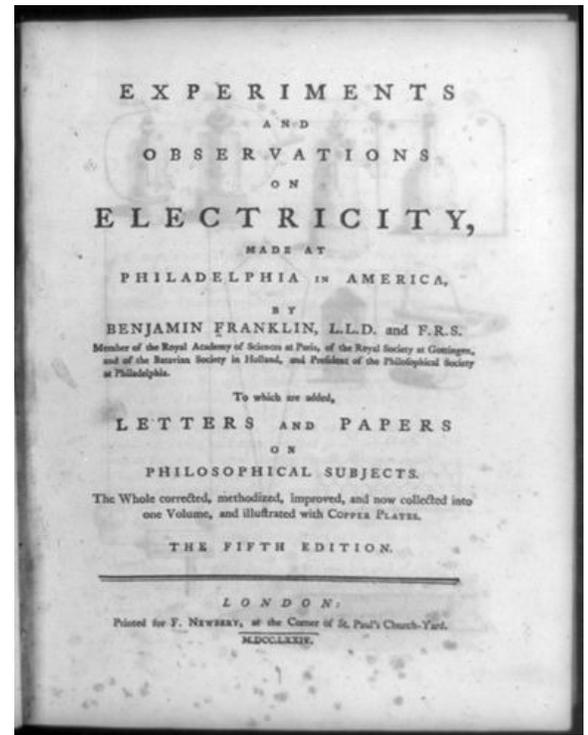
But that wasn't enough for Franklin. He believed that this knowledge should be used for practical purposes.



"Civilian defense. Fire prevention. Fires started by lightning are more common in rural sections than in cities. . . ." 1942 Sept. America from the Great Depression to World War II: Photographs from the FSA-OWI, 1935-1945 from the Library of Congress.

This lightning bolt caused a fire.

What could be practical about lightning? Many folks knew what wasn't practical: having your house burn down because it was struck by lightning. Franklin thought he could help. He knew that lightning usually hit the highest part of a building. He also knew that the electrical current in lightning could start a fire. So he invented the lightning rod. A lightning rod is made of metal and is attached to the highest point on a house. The lightning hits the rod instead of the house, and the electrical current from the lightning goes into the ground and leaves the house undamaged. Franklin thought the lightning rod was his most important invention.



Franklin, Benjamin. "[Diagrams of various electrical phenomena and title page of Experiments and observations of electricity]." Published in: *The tradition of science* / Leonard C. Bruno. Washington, D.C. : Library of Congress, 1987, p. 278.

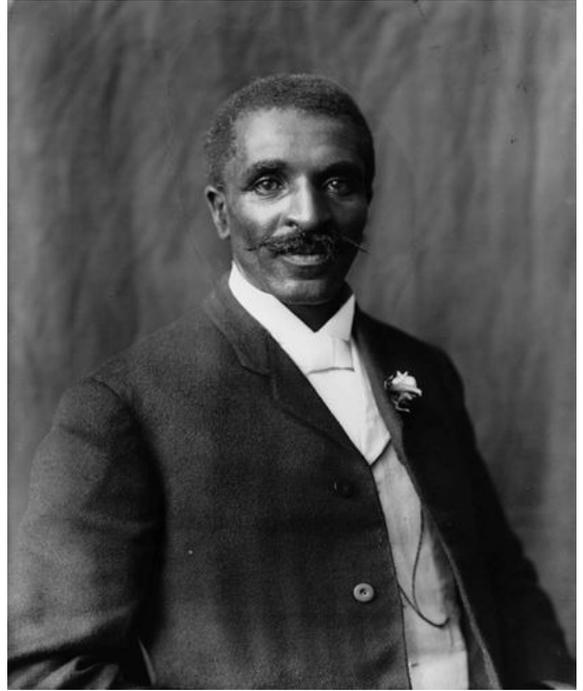
Franklin's Experiments and Observations on Electricity

George Washington Carver: Teaching at Tuskegee Institute

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

The Civil War freed the slaves, but it didn't teach them how to live as free people. After the war, schools were created to help train African Americans. Tuskegee Institute in Alabama opened in 1881, and it was one of [the] most famous training schools. Booker T. Washington was its president. Job skills such as carpentry, printing, brick making, and home economics were taught there. Tuskegee also provided training for elementary school teachers.

In 1896, Booker T. Washington needed someone to teach agriculture at Tuskegee. George Washington Carver was just finishing his master's degree in agriculture science at Iowa State. Washington offered Carver the job. . . .



Johnston, Frances Benjamin., photographer. "George Washington Carver." 1906. Prints and Photographs Division from the Library of Congress.

George Washington Carver in 1906



"Faculty of the Tuskegee Normal and Industrial Institute, at Tuskegee, Alabama, seated and standing on steps in front of building." March 1897. Booker T. Washington Collection, Prints and Photograph Division of the Library of Congress.

