



THE GREAT AMERICAN Hall of Wonders

The United States began with an act of imagination. The Founding Fathers envisioned the nation as a Great Experiment for promoting human happiness, an ongoing trial of democratic liberties that would be sustained by the inquiring spirit of each new generation. As the last of the founders passed away, nineteenth-century citizens took up their work. Calling themselves “an inventive people,” they began to shape what they thought a democratic nation should be through scientific and artistic descriptions of the country’s bounteous nature and mechanical innovations aimed at improving their lives. Americans in every walk of life were bound together by the idea that they shared a special genius for invention.

Our modern technologies have surpassed the nineteenth century’s beginning efforts, and we know that century’s failures well, from the decimation of the buffalo to the ruin of the Civil War. But we are the heirs of the nineteenth century’s successful experiments as well as the ones that went terribly awry. As we confront the complexities of our twenty-first-century stewardship, knowing where we have come from may show us where we are headed. How do we sustain our nation’s liberties, bountiful natural systems, and prosperity? If we accept the Founding Fathers’ premise that the Great Experiment is refreshed each day by each American, there is work to do. Today’s urgent social and environmental challenges call for a great national brainstorm, a collaborative imagining of enduring solutions. We can start by claiming our forebears’ most important legacy—the belief in the transformative power of American inventiveness.



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The Artist in His Museum

1822

oil on canvas

Charles Willson Peale

born Queen Anne County, MD 1741--died Philadelphia, PA 1827

Courtesy of the Pennsylvania Academy of the Fine Arts, Gift of Mrs. Sarah Harrison (The Joseph Harrison Jr. Collection)

In 1822, the artist, naturalist, museum founder, and inventor Charles Willson Peale reached the venerable age of eighty-one. The trustees of his Philadelphia museum commissioned him to paint a full-length self-portrait to honor his great contributions to science, art, and mechanical improvements in the United States. Peale took advantage of the commission to set forth a template of the work of democratic citizenship. The artist portrayed himself as a guide ready to embark on a tour of the museum's scientific specimens, fine paintings, and mechanical marvels. At a time when many citizens feared that the country would not survive the demise of its founders, *The Artist in His Museum* insisted that it was not the revolutionary generation but invention itself that lay at the heart of the national project. Peale's galleries gave evidence of America's natural abundance, but his museum represented much more than a bonanza of resources awaiting development. With reverence, the artist laid out a project of stewardship and invited the people of the United States to devise a nation that would endure. Peale's hall of wonders posed the question that first sparked the Great Experiment: Can you imagine?

Zoology

During the nineteenth century, zoology was a battleground where native-born naturalists fought the "dictatorial powers" of Old World science. People in the United States were incensed when European naturalists described American animals as degenerate versions of Old World creatures. Both American scientists and explorer-artists worked to create inventories of North America's magnificent fauna. They believed the quantity and robustness of the animals of the United States predicted the success of the nation's strenuous project of self-government.

Louis Agassiz Lecturing

1872

albumen print

Carleton Watkins

born Oneonta, NY 1829--died Imola, CA 1916

From the collections of the Ernst Mayr Library of the Museum of Comparative Zoology, Harvard University

Distinguished naturalist Louis Agassiz was a professor of zoology and geology at Harvard University and the head of its Museum of Comparative Zoology. Agassiz believed in a close affinity between art and science. "Every real artist is also a scientist," he declared. "An artist [like a scientist] is not satisfied until his work is a true expression of what he feels to be real. . . . Both eschew vagueness and eliminate that which is irrelevant and meretricious."

A Nomenclature of Colors for Naturalists, and Compendium of Useful Knowledge for Ornithologists

(Boston: Little Brown, and Company, 1886)

book, open to Pl. XIV, Figures Illustrating Various [Feather] Color-Markings

Robert Ridgway (1850--1929)

Private collection

Robert Ridgway became curator of the Department of Ornithology at the Smithsonian in 1880. One of his main interests was the standardization of ornithological imagery and terminology so that both artists and scientists could convey accurate information about birds.

