

BREAKTHROUGH IDEAS

by Tom Cardigan

What leads some
people to ideas
that can change
the world?

BREAKTHROUGH IDEAS

A breakthrough idea is something new and different. It changes how we think or behave. What do people who have breakthrough ideas have in common? Read the short biographies in this book to find out. You will discover that each of these remarkable individuals had a powerful vision—and the willingness to work hard for what they believed in.



PEOPLE Who Changed THE WORLD

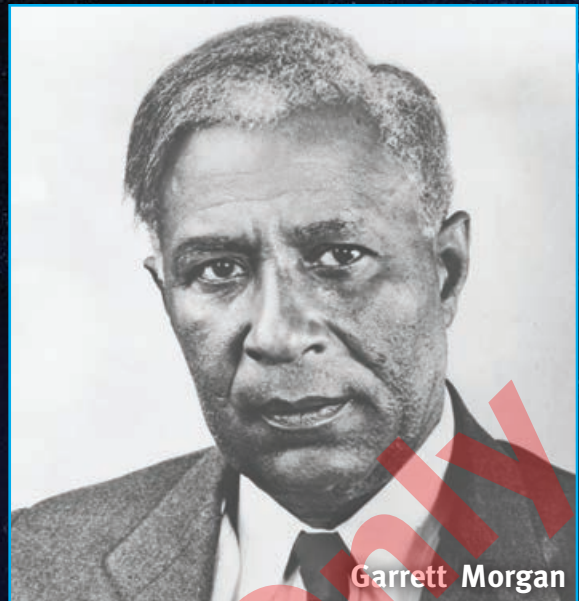
Changing the world is not easy. But Cyrus McCormick, Maria Mitchell, Garrett Morgan, Jonas Salk, and Patsy Mink were up to the challenge.

Some of their inventions, discoveries, and ideas saved millions of lives. Others made people's lives easier, safer, or better.

Cyrus McCormick helped farmers gather more crops in less time and with less work. Maria Mitchell

discovered something new in the night sky. Garrett Morgan invented a mask that saves the lives of firefighters. Jonas Salk saved millions from the dangers of a horrible disease. Patsy Mink fought for girls to have equal access to sports and education.

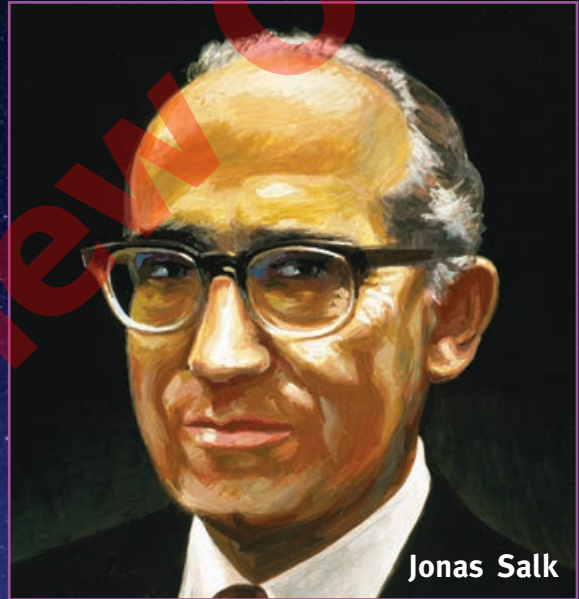
Many factors played a role in these breakthrough ideas. But the people behind them all have some things in common—bravery, hard work, and vision.



