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What Americans Owe to Inventors

The American Revolution gave us independence and political and religious liberty, but economic conditions had changed very little in thousands of years. Then, suddenly, in the short space of two centuries, America experienced a tremendous explosion of human energy, an expansion of wealth, a rise in living standards that exceeded all the economic changes in the thousands of years that preceded our Constitution. Why did this happen?

What made America different was the economic freedom guaranteed by the United States Constitution. The Founding Fathers also understood that securing to individual inventors the right to own and market their original ideas is just as much a part of economic freedom as any other personal labor. The senior delegate at the Constitutional Convention, **Benjamin Franklin**, had invented such useful items as bifocals and a rocking chair, and had discovered electricity by his famous experiment of flying a kite in a storm.

Before the United States Constitution, there were no laws that gave an inventor the right to own his invention. Our Founding Fathers wrote into the United States Constitution this uniquely American rule: "The Congress shall have power . . . to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."

Almost immediately, inventors started applying for patents. On April 10, 1790, President George Washington signed the Patent Act, which established the distinctively American rule that inventions should be encouraged by guaranteeing to every inventor the exclusive right to his invention for a fixed term of years, after which the public is free to use it.

Thomas Jefferson was the first administrator of the American Patent System and personally examined all the applications. "Nobody wishes more than I do," Jefferson said, "that ingenuity should receive liberal encouragement." Before Jefferson died, he was able to say: "The issue of patents for new discoveries has given a spring to invention beyond my conception."

◆ **AGRICULTURE.** At the time our Constitution was written, American farmers felled the trees, tilled the soil, and ground the grain with the same crude tools that men

had used for thousands of years. Then, after our Constitution was adopted, things began to change almost immediately!

In 1793, **Eli Whitney** received a patent for his cotton gin, a device to mechanically separate the seeds from cotton fiber. That one machine replaced the hand labor of four dozen men, revolutionized cotton harvesting, and made cotton commercially profitable. This created prosperity for the southern states that grew the cotton, and prosperity for the northern states that manufactured the cloth.

Cyrus McCormick of Virginia took farming one big step further when he received a patent for his reaper in 1829. From the dawn of history, grain had been cut with a hand sickle. McCormick's reaper enabled farmers to harvest wheat by machine instead of by hand, so a farmer could harvest seven acres of grain in a day instead of only the half acre he could cut by hand.

In 1846, when horses were still the main source of power on the farm, a Midwestern blacksmith named **John Deere** invented a plow with a steel wearing surface. This new plow solved the problem of soil sticking to iron plows, thereby helping the farmer to "plow ahead!" Twenty years later, **James Oliver** of Iowa developed an iron plow with a face that was hardened by being chilled in the mold when it was cast. When Oliver died in 1908 he was the richest man in Iowa, and his invention had tremendously enriched all American farmers.

Joseph Glidden of Illinois invented what he called an "improvement in wire fences" in 1873. Today we call his invention barbed wire. Glidden's ingenuity provided a cheap and efficient way to fence our vast western farm lands.

◆ **COMMUNICATIONS.** At the time our country was founded, the fastest way to send a message between one town and another was typified by the horseback ride of Paul Revere.

In 1840, a pioneer in communications, **Samuel Morse**, received a patent in 1840 for what he called "telegraph signs," a method of sending messages over wire. His invention made possible instantaneous communication between distant points. On May 24, 1844, Morse himself sent the first telegram from

Washington, D.C., to Baltimore. It was the famous message, "What hath God wrought."

Foreign inventors recognized the value of the U.S. patent system. In 1887, the Italian, **Marconi**, received an American patent for his wireless telegraph. Soon we were able to send wireless messages across the Atlantic Ocean.

The legendary **Alexander Graham Bell** received a patent for the telephone in 1876. No other invention was ever taken up so quickly and by so many people. From the first clumsy telephone that was manually handled by a crude switchboard, the telephone was developed into one of the most efficient of all our modern conveniences.

America's greatest inventor, **Thomas A. Edison** of Menlo Park, New Jersey, gave us the phonograph. To hear the human voice coming from a record seemed like a miracle to Edison's generation. The puzzled look on the dog's face when he heard "His Master's Voice" coming out of a record-player became a famous advertisement, and the old hand-cranked Victrola became a household treasure. Another of Edison's important inventions was motion pictures. Edison created the idea of a laboratory in which a team of people works full time on inventions. Despite only three months of formal schooling, Edison was our greatest inventive genius and patented more than 1,000 inventions.