The faculty at Tuskegee Institute, March 1897

It was a tough decision. Carver had other good job possibilities. In the end, he accepted

Washington's offer. He decided that he could do the most good at Tuskegee. Carver said about Tuskegee, "It has always been the one ideal of my life to be the greatest good to the greatest number of 'my people' possible. . . . This line of education is the key to unlock the golden door of freedom to our people."

Carver was put in charge of the new agriculture department at Tuskegee. He taught African American students at the school as well as poor black farmers outside the school. Eventually, he also was responsible

for an agricultural research program, two school farms, and a variety of other tasks. It was enough work to keep several people busy!

When Carver arrived at Tuskegee, the agriculture department had few students, few resources, and no laboratory. The resourceful Carver knew what to do. He and his students created a laboratory. They gathered old jars, china, pots, and pans. They collected metal, string, and rubber from the trash. Carver showed his students how to turn these discarded items into laboratory equipment.

Using this equipment, they conducted experiments on Carver's old desk. They tested soil, fertilizers, and animal food. Carver taught his students to see how everything in nature was interrelated. Many years later, Carver finally got a real laboratory with real equipment.

Before Carver arrived, agriculture was not a popular subject at Tuskegee. Students associated it with the poverty of people who farmed only to grow enough food to survive.



Rothstein, Arthur, photographer. "Tuskegee Institute, Alabama. Students in the greenhouse." 1942 Mar. America from the Great Depression to World War II: Photographs from the FSA-OWI, 1935-1945 from the Library of Congress.

Students in a greenhouse at Tuskegee



Johnston, Frances Benjamin, photographer. " [Laboratory at Tuskegee Institute, Ala.]" [1902]. Prints and Photographs Division of the Library of Congress.

Students in the laboratory at Tuskegee

But Carver was a trained scientist, and he treated the study of agriculture as a science. For him, agriculture was about real-life botany (the study of plants) and chemistry. Carver taught students respect for agriculture, and the department grew.

While the department didn't produce many farmers, it did produce many teachers. These young teachers were able to help fulfill the Tuskegee mission to help all African Americans by going out into the world and spreading their knowledge of agricultural science with black farmers.

The Peanut Man

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

George Washington Carver was always interested in plants. When he was a child, he was known as the "plant doctor." He had a secret garden where he grew all kinds of plants. People would ask him for advice when they had sick plants. Sometimes he'd take their plants to his garden and nurse them back to health.

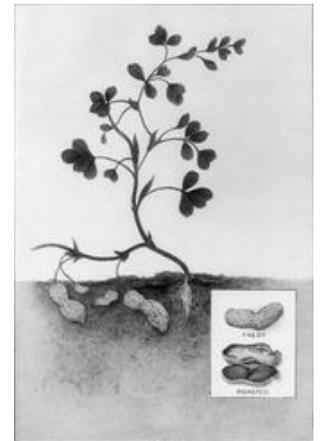
Later, when he was teaching at Tuskegee Institute, he put his plant skills to good use. Many people in the South had been growing only cotton on their land. Cotton plants use most of the nutrients in the soil. (Nutrients provide nourishment to plants.) So the soil becomes "worn out" after a few years. Eventually, cotton will no longer grow on this land.

This was especially bad for poor African American farmers, who relied on selling cotton to support themselves. Carver was dedicated to helping those farmers, so he came up with a plan.

Carver knew that certain plants put nutrients back into the soil. One of those plants is the peanut! Peanuts are also a source of protein.

Carver thought that if those farmers planted peanuts, the plants would help restore their soil, provide food for their animals, and provide protein for their families--quite a plant! In 1896 peanuts were not even recognized as a crop in the United States, but Carver would help change that.

Carver told farmers to rotate their crops: plant cotton one year, then the next year plant peanuts and other soil-restoring plants, like peas and sweet potatoes. It worked! The peanut plants grew and produced lots of peanuts. The plants added enough nutrients to the soil, so cotton grew the next year. Now the farmers had lots of peanuts--too many for their families and animals--and no place to sell the extras. Again, Carver had a plan. . . .



drawing of a peanut plant



George Washington Carver gathering soil samples

Carver invented all kinds of things made out of peanuts. He wrote down more than 300 uses for peanuts, including peanut milk, peanut paper, and peanut soap. Carver thought that if farmers started making things out of peanuts, they'd have to buy fewer things and would be more self-sufficient. And if other people started making things out of peanuts, they would want to buy the extra peanuts, so the farmers would make more money. Although not many of Carver's peanut products were ever mass-produced, he did help spread the word about peanuts.

Peanuts became more and more popular. By 1920 there were enough peanut farmers to form the United Peanut Association of America (UPAA). In 1921 the UPAA asked Carver to speak to the U.S. Congress about the many uses for peanuts. Soon the whole country had heard of George Washington Carver, the Peanut Man! And by 1940 peanuts had become one of the top six crops

in the U.S.