6 INVENTING IN ILLINOIS

K–5 9–12

Illinois has long been an incubator of inventions ranging from tools so commonplace as to now be considered rudimentary to one of the most dangerously bold energy advances in human history. For young learners, we recommend learning more about two Prairie State agricultural inventors who improved quality of life for generations. For older grades we hope to facilitate discussions focused on nuclear science, beginning with its birthplace in Illinois in 1942 through its impact on the world today and tomorrow.

DATE: 1837–1851
ARTICLE: "NEW HARVESTER BOOSTS FARMING"


FROM TOWN TO CITY IN JUST 4 YEARS

ILLINOIS' OWN TRAIL OF TEARS

NEW HARVESTER BOOSTS FARMING

INGENIOUS HORSE-DRAWN REAPER CUTS, THRESHES, AND BALES ALL IN ONE GO

Religious Minority Forced To Flee Their Homes In Nauvoo

K–5

STANDARDS

SCIENCE STANDARDS

K–2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

K–2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

K–2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

3–5-ETS1-1: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3–5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3–5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

SOCIAL SCIENCE STANDARDS

SS.H.1.K: Compare life in the past with life today.

SS.H.2.1: Describe individuals and groups who have shaped a significant historical change.

SS.H.2.2: Compare individuals and groups who have shaped a significant historical change.

SS.H.2.3: Describe how significant people, events, and developments have shaped their own community and region.

SS.H.3.4: Explain probable causes and effects of events and developments in Illinois history.

SS.H.3.5: Explain probable causes and effects of events and developments in U.S. history.

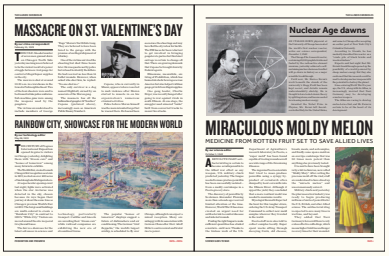
ACTIVITIES

- Explore the engineering successes of John Deere and Cyrus McCormick as two of Illinois's most dedicated inventors. Discuss how their contributions dramatically increased yields and cultivated Midwest prairies into the rich farmland that crisscrosses the State. Today, Illinois is a major producer of corn and soybeans, dozens of agricultural commodities, and even some specialty crops such as grapes, pumpkins, and Christmas trees.
- Mechanical Reaper: Have students try to gather and bundle objects such as straws or toothpicks with their hands. Afterward, try utilizing a variety of tools such as a brush, comb, scoop, etc., to see if they can improve upon the process. Connect this hands-on experience to the ease and efficiency with which the reaper allowed farmers to bundle wheat.
- Steel Plow: Discover why the steel plow was an improvement from the wooden one. Try digging in the ground outside with wooden tools (e.g. a wooden spoon) versus metal tools (e.g. a trowel). Discuss why steel was a stronger and more durable material, better suited to help farmers cut through the hard Illinois soil.
- "Shark Tank" Inventions of the Future: Have students think about an invention they believe would make life easier for individuals or businesses. After creating a concept, students can take their design (depending on time) through various phases of development and testing.

RECOMMENDED RESOURCES

- Online: Check out http://www.agintheclassroom.org/ for USDA Agriculture in the Classroom resources and materials.
- In print: Take a look at *John Deere, That's Who!*, a picture book biography by Tracy Nelson Maurer, published by Henry Holt & Company (2017).

DATE: 1942
ARTICLE: "NUCLEAR AGE DAWNS"


MASSACRE ON ST. VALENTINE'S DAY

RAINBOW CITY, SHOWCASE FOR THE MODERN WORLD

Nuclear Age dawns

MIRACULOUS MOLDY MELON

MEDICINE FROM ROTTEN FRUIT SET TO SAVE ALLIED LIVES

DATE: 1945
ARTICLE: "HIROSHIMA ATOM BOMB DROPPED BY QUINCY PILOT"


WARTIME SPEECH FOR OUR TIMES

VOLUNTEERS BUY A PIECE OF HISTORY TO INSPIRE LEADERS OF TODAY

HIROSHIMA ATOM BOMB DROPPED BY QUINCY PILOT

Shining Temple to Tolerance Completed

A SIGHT TO SHAME AMERICA

9–12

STANDARDS

SCIENCE STANDARDS

HS-ETS1-1: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS1-2: Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
HS-ETS1-4: Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

SOCIAL SCIENCE STANDARDS

SS.H.1.9–12: Evaluate how historical developments were shaped by time and place as well as broader historical contexts.
SS.H.4.9–12: Analyze how people and institutions have reacted to environmental, scientific, and technological changes.
SS.H.5.9–12: Analyze the factors and historical context that influenced the perspectives of people during different historical eras.
SS.H.7.9–12: Identify the role of individuals, groups, and institutions in people's struggle for safety, freedom, equality, and justice.
SS.H.10.9–12: Analyze the causes and effects of global conflicts and economic crises.
SS.H.11.9–12: Analyze multiple and complex causes and effects of events in the past.
SS.H.12.9–12: Analyze the geographic and cultural forces that have resulted in conflict and cooperation.