In 1868, **Charles Sholes**, editor of a Milwaukee newspaper, received a patent for the first typewriter. More Americans began to read the printed word after **Ottmar Mergentheler** of Baltimore received a patent in 1884 for a typesetting machine that could set a whole line of type in one solid block. His Line-O-Type Printing Press made possible the cheap and rapid printing of newspapers, magazines, and books.

In the 1880s, **George Eastman** invented the first Kodak camera. Prior to Eastman, all cameras required a tripod. Eastman's invention enabled amateurs to take snapshots, and millions of Americans have been preserving precious memories on film ever since. The Polaroid camera, invented by **Edwin Land** in 1947, enabled us to take instant 60-second pictures. In 1893, **Frederic Ives** of Philadelphia received a patent for a "photogravure" printing plate. Pictures in newspapers became, first a curiosity, then customary.

One of the most remarkable inventors of our time was **Chester Carlson**, who invented the xerox copy on Oct. 22, 1938, when he successfully transferred an image of that day's date onto a piece of paper. While working a full-time, \$35-a-week job during the Great Depression, he spent his evenings in the public library and, to his wife's dismay, conducted experiments in their kitchen. The first xerox copier became one of the most successful single products ever made.

The year 1907 marked a great turning point in radio communication when **Lee DeForest**, one of the "fathers of radio," patented a vacuum tube called an audion. This tube, which amplified weak sounds, was an invention as great as radio itself because it made possible long-distance radio and television communication. The first musical radio broadcast in history featured Caruso singing from backstage of the Metropolitan Opera House in 1910.

Vladimir Zworykin demonstrated the first practical

television set in 1929. He invented the first television tube suitable for broadcasting and the picture tube in a television receiver.

In 1947, the transistor, one of the most influential inventions of the 20th century, was developed by a group at **Bell Labs** headed by **William Shockley**. This miniature device to control the flow of electric current replaced the bulky and unreliable vacuum tube.

Transistors were an essential part of the gigantic expansion of our telephone communication system. In 1940 someone estimated that, if telephone usage continued to expand, within 30 years every woman in the United States would be a telephone operator! Fortunately, the transistor did the work that those millions of women would have done.

The effect of the transistor on computers was even more spectacular. The analog computer was invented by **Vannevar Bush** in 1930, but for 20 years computers were made with those big, unreliable vacuum tubes. In the 1960s our engineers learned how to put several transistors on a chip of silicon the size of a fingernail. In the capitalist climate of Silicon Valley, California, new companies competed with each other to develop improvements, and creative uses for the transistor. The evolution of the computer, with its increase in speed and reliability accompanied by a decrease in size and cost, is one of the miracles of the 20th century.

◆ **TRANSPORTATION.** When our Constitution was written, the need to travel vast distances was one of America's greatest challenges. In 1789, **John Fitch** built the first steamboat. He used steam power to propel a rowboat, and established regular steamboat passenger service on the Delaware River. Another American, **Robert Fulton**, invented the first practical steamship in 1807.

In 1849 a young Congressman from Illinois, **Abraham Lincoln**, as a result of his river experience, invented "a device for buoying vessels over shoals and sandbars." Lincoln whittled the model for his application with his own hands. In a lecture in Springfield, Illinois, Lincoln spoke the much-quoted line: "The patent system added the fuel of interest to the fire of genius."

For years, train travel was the principal method of transportation for most Americans. After **George Pullman** invented the Pullman traveling train car in 1858, passengers could ride in comfort and style. The Pullman car remained a vital part of our transportation system until the 1950s.

Americans of all ages can still enjoy the bicycle, thanks to **Pierre Lallement**, a French carriage maker, who took out a U.S. patent on a pedal bicycle in 1866.

One of the most important transportation advances of all time came in 1869 when **George Westinghouse** of Schenectady, New York, invented the air brake for railroad cars. This invention enabled the engineer of the train to control the brakes himself, using compressed air, rather than relying on brakemen. The air brake made it possible for trains to be longer and faster, enabling railroads to handle the passenger and freight traffic of our expanding nation.

The air brake was soon followed by a patent for railroad "car couplings" invented by **Eli Janney** of

Virginia. Before Janney, railroad cars had to be coupled by a brakeman going between the cars and manually linking them while the engineer gently pushed the cars together – a dangerous process that killed or injured hundreds of men. The automatic car coupler saved lives, limbs, and time.

The automobile age was born in 1899 when **Ransom Olds** invented the first affordable automobile. Olds conceived the idea of an inexpensive auto for everybody, and sold what he called a “runabout” for \$650. It cost \$25 more if you wanted a top on your car.

