BIG IDEAS

Some of the most important inventions of the past 2,000 years may surprise you.

BY THOMAS FLEMING
ILLUSTRATIONS BY DAVID BECK

Want to get rich? Become famous? You don't have to be a movie star or a quarterback or a stockbroker. You can do it by becoming an inventor. In the past 2,000 years inventors have created machines and devices that have changed the world.

And it's not just the big ideas—like computers, printing presses and steam engines—that become big things.

Just think how the past 2,000 years would be different without these "small" big ideas.

It's a Clean Sweep

In 1871, American inventor Ives McGaffey realized that if you turned an air pump backward, you would have a machine that could pick up dirt. He called his machine an aspirator. The huge device was powered by a steam engine.

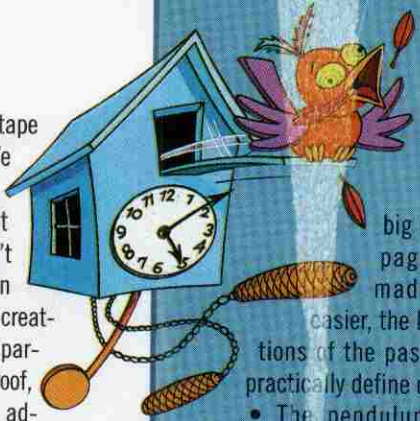
Another American, James Murray Spangler, designed a much lighter machine in 1907 with an electric engine. He sold the idea, now called a vacuum cleaner, to a man named William H. Hoover. The company is still making Hoover vacuums—and we're all a little bit cleaner for it.

Stuck On You

Inventors get interested when they find out people don't like the way something works.

One day in 1923, young lab technician Richard Drew from the Minnesota Mining and Manufacturing Company heard workers in an auto body shop complaining. Seems they could not find the right kind of tape to put on cars while they painted them. Either the tape stuck too much and ruined the paint job or it fell off too soon and the paint dribbled onto another part of the car.

Drew spent two years creating a tape that stuck just enough. We know it now as masking tape. But Drew wasn't done. In 1930, he created a transparent, waterproof, cellophane adhesive. The company called it Scotch tape and started selling it by the ton.



REALLY BIG IDEAS

While the "small" big ideas on these pages certainly made our lives easier, the biggest inventions of the past 2,000 years practically define us.

- The pendulum clock was invented by Frenchman Gerbert d'Aurillac around 999, the same year he also became Pope Sylvester II. The clock enabled people to measure time in a new way.
- The printing press was invented by German Johannes Gutenberg in the mid-15th century. It changed the way people thought. It made books, newspapers and magazines available to millions.
- The first practical steam engine was patented by Englishman James Watt in 1769. It changed the way people lived. It started what historians call the Industrial Revolution, powering machines in factories and being used in trains and boats to transform transportation and travel.
- Computers date to the 1600's, when mathematicians invented simple calculating machines. But the high-speed wonders we know today were born in the mind of Englishman Charles Babbage in 1822. In 1946, American engineers brought Babbage's dreams to life with a huge working computer. Soon tiny transistors replaced large electron tubes, and, in 1977, personal computers designed for home use appeared.

Accidents Can Work Wonders

In the late 1940's, engineer Percy L. Spencer of the Raytheon Company was experimenting with high-frequency radio waves. These had been used to detect enemy planes and ships in World War II. Spencer noticed the waves had melted a candy bar in his pocket. Could these waves be used to heat food?

Spencer soon invented the microwave oven, which made millions of dollars for Raytheon—and millions of bags of popcorn for kids everywhere.

Keep Your Pants On

In 1907, engineer Gideon Sundback got interested in improving a "hookless fastener" patented in 1893. It was supposed to replace the tedious work of buttoning the many buttons on clothes of the day. But the fastener did not work well.

For years Sundback lay awake half the night trying to solve the problem. In 1913 he designed a hookless fastener that worked. But no one made much money on the invention until a businessman decided to call it a "zipper." Soon millions were being sold every year—and pants everywhere stopped falling down.

Now that's a tiny—yet BIG—idea.