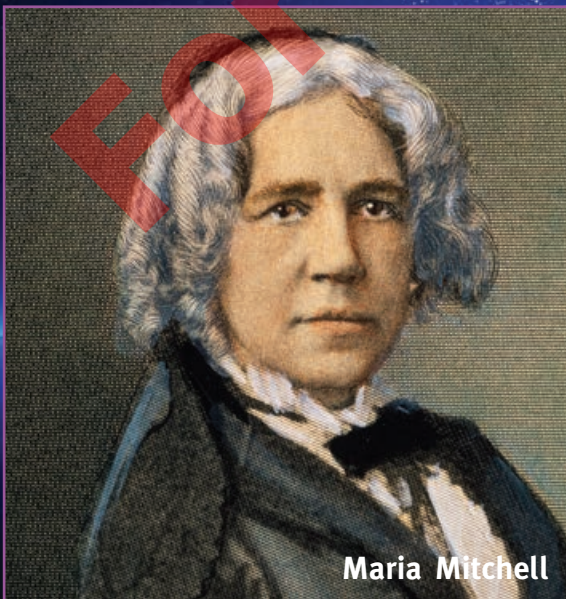
Garrett Morgan



Cyrus McCormick



Jonas Salk



Maria Mitchell



Patsy Mink

CYRUS MCCORMICK

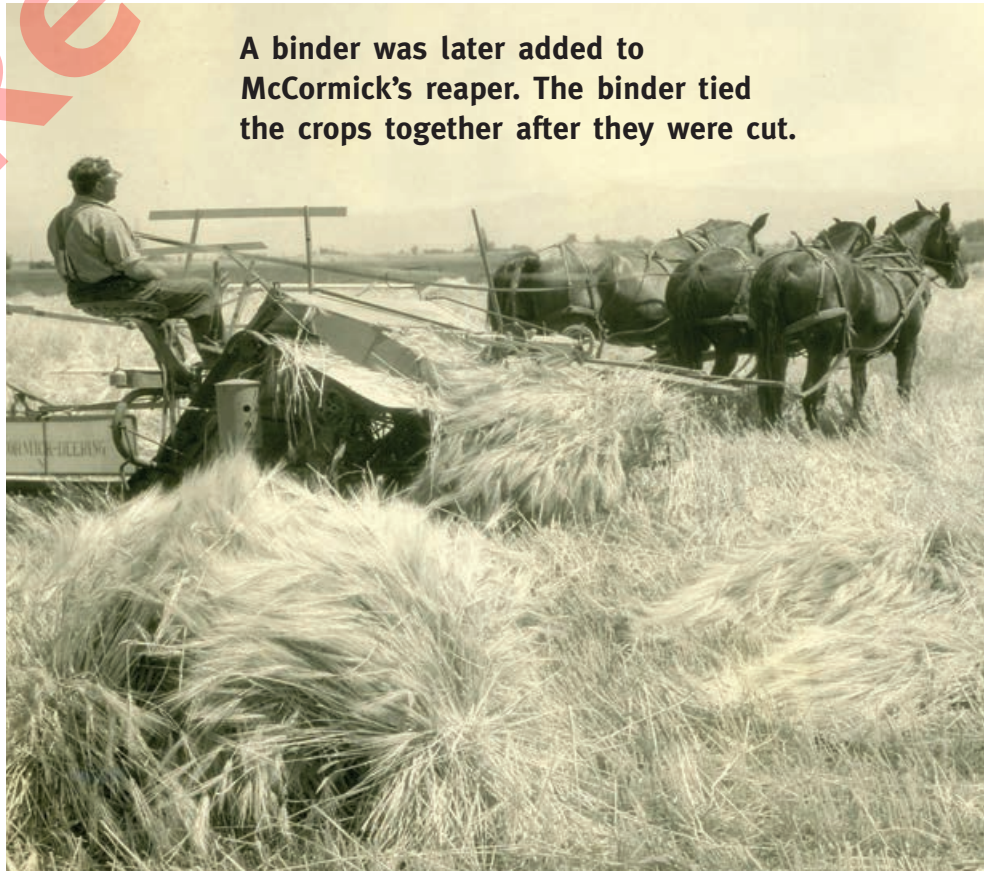
Improving Farming

Farming can be a difficult job today. But before the 1830s, it was even harder. Crops such as wheat had to be harvested by hand.

In 1831, Cyrus McCormick created a farming machine called a reaper. Jo Anderson,

an enslaved worker, helped McCormick build the reaper.

Pulled by horses, the reaper could gather wide rows of crops at a time. A moving blade did the work of cutting and gathering the crops.

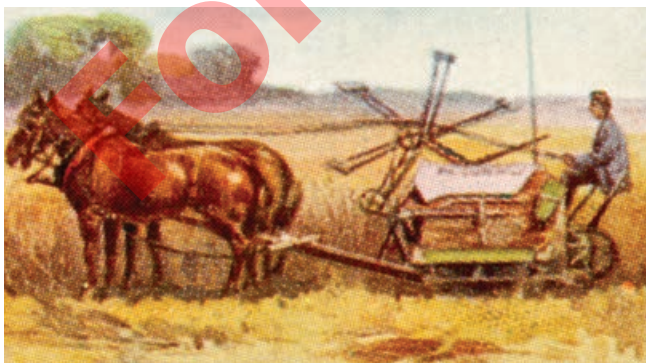


A binder was later added to McCormick's reaper. The binder tied the crops together after they were cut.