Mastodon

Exhumation of the Mastodon

1806--1808

oil on canvas

Charles Willson Peale

born Queen Anne County, MD 1741--died Philadelphia, PA 1827

Maryland Historical Society, Baltimore City Life Collections

Charles Willson Peale created this painting to celebrate his 1801 discovery of two nearly complete mastodon skeletons in a New York bog. His picture deploys more than seventy figures, a sky filled with darkening clouds, and a lightning bolt to set the stage for a momentous scientific event. The scene shows the climactic moment when a worker arises from a watery pit holding a prodigious bone, the first find. Peale stands near the wheel of an enormous pumping contraption that he had devised for the excavation. He clutches a drawing of an ancient bone and gestures as if calling, "Yes, you have found it!" Peale exhibited the mammoth fossils at his Philadelphia museum as evidence of the immensity of nature in the United States.

American Natural History

Volume 2, Part 1, *Mastology*

(Philadelphia: H. C. Carey and I. Lea, 1826)

book, open to page 205, The Mammoth Skeleton

Titian Ramsay Peale (1799--1885)

John D. Godman, author (1794--1830)

Cullman Library, Rare Books, Smithsonian Institution Libraries, Washington, DC

The emotions experienced, when for the first time we behold the giant relics of this great animal, are those of unmingled awe. We cannot avoid reflecting on the time when this huge frame was clothed with its peculiar integuments, and moved by appropriate muscles; . . . and the mastodon strode along in supreme dominion over every other tenant of the wilderness.

---John D. Godman, 1826

Steamboat

America

1853

oil on canvas

James Bard

born New York City 1815--died White Plains, NY 1897

Courtesy of The Mariners' Museum, Newport News, VA

As political power has been diffused among the great mass of men [in the United States], the human mind has been directed to those inventions that were calculated to confer solid benefits. . . . Among the most important of these useful inventions is . . . the science of navigation by steam . . . the crowning victory of the mechanical philosophy of this nineteenth century.

---*Hunt's Merchants' Magazine*, February 1841

Drawing for Patent Application for Robert Fulton's Atmospheric Steamboat Engine (A), Assembled Engine & Boiler (Clermont)

1809

pen and ink with watercolor

James Kearney

life dates unknown

The American Society of Mechanical Engineers, New York, NY and The Mariners' Museum, Newport News, VA

Robert Fulton was an accomplished artist who became interested in mechanical invention. He viewed mechanical improvements as a way to promote social equality and eliminate political oppression. Although many inventors in the United States and in Europe contributed to the invention of steam navigation, it was Fulton's *Clermont* that attained renown as the world's first commercially successful steam vessel. Throughout the nineteenth century, the steamboat served as a proud symbol of American ingenuity.

Smithsonian American Art Museum

Wall Text, The Great American Hall of Wonders

7/7/11 my

Drawing for Patent Application for Abraham Lincoln's Device, Manner of Buoying Vessels over Shoals

U.S. Patent No. 6469

1849

photo reproduction

Unidentified artist

National Archives and Records Administration

Abraham Lincoln worked on a flatboat as a young man in Illinois and had experience dealing with vessels stranded in the region's shallow waters. As a solution for the problem he invented a "Device for Buoying Vessels over Shoals" and submitted a patent application in 1849. Lincoln's interest in innovation served him well when he assumed command of the ship of state in 1860. During the Civil War, Lincoln took full advantage of improved technologies---steamships, telegraph, railroad, and breech-loading rifles with telescopic sights---to preserve the Union that he swore to protect as president.

American Ingenuity

Let me enumerate the seven wonders of American invention: The cotton-gin; the adaptation of steam to methods of transportation; the application of electricity in business pursuits; the harvester; the modern printing press; the ocean cable, and the sewing machine. How wonderful in conception, in construction, in purpose, these great inventions; how they dwarf the Pyramids and all the wonders of antiquity; . . . how wide, direct, and far-reaching their benefits!