In 1898 **Henry Ford** of Detroit received the first of his 161 patents. It was for carburetors. He introduced his Model T Ford in 1906; it was cheap, rugged, and dominated the American market for 20 years. While others before him had invented mass production, as opposed to custom-built products, Henry Ford developed to a high degree the modern methods of mass production with interchangeable parts, the assembly line, and finally the conveyor assembly.

At first, each driver had to hand-crank his car to start it. Driving certainly was made easier when **Charles Kettering** invented the electric self-starter for automobiles in 1911. Rubber tires immediately became essential for automobiles. It was fortunate that **Charles Goodyear** had already invented vulcanized rubber, a process of heating rubber with sulphur, which made it soft, pliable, and elastic.

When two brothers who ran a bicycle shop in Dayton, Ohio, took to the sky at Kitty Hawk, North Carolina, the whole world of transportation took off with them. Solemnly told by the Smithsonian Institution that air flight was impossible, **Orville and Wilbur Wright** proceeded with their experiments and were among the first to apply scientific methodology to inventions. In 1906, the Wright brothers received a patent for what they called “new and useful improvements in flying machines.”

From the covered wagons that carried the early Americans to the western frontier, to the space ships that carry our astronauts into space, is a long way to go in two centuries – farther and faster than the whole world had gone in the previous 10,000 years. But then, those other nations didn't have economic freedom and a unique patent system which has stimulated so much creative talent in America.

◆ **HOME.** When our Constitution was written, American women cooked over an open fire, just as women had cooked since the dawn of history. Housewives carried water from a spring or well, made their own soap, and made the candles that provided meager light for the long hours of darkness. American wives and mothers in those days not only made all the family's clothes, but they spun the thread and wove the coarse cloth with a spindle and loom like those used by the ancient Egyptians.

After **Eli Whitney's** cotton gin made cotton cloth cheap and abundant, women no longer had to spend every evening spinning and weaving cloth for their families. In 1842 **Elias Howe** of Cambridge, Massachusetts, received a patent for his sewing machine, which he called a “new and useful machine for sewing

seams in cloth or other articles,” and **Isaac Singer** patented improvements. It is impossible to overestimate how the sewing machine lightened the workload of the average woman.

In the 1890s **James Northrup** invented the first completely automatic loom, and **Whitcomb Judson** invented what he called the “slide fastener” and we call the zipper. In 1849 **Walter Hunt** invented the modern safety pin. I can't imagine what it must have been like diapering babies in the hundreds of years before the safety pin was invented.

Traditional wood-burning stoves and fireplaces began to be replaced when **Jordan Mott** invented the first practical coal stove in 1833. Called a baseburner, this stove had ventilation so it could burn coal efficiently, and was a great boon to the housewife.

A distinctive American contribution to heating technology was the radiator, invented by **William Baldwin**. His process of making radiators of cast iron brought central heating into the homes of most Americans by the start of the 20th century.

The best friend women ever had was **Thomas A. Edison**, who received a patent in 1880 for what he called “an electric lamp for giving light by incandescence.” No other invention changed the lives of so many people as the electric light bulb. At the beginning, light bulbs were sold door-to-door from horse-drawn wagons. By the 1930s, some new houses were able to advertise that they were already wired with electricity! Today, every American home has electric light, and modern kitchens are filled with a dazzling variety of electric appliances, especially refrigerators, stoves, and ovens.

American homemakers will be forever grateful to **Alva Fisher**, who invented the electric washing machine in 1910.

In 1886 **Schulyer Wheeler** invented the electric fan, a principal method of home cooling until **Willis Haviland Carrier**, the father of air conditioning, designed the first scientific system to clean, circulate, and control the temperature and humidity of air.

When it comes to keeping cool, Americans can even take credit for the ice cream cone. It was invented at the **St. Louis World's Fair** in 1904. A process called frosted foods was invented by **Clarence Birdseye**. It was an instant success and, today, frozen foods are part of our way of life.

Seventy years ago, the ice man used to come every day and deliver blocks of ice to home “ice boxes” so we could keep our foods from spoiling. Today's refrigerators enable us to preserve our food for weeks at a time.

◆ **INDUSTRY AND ENERGY.** The industrial expansion of the late 19th century was built on dozens of inventions that created new industries, jobs, and products.

J.J. Ritty invented the cash register in 1879, just in time to ring up the profits of one of the greatest decades in the history of inventions. The 1880s gave us the light bulb, the street car, the automobile, the pneumatic tire, electrical welding, the steam turbine, the electric furnace, and **Nikola Tesla's** alternating-current electric motor.

In 1869, **John Wesley Hyatt**, a printer in Albany,

New York, tried to win a \$10,000 prize offered for a substitute for ivory to make billiard balls. What he discovered was celluloid, the first synthetic plastics material to be widely used commercially. It soon was used in making photographic film, combs, collars, dentures, and handles for appliances.