McCormick's **mechanical** reaper helped farmers gather crops more quickly. Farmers could use less labor, and spend less money.

As a youth, McCormick worked in his father's blacksmith shop in Rockbridge County, Virginia. His father had tried to build a reaper, but failed. When McCormick was only twenty-two years old, he successfully built one. He used some of his father's ideas to create his machine.

That first reaper was only the beginning for McCormick. In 1834, he took out a **patent** on his invention. A patent is a legal document that prevents others from using the patent owner's idea. He then began making and selling reapers.



▲ McCormick created a successful business producing reapers.

Reapers Then and Now

While the two machines shown below look very different, they both work in much the same way. A long arm with sharp blades cuts stalks of grain. But modern reapers also bundle grain for easy handling. They even knock the seeds from the stalks.



▲ the McCormick reaper of 1831

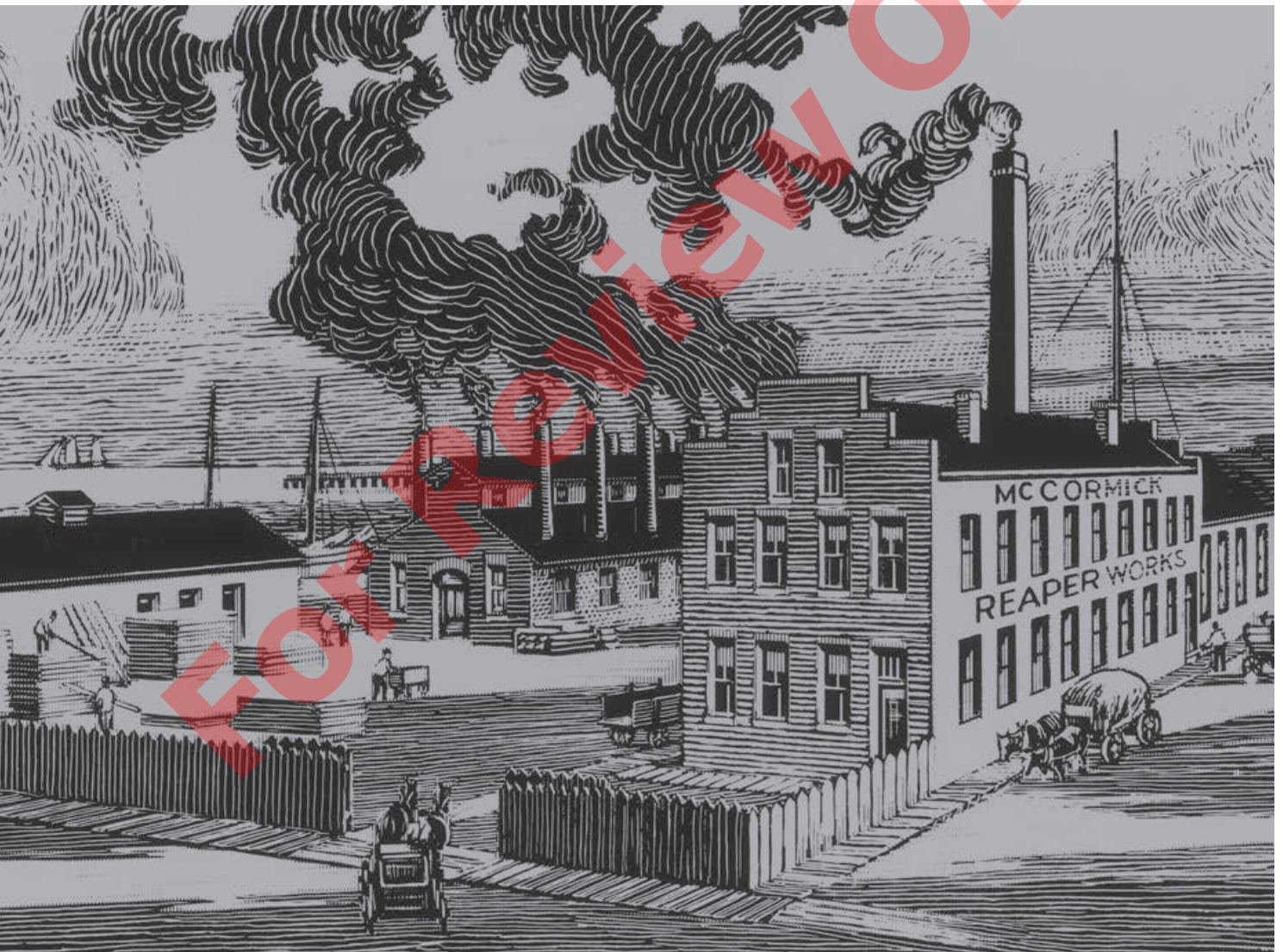


▲ a modern-day reaper

McCormick opened his first reaper factory in Chicago, Illinois, in 1847. Soon after, he became involved in a legal battle over the patent for his reaper. Another inventor had developed a similar machine. McCormick lost this fight. That meant that anyone could make

a reaper. But McCormick's sales kept increasing. His reaper had a high-quality cutter bar.

In the 1850s, McCormick's reaper took the grand prize at shows in London and Paris. In a single year, he sold more than 4,000 machines.



▲ Factories like this one could produce many reapers in a single day.

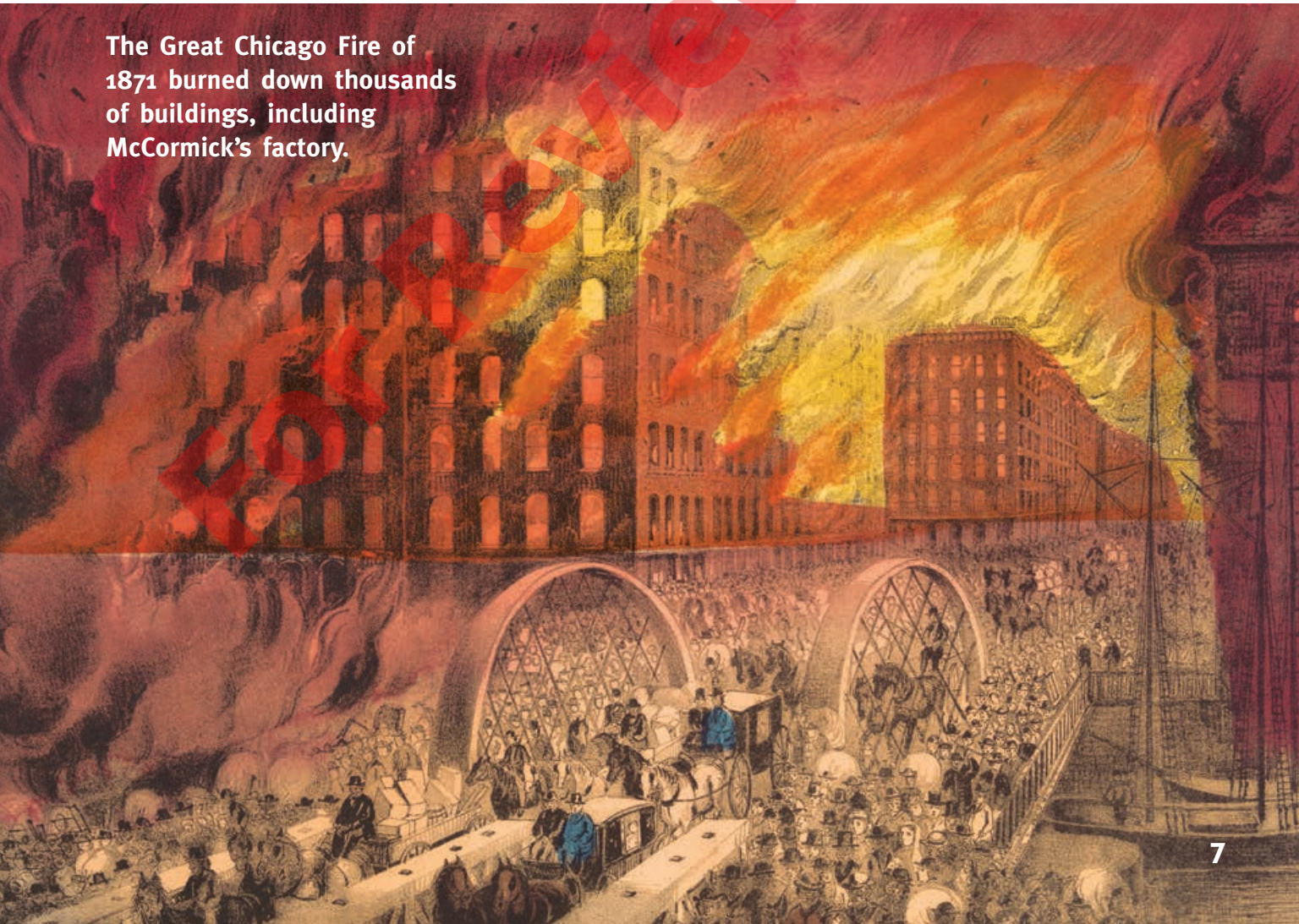
McCormick faced another challenge late in his career. The Great Chicago Fire of 1871 damaged his factory. He recovered and rebuilt it.