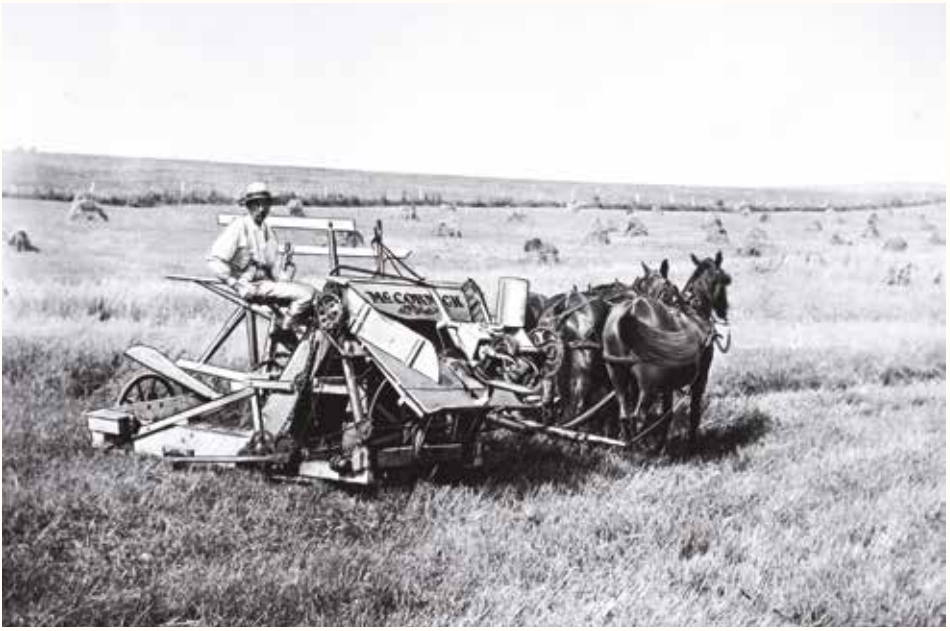
ACTIVITIES

In addition to hosting the world's first nuclear reactor, Illinois is the home to two dedicated nuclear facilities, as well as the Atomic Science Bulletin. The historical relevance of these places and events combined with modern concerns and perspectives will foster meaningful discussion of the impact of nuclear science.

- Engage in historical and contemporary investigations of the Fermilab or the Argonne National Laboratory and consider each location for site visits and as opportunities to connect with nuclear scientists.
- Consider the benefits of nuclear energy against the dangers of nuclear proliferation and atomic warfare. Debate/discuss the merits of such advances and develop an ethics plan for managing nuclear science discoveries.
- Study the movement of the Atomic Scientists's Doomsday Clock and speculate what types of world events might move the clock forward or backward in time. Or, design your own "Doomsday Clock" and determine what events may influence the clock in the future.

NEW HARVESTER BOOSTS FARMING

INGENIOUS HORSE-DRAWN REAPER CUTS, THRESHES, AND BALES ALL IN ONE GO



By our agriculture correspondent
May 2, 1851

MR. CYRUS McCormick's amazing new mechanical reaper has proved an international sensation at the Great Exhibition of the Works of Industry of All Nations in London, England.

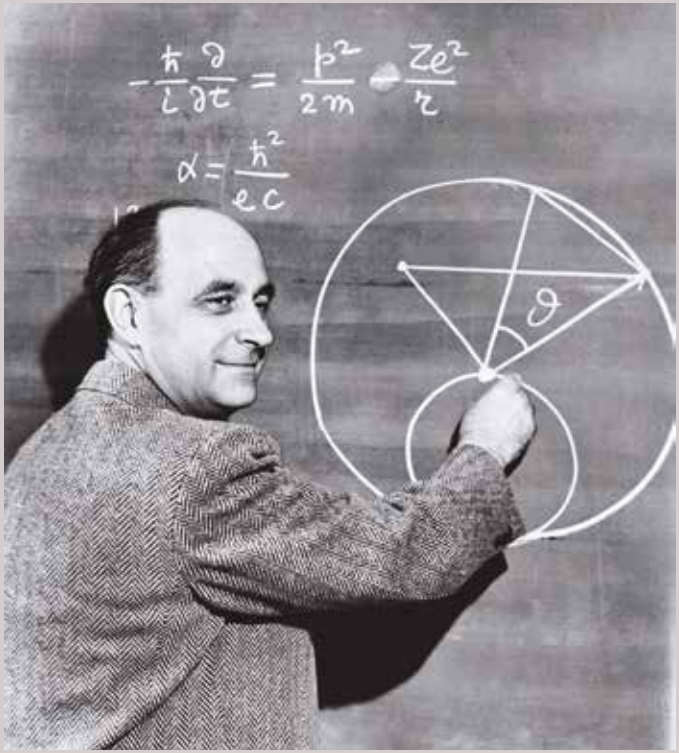
Chicago-based Mr. McCormick traveled to England himself to display his harvesting machine at the Crystal Palace, and was yesterday awarded a medal for his invention. Among the dignitaries supporting the exhibition are Queen Victoria and Prince Albert, Charles Darwin, Charlotte Brontë, and Charles Dickens. Mr. McCormick's prize follows the success of Mr. John Deere, of Moline, whose moldboard plow has allowed far more land of the Midwest prairies to be cultivated.