---Senator Orville H. Platt, 1891

Scientists at Work

about 1894/1895

oil on canvas

William Holbrook Beard

born Painesville, OH 1824--died New York City 1900

Private collection

George Beard's painting poked fun at America's adulation of science. It also may express the artist's opinion of the debates over evolution that were raging across the nation during the latter decades of the nineteenth century.

Thomas Alva Edison

1907

gelatin silver print

Pach Brothers Studio (established 1867)

National Portrait Gallery, Smithsonian Institution, NPG.93.388.9

Thomas Edison was one of the most prolific and celebrated American inventors of the nineteenth century. He developed a collaborative system of invention at his laboratory in Menlo Park, New Jersey, where scores of scientists, electricians, and mechanics worked together under his direction to create new devices. Menlo Park proved the practicality of its innovative work system by filing an average of forty patents a year, or approximately one every nine days.

Samuel F. B. Morse

1831

marble

Horatio Greenough

born Boston, MA 1805--died Somerville, MA 1852

Smithsonian American Art Museum, Gift of Edward L. Morse

Samuel F. B. Morse began his career as an artist and produced a series of highly acclaimed paintings, including portraits of the most celebrated personages of the day. While working as a painter, he labored to instill in his fellow Americans the idea of the vital role of the arts in the development of the United States. Because of a lack of steady patronage, Morse ultimately abandoned art and devoted his time to further development of the electromagnetic telegraph he unveiled in 1837.

Patent Model of Machine for Making Paper Bags

U.S. Patent No. 220925

1879

wood, brass, paper, and paint

Margaret E. Knight

born York, ME 1838--died Framingham, MA 1914

Smithsonian Institution, National Museum of American History, Kenneth E. Behring Center

The darkness of the world [is] kept more dense, and its civilization retarded, by all forms of thought, customs of society, or systems of law which prevent the full development and exercise of woman's inventive powers.

---Matilda Joslyn Gage, 1883

Art and Invention

Nineteenth-century painters, sculptors, and designers hoped to convince their fellow citizens that accomplishments in the arts were part of America's nation-building work. They believed that art's refinements would nurture social stability and pointed out that skill in visual representation would allow scientists and inventors to record their observations accurately. Still, most Americans remained suspicious of "luxurious" art. Colonel John Trumbull, one of the nation's most esteemed artists and a revolutionary hero, summed up the prospects of an artist in the United States. He told a young painter who sought his advice, "You had better learn to make shoes. Better to make shoes than to become a painter in this country."

Interior of a Smithy

1815

oil on canvas

Bass Otis

born Bridgewater, MA 1784--died Philadelphia, PA 1861

Courtesy of the Pennsylvania Academy of the Fine Arts, Gift of the Artist, 1845.2

Interior of a Smithy portrays a blacksmith shop where a water-powered wheel drives a forging operation at the center of the canvas. During the first half of the century, workers were scarce in the United States, and businesses large and small eagerly adopted labor-saving technologies. The artist took a keen interest in the nation's mechanical advances because he, too, was an inventor. Bass Otis patented a perspective protractor (a device for painters) and experimented with surgical saws and chemical processes. He also was one of the first American artists to work with lithography, a new printing technology.

Prototype for Canvas Stretcher Telegraph Receiver

1837

wood, brass, jute, paper

Samuel F. B. Morse

born Charlestown, MA 1791--died New York City 1872

Smithsonian Institution, National Museum of American History, Kenneth E. Behring Center

I do not pretend that the mechanism of the first forms of the telegraph was not rude, and even uncouth when compared with . . . the hundreds of accomplished mechanics who have brought to the work their incomparable ingenuity and skill, but I think I may justly claim that the essential characteristics of a new art were demonstrated even in the rudest instruments, constructed in the earliest times of the invention.