McCormick died at age 75 in 1884. By that time, he had accomplished much. He had a successful business. And he had helped others by donating money to schools and other organizations.



▲ The U.S. Post Office honored McCormick for his achievements by featuring him on a stamp.

The Great Chicago Fire of 1871 burned down thousands of buildings, including McCormick's factory.



MARIA MITCHELL

Finding a New Comet

In 1847, a new comet was discovered. Comets are chunks of ice, dust, and gas that travel through space. The discovery of a comet was a rare event. A bigger surprise at that time was that the discoverer was a twenty-nine-year-old woman, Maria Mitchell. In those days, few women worked in

astronomy. This area of science is the study of stars, planets, and space.

Mitchell's father began training her in astronomy when she was young. By age fourteen, Mitchell could use the position of the moon and the stars to **determine** the best path to a faraway place.

▼ Mitchell studied astronomy her entire life.

▼ Most comets have two tails. The blue tail is made of gas. The white tail is made of dust.



Careers In: Astronomy

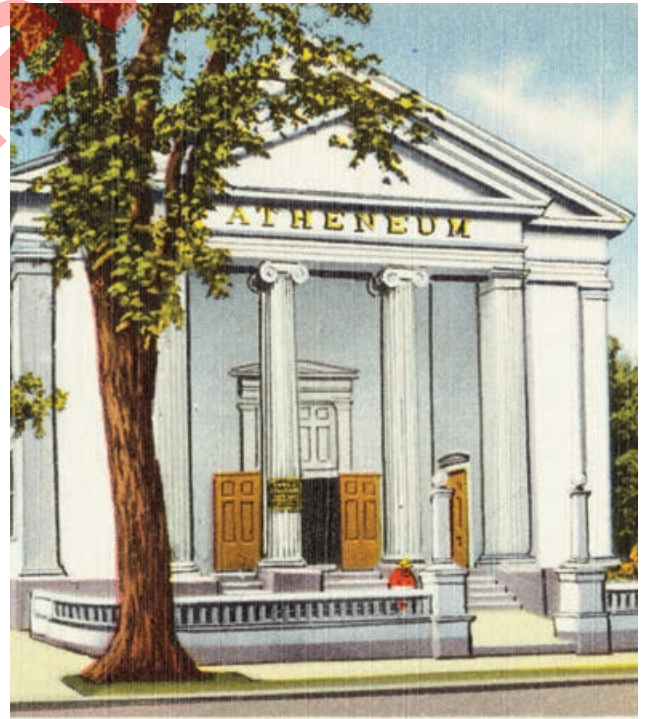
An astronomer is a person who studies outer space. Astronomers today use huge, powerful telescopes that can see far into space. Some astronomers study outer space to learn whether life exists on other planets. Other astronomers study outer space to learn more about the sun or for other reasons. Astronomers use math to study outer space. Many astronomers work for universities.



Mitchell's father built his own school in their hometown of Nantucket, Massachusetts. Mitchell went to his school.

When Mitchell was seventeen, she started a school of her own. She founded the school to train girls in math and science.

A year later, in 1836, Mitchell became the head librarian at the Nantucket library. She worked there for the next twenty years. She also continued to study space.



▲ Maria Mitchell was head librarian at the Nantucket Atheneum.