Friends of Mr. McCormick say it was the proudest day of his life, recognition for all the years spent overcoming problems with his invention's reliability to help revolutionize agriculture. They also say he would be the first to acknowledge the debt he owes his father Robert, also an inventor, who spent 20 years developing a mechanical reaper, though it never proved reliable enough.

Virginia-born Mr. McCormick took out his first patent in 1834 for a horse-drawn machine that would automatically cut, thresh, and bundle grain. He showed how, with little effort, it could increase farms' yield tenfold. He recalled with amusement that farmers were skeptical of the reaper at first, with some of them unkind enough to describe it as moving like an elephant, and insisting that men could harvest the grain just as fast without it.

He admitted his invention only started to catch on after many workers in the Midwest left for the new territories further west and the California gold rush, creating labor shortages. Taking advantage of Chicago as a transportation hub, he has established a factory in the city to sell his machines across North America.

Devoutly religious, Mr. McCormick says he believes it is his mission to feed the world.



Nuclear Age dawns

AN ITALIAN-BORN physicist at the University of Chicago has created the world's first nuclear reactor, *writes our science correspondent, December 3, 1942.*

The Chicago Pile-1 research reactor, containing 45,000 graphite bricks and fueled by the radioactive element uranium, yesterday achieved a self-sustaining nuclear chain reaction that will go down in history as a major scientific breakthrough.

Until now, Mr. Enrico Fermi's work beneath the stands of the university's Stagg Field has been kept secret, and details remain understandably sketchy. He is thought to have tested atomic theory by splitting atoms, and has succeeded in releasing nuclear energy.

Awarded the Nobel Prize in Physics, Mr. Fermi left fascist-controlled Italy for the United States, and came to Chicago after accepting an earlier post at New York City's Columbia University.

According to friends, he has modestly described his reactor as a "crude pile of black bricks and wooden timbers."

Experts said last night that Mr. Fermi's breakthrough opened up the possibility of a world powered by cheap nuclear energy. But they also cautioned that his research could be used to develop nuclear weapons with the potential to destroy the planet.

Since entering World War II a year ago, the U.S., along with its Allies, is increasingly worried that Nazi Germany may be developing a nuclear weapon.

The Allies are racing to develop such a device first, and Mr. Fermi is certain to be at the heart of its development.

HIROSHIMA ATOM BOMB DROPPED BY QUINCY PILOT

By our war correspondent
August 7, 1945

THE ATOMIC BOMB that destroyed the Japanese city of Hiroshima yesterday was dropped from the B-29 Superfortress *Enola Gay*, piloted by Col. Paul Tibbets, born in Quincy, Illinois. The devastation caused by the single bomb called "Little Boy," dropped by Col. Tibbets and his crew, is so severe that exact casualty figures may never be known.

It is understood tens of thousands were killed in the explosion, and many more are certain to die as a result of their wounds, starvation or the new horror of war from atomic weapons—radiation poisoning.

Many of those killed or injured are believed to be civilians, although Hiroshima had a military garrison.

The nuclear attack was so overwhelming that military chiefs believe it must surely compel Japan to surrender, which would bring to an end WWII following the collapse of Germany and Italy.

A Japanese surrender will avoid the need for Allied troops to mount what many predict would otherwise be an extremely bloody invasion of the country.

Col. Tibbets, who graduated from Alton's Western Military Academy, is among nearly one million Illinoisans who have served during World War II, of whom 22,000 have been killed.

The bomber, *Enola Gay*, was named by Col. Tibbets for his mother.

Japanese Americans, released from internment camps in the Pacific Coast area, flock to wartime Chicago, and are hired by companies desperate for labor. Many return to the Pacific Coast after WWII, but the Chicago community survives to this day.

War heroes

ORCHARD Field Airport is renamed O'Hare International Airport in 1949, to honor the bravery of Edward "Butch" O'Hare, the Navy's WWII flying ace and Medal of Honor recipient, who later died in action.

Passengers will discover that boarding passes are still coded with the letters ORD—a throwback to Orchard Field.

Later, Silvis is home to Hero Street USA, famous for having more people serving in the military than any other comparable street in the nation.