---Samuel F. B. Morse, 1867

Patent-Office, Washington, D.C. --- Examiners at Work

1869

hand-colored wood engraving on paper

Theodore R. Davis

born Boston, MA 1840--died Asbury Park, NJ 1894

National Portrait Gallery, Smithsonian Institution, Washington, DC

In 1790 the United States passed its first patent law, which allowed inventors to own and profit from their creations for a period of time. The construction of a grand Patent Office building began in 1836 on land that had originally been set aside for a national cathedral or a pantheon of American heroes. Instead, the massive structure erected on the site was a “Temple of Invention” that showcased the creative talents of average citizens. The patent office required inventors to prove through drawings and small models that their inventions were new and useful. By the 1850s, patent models from every part of the country filled the great building. Abraham Lincoln explained that the nation’s patent laws energized America’s everyday inventors by adding “the fuel of interest to the fire of genius.”

Corliss Engine

about 1876

silver albumen print

Centennial Photographic Co. (active 1870s--1880s)

Print and Picture Collection, Free Library of Philadelphia

The Corliss Engine does not lend itself to description; its personal acquaintance must be sought by those who would understand its vast and almost silent grandeur. . . . Yes, it is still in these things of iron and steel that the national genius most freely speaks.

---William Dean Howells, 1876

The Science of Mechanics

(Providence, RI: Hutchens and Cory, 1829)

book, open to Frontispiece, Double Acting Steam Engine

Zachariah Allen (1795--1882)

Private collection

There is among all classes of people in this Republic a vivacity of inquiry, and an intelligence upon subjects relating to Mechanics.

---Zachariah Allen, 1829

Chemical Atlas; or, the Chemistry of Familiar Objects

(New York: D. Appleton and Company, 1857, copyright 1854)

book, open to Pl. XI, Chemistry of Combustion and Illumination; Structure of Flame

Edward L. Youmans (1821--1887)

Special Collections (Dibner Library), Smithsonian Institution Libraries, Smithsonian Institution, Washington, DC

Edward Youmans, editor and founder of *Popular Science* magazine, pioneered innovative color graphics to communicate quantitative information. A page of his *Chemical Atlas* combined color printing and hand tinting to give a novel visual description of the chemical structure of a flame.

Geology

Geology was the most popular science in nineteenth-century America, and artists and photographers steeped themselves in geological theory. Many adopted the disciplined observation methods of professional scientists and carefully documented unusual rock formations in their works. Geologists and artists collaborated in the reconnaissance of the nation’s vast and still expanding territory. The images that resulted from their explorations acquainted viewers with every region of the country and helped create a vision of a whole and unified nation.

A Statistical Atlas of the United States Based on the Results of the Ninth Census 1870

(New York: Julius Bien, Lith., 1874)

book, open to Pl. XXXI, Chart Showing the Ratio of Church Accommodation

Francis A. Walker (1840--1897)

Special Collections, Research Annex, Smithsonian Institution Libraries, Washington, DC

Nineteenth-century Americans worried constantly about the progress of their “Great Experiment” in democratic government. They hungered for authenticated facts about such subjects as the growth of industry and the country’s agricultural resources. The emerging

science of statistics offered measurable ways to evaluate the nation's well-being. *Statistical Atlas of the United States* employed revolutionary printmaking techniques to convey quantitative information gathered in the national census of 1870. This image's highly innovative graphic design describes the range of Americans' religious affiliations.

Water Power

It is probably safe to say that in no other country in the world is an equal amount of water-power utilized. . . . In regard . . . to the number and importance of its large improved [rivers], this country stands pre-eminent.

---George F. Swain, 1885

Allegory of the Waterworks (The Schuylkill Freed)

1825

painted Spanish cedar

William Rush

born Philadelphia, PA 1756--died Philadelphia, PA 1833

Philadelphia Museum of Art, on loan to the Philadelphia Museum of Art from the Commissioners of Fairmount Park

Sculptor William Rush portrayed Philadelphia's Schuylkill River as an elegant woman in a classical gown holding her hand above a waterwheel, a vision of an American waterway transformed by human inventiveness. The wheel is the symbol of the city's steam-powered Fairmount Waterworks, an hydraulic pumping station that nineteenth-century Americans hailed as a technological wonder. Rush's sculpture links Philadelphia's innovative waterworks to the art and engineering feats of ancient Greece and Rome.