When chemist **Leo Baekeland** of Yonkers, New York, invented the first synthetic resin called Bakelite in 1909, the plastics industry took a giant step forward. Bakelite became widely used to make telephones and handles for pots and irons, and it laid the foundation of the modern plastics industry. In 1889, **Charles Hall** of Oberlin, Ohio, received a patent for the first inexpensive method to produce aluminum, giving birth to our giant aluminum industry.

Americans devised new and ingenious ways to drive across our nation's rivers. **John Roebling** invented the suspension bridge used in 1869 to design the Brooklyn Bridge, which became known as the eighth wonder of the world. **Captain James Eads** developed the world's first steel arch bridge and built Eads Bridge across the Mississippi River at St. Louis in 1874, a vital link in opening up our transcontinental railway system.

In 1902, **George Fuller** invented the first steel skyscraper, the 21-story Flatiron Building in New York City. His original design was based on a steel cage. Fuller went ahead despite predictions that wind and weight would make his skyscraper collapse. Today more than half our large office and apartment buildings are copied from Fuller's steel cage design.

Nylon, invented by **DuPont** chemists in 1939, was the first synthetic fabric that was superior to natural fabrics. It was a great day for women when we started to wear long-lasting nylons instead of fragile silk stockings.

The story of how the slide rule was replaced by the pocket calculator is a great lesson in how our American competitive system brings consumer prices down. When the calculator first came on the market about 1970, it sold for hundreds of dollars. Now, a powerful calculator sells for a fraction of what a slide rule used to cost.

◆ **MILITARY.** America's unparalleled prosperity rests ultimately on our ability to keep aggressors from stealing our bounty, conquering our people, exacting tribute, and invading our homeland. Economic prosperity depends on military power to protect it. Creative men have invented and developed new technologies, new processes, and better weapons needed to meet every military challenge.

The same man who created and patented the first important invention after our Constitution was adopted, **Eli Whitney** of cotton gin fame, was, through the influence of Thomas Jefferson, given a government contract to build 10,000 muskets for the war department. Up until that time, guns had always been built by hand, each part laboriously filed and fitted together by skilled gunsmiths. Each worker made everything from the stock to the trigger. **Whitney** had an original idea. He thought that, if he could make standard parts, then the parts of a gun would be interchangeable, and a gun could be repaired right on the battlefield. This sounds obvious today, but it was a new idea when Whitney pioneered it. Eli Whitney completed his contract and the United States

entered the War of 1812 with 10,000 precision firearms. Whitney had laid the foundation for quantity production of complex military and civilian products.

◆ **HEALTH.** The creative genius unleashed by the Constitution has been responsible for tremendous inventions to cure disease, save lives, and lengthen the life span of Americans to at least 75 years.

During the Civil War, a soldier with a battle wound had a small chance of surviving and had no anesthetics for his pain, as we remember so well from those tragic scenes in *Gone With the Wind*. By World War II, our servicemen had sulfa drugs, blood transfusions, and anesthetics available for immediate use.

◆ **CONCLUSION.** Our Constitution gave America a wonderful system for protecting the labor and work-product of inventors, fostering industrial and technical progress, and ultimately letting the world benefit from individual genius. We've seen the spectacular results. America has only five percent of the world's population, but we have created more new wealth than all other nations in the world combined.

The drawings of Leonardo da Vinci in the 15th century prove that some great inventors are not American. Leonardo's inventions included an automobile, an airplane, a parachute, a movable bridge, and a multi-barrel gun. But his inventions existed only on paper. Only in America could such ideas actually be built, where men are free to invent and to invest in the certainty that they will own the product on which they pour out their talent, skill, and financial resources.

Our unique American patent system is just as important today as ever before, and it continues to produce spectacular results. The 20th century has given us such marvelous inventions as microprocessors, RAM chips, lasers, compact discs, liquid crystals, microwave ovens, fiber optics, and satellite communications.

President Dwight Eisenhower summed it up: "This system has for years encouraged the imaginative to dream and to experiment — in garages and sheds, in great universities and corporate laboratories. . . . Innovations and discoveries . . . have created new industries . . . , giving more and more Americans better jobs and adding greatly to the prosperity and well-being of all."

The above is a partial transcript of a video written and produced by Phyllis Schlafly during the Bicentennial Year of 1987 called "American Inventors." (available from Eagle Forum, Alton, Illinois 62002, 618-462-5415 for \$21.95) See also the May Phyllis Schlafly Report called "Protect Our Constitutional Patent Rights."

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eagle@eagleforum.org