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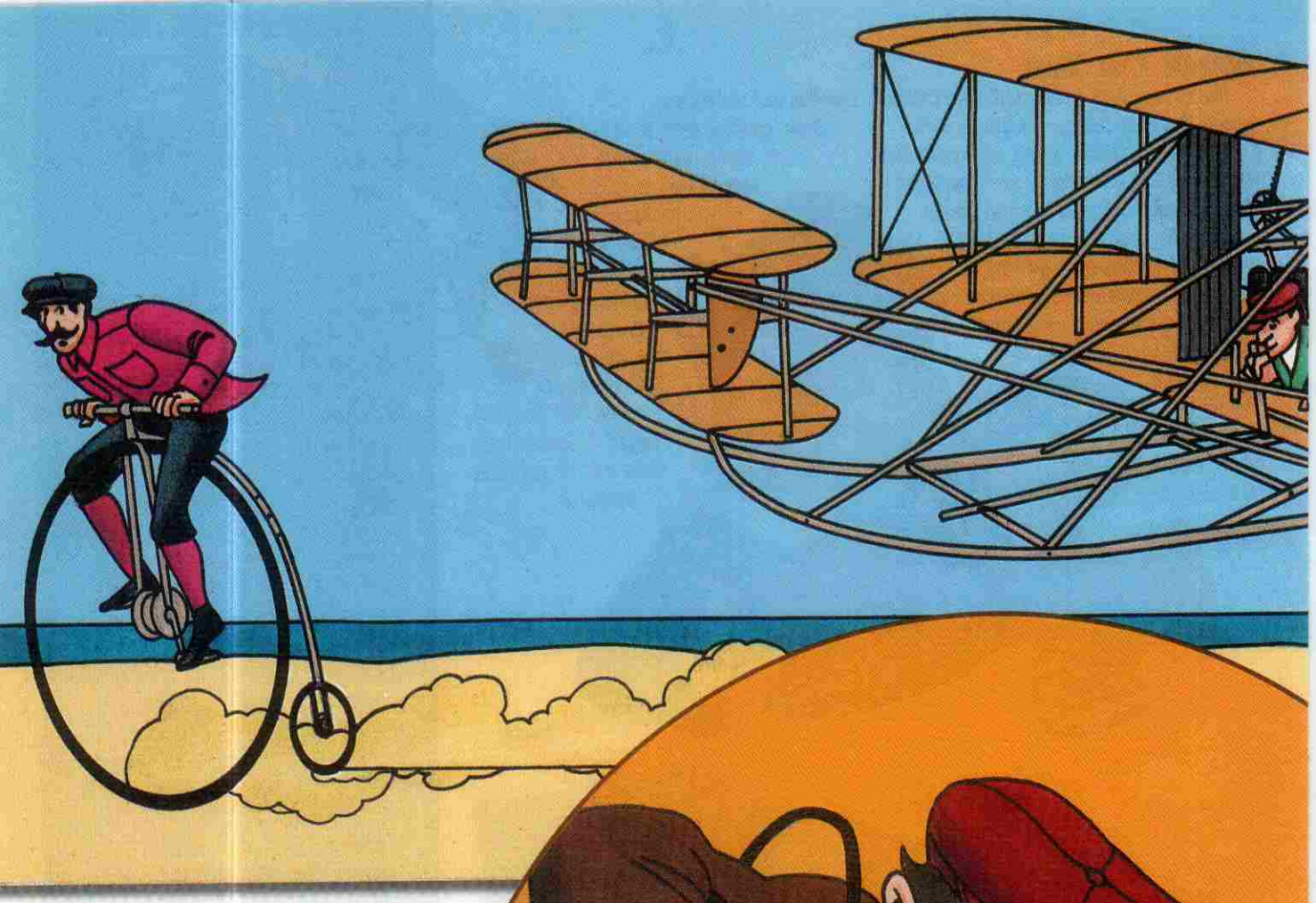
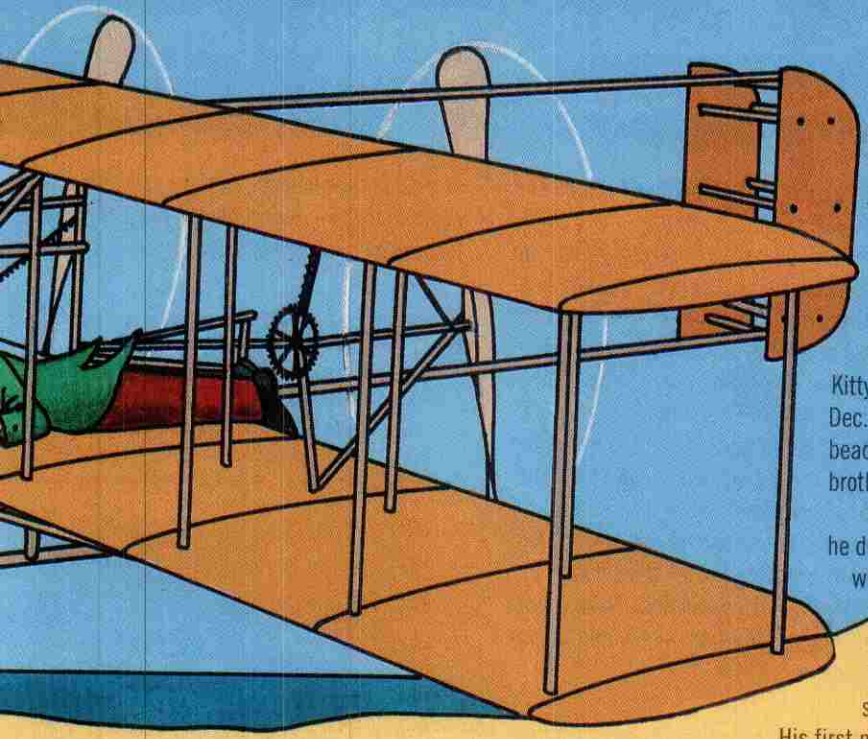