Lowell Hydraulic Experiments

(Second ed. New York: D. Van Nostrand, 1868)

book, open to Pl. VIII, Centre Vent Wheel at the Boott Cotton Mills

James B. Francis (1815--1892)

Private collection

It was not the steam engine but rather the water-driven mill that powered America for most of the nineteenth century. For the people of the United States, the water mill was a symbol of the famous innovations that proved the nation's inventive genius. Visual representation helped engineers conceive of improvements that increased the power of the mills. James Francis, chief engineer at the famed Lowell textile mills in Massachusetts, made hundreds of drawings to analyze the hydraulic energy generated by different kinds of waterwheels and turbines. Even today, his work remains a standard reference in the field of hydraulics.

Meteorology

Every nineteenth-century American seemed to be a meteorological expert. A love of gathering and sharing information about weather united people across the country. Landscape artists participated by filling their canvases with authentic depictions of wind, clouds, and unusual atmospheric effects such as rainbows. The nation's enthusiasm for meteorology, a science that helped citizens make predictions, expressed the forward-looking character of a country powered by the idea of progress.

Buffalo

I remember my first and my succeeding impressions of Niagara; but never did I see an incarnation of vast multitude, or resistless force, which impressed me like the main herd of the buffalo . . . I only wished to look . . . till I could realize or find some speech for the greatness of Nature that silenced me.

---Fitz Hugh Ludlow, 1870

The buffalo was the icon of America's natural abundance and the dynamic energy of its people. Nineteenth-century citizens took great pride in the teeming herds of bison that covered the prairie, but they wondered about the place of wild creatures in their expanding nation. Charles Willson Peale, the Philadelphia artist and museum founder, advised Americans to safeguard the country's wildlife. He taught that studying the habits of animals was a way for democratic citizens to learn about the natural laws of wise governance that wild creatures modeled. Over the course of the nineteenth century, millions of bison would lead the people of the United States in an

extended course of instruction. The lesson of the buffalo was so monumental and profound that, even today, Americans are still trying to comprehend its full meaning.

The Last of the Buffalo

about 1888

oil on canvas

Albert Bierstadt

born Solingen, Germany 1830--died New York City 1902

Private collection

As Albert Bierstadt put the finishing touches on this painting, the people of the United States learned that the last of the great buffalo herds had vanished. Hide hunters still wandered the plains, guessing that the bison had merely migrated north into Canada and would soon return. By the late 1880s, however, the United States Army confirmed that the herds that had once covered the prairie were no more.

Buffalo Bull, Grazing on the Prairie

1832--1833

oil on canvas

George Catlin

born Wilkes-Barre, PA 1796--died Jersey City, NJ 1872

Smithsonian American Art Museum, Gift of Mrs. Joseph Harrison Jr.

Beginning in 1830, artist-explorer George Catlin made five trips to the western frontier. He was inspired to go west by the idea that America's native people and its great herds of buffalo would soon melt away in the face of advancing civilization.

Bos americanus, American Bison or Buffalo, No. 12, Pl. LVII

1845

hand colored lithograph

John T. Bowen, lithographer

born England, about 1801--died Philadelphia, PA about 1856

after John James Audubon

born Les Cayes, Haiti 1785--died New York City 1851

Buffalo Bill Historical Center, Cody, WY, Gift of the Coe Foundation, 159.69

In 1843, John James Audubon noted that the size of America's buffalo herds was rapidly decreasing. "What a terrible destruction of life, as it were for nothing," he lamented. "Daily we see so many that we hardly notice them more than the cattle in our pastures about our homes. But this cannot last; even now there is a perceptible difference in the size of the herds, and before many years the Buffalo, like the Great Auk, will have disappeared."