ENTERTAINING YOUTH

In 1922, 15-year-old Philo Farnsworth of Rigby, Idaho, designed a cathode ray vacuum tube to send and receive images. Five years later, at age 20, Farnsworth was sending clear images, and eventually scenes from movies. He called his system "Telecine." The Radio Corporation of America (RCA) bought many of Farnsworth's patents and began broadcasting pictures in 1939. They called it television.

In 1896, 19-year-old Guglielmo Marconi got an idea that dozens of older scientists had ignored. Machines existed to detect waves of electrical radiation. Why not use these waves for "telegraphy without wires"? Marconi had almost no scientific training. But his wealthy father gave him the money to hire 17 electrical engineers to help him perfect his "wireless." In 1901 he sent signals across the Atlantic. Soon other inventors learned to send music and voice sounds, creating radio as we know it.

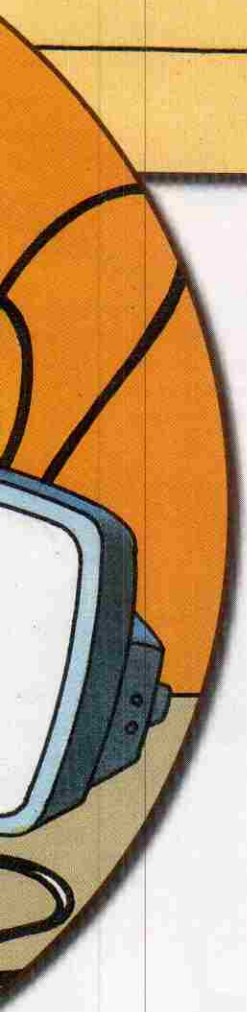


GENIUSES NEED NOT APPLY

Many inventors were not great scientists. Orville and Wilbur Wright ran a bicycle repair shop in Dayton, Ohio. In their spare time they decided to invent the airplane. They studied the plane designs of other inventors and added some improvements. The most important was ailerons, movable wing tips that helped control the plane. They also added a movable tail rudder. They built their first plane, a glider with no engine, for $15. In 1900 they took it to Kitty Hawk, N.C., to try it out. They soon added an engine, and on Dec. 17, 1903, Orville Wright flew 120 feet down the Kitty Hawk beach and landed safely. He was in the air only 12 seconds. But the brothers had proved that human beings could fly.

Samuel Finley Morse was a painter who needed money. In 1832 he decided the telegraph could make him rich. He asked scientists who knew more about electricity to help him perfect it. He also created a code made up of dots and dashes. After years of work Morse was ready to send the first message over the wire. Then he talked the U.S. Congress into putting up the money to stretch a wire between Washington, D.C., and Baltimore, Md. His first message: "What hath God wrought." He became very rich.

Alexander Graham Bell was a teacher of the deaf. He too did not know much about electricity. That was probably a good thing because most electrical experts did not think a voice could be sent over a wire. In three years of day and night effort, Bell figured out how to send sound over a fluctuating electric current. He got his patent on the telephone on March 7, 1876. It is one of the most valuable patents ever issued by the U.S. Patent Office.



THE GREATEST INVENTOR

Thomas Alva Edison specialized in taking an idea and experimenting until he perfected it. Many inventors had toyed with the idea of electric light ever since Alessandro Volta invented the electric battery in 1800. But no one could find the right wire, called a filament.

After 13 months of experiments, Edison and his assistants stumbled on cotton thread coated with carbon. For three days and three nights they tried to insert a piece into a bulb. On Oct. 21, 1879, they succeeded. They were so excited, they stayed up for 45 consecutive hours, watching it burn.

Edison used the same approach with the phonograph and the motion picture. By the time he died in 1931 Edison had patented more than 1,093 ideas, including the alkaline battery and the electrical railroad.

But it was never easy.

"Genius? Nothing!" Edison once said. "Sticking to it is the genius! Any other bright-minded fellow can accomplish just as much if he will stick to it and remember: Nothing that's any good works by itself. You've got to *make* the thing work! I failed my way to success."