The Far West. --- Shooting Buffalo on Line of the Kansas-Pacific Railroad

from *Frank Leslie's Illustrated Newspaper*, June 3, 1871

wood engraving on paper

Ernest Griset

born Boulogne, France 1843/1844--died London, England 1907

Private collection

In the 1870s and 1880s, railroad companies offered low fares for daylong buffalo hunts. Passengers were allowed to fire their weapons from the windows and tops of trains. An artist who joined a railroad hunt as a magazine reporter described what he saw: "It would seem to be hardly possible to imagine a more novel sight than a small band of buffalo loping along within a few hundred feet of a railroad train in rapid motion, while the passengers are engaged in shooting, from every available window, with rifles, carbines, and revolvers. An American scene, certainly."

The Big Tree

I told our guide that I could not stand to look at a bigger [tree] without taking chloroform.

---P. T. Barnum, 1870

In 1850, gold rush adventurers came upon a forest of giant redwoods in California's Sierra Nevada. They gazed in awe at trunks that were wider than steamships and limbs towering three hundred feet above them. The news of trees as old as the pyramids and taller than the tallest buildings on earth soon spread from the mining camps to the rest of the country. For former miners looking for new enterprises, the big trees represented another kind of mother lode: a quantity of timber that beggared description.

The giant sequoias of Yosemite's Mariposa Grove were protected by an act of Congress in 1864, but loggers continued to cut them in other parts of the state. Big tree lumber was ill-suited for construction, however. It usually was shipped to agricultural areas to be used for grapevine stakes and trays for drying raisins. Ralph Waldo Emerson seemed to comment on such work when he described the United States itself as a growing plant: "Alas for America as I must so often say, the ungirt, the diffuse, the profuse, procumbent, one wide ground of juniper, out of which no cedar, no oak will rear up a mast to the clouds! It all runs to leaves, to suckers, to tendrils, to miscellany. . . . America is formless."

Giant Redwood Trees of California

about 1874

oil on canvas

Albert Bierstadt

born Solingen, Germany 1830--died New York City 1902

Collections of Berkshire Museum, Pittsfield, MA, Gift of Zenas Crane

The most celebrated painter to travel the great distance to California in the 1870s was Albert Bierstadt. He was famous across America for his portrayals of big things: big buffalo herds, big mountains, big western skies. Art critics said it was impossible for any artist to capture the wonder of the giant redwoods, but Bierstadt was determined to try. The eminent landscapist finally produced a canvas that showed only the base of the big trees, as if conceding that his painterly talents were no match for the sublime verticality of the Mariposa Grove.

The painting includes a band of Native Americans who point to a very different art of landscape. Nineteenth-century scientists counting the giant sequoias' thousands of concentric rings began to speak of the pyramids and the Parthenon, but they might also have spoken of the enduring landscape art of the tribes that thrived in the region of the big trees. The whole of California was their great canvas, made up of carefully tended habitats that supported some of the highest-density populations in North America. The land's original people sustained their diverse societies over millennia through their broad knowledge of nature. Bierstadt's vision of ancient trees and people begged a question of the newcomers who were its audience: what were they cultivating, for whom, and for how long?

Botany

The United States was a nation of "botanizers" during the nineteenth century. Schoolchildren learned to identify plant types when they learned to read, and rural and city folk roved in wooded areas to search for botanical specimens. Knowledge of botany played a significant role in the United States' economic declaration of independence from Europe, as plant scientists worked to propagate useful North American species and experimented with imported varieties to promote homegrown agriculture and industry. Artists also were intimately connected to the science of botany, which they viewed as an essential part of their training. Painters and printmakers studied plants to hone their observation skills and to stimulate interest in their works by calling attention to the country's unique flora.

No Cross, No Crown

1874

albumen print of a photogram

Anna K. Weaver

active in Salem, Ohio, 1870s

Smithsonian American Art Museum, Museum purchase from the Charles Isaacs Collection made possible in part by the Luisita L. and Franz H. Denghausen Endowment

No Cross, No Crown combines references to spiritual belief and botany in a photogram, an image made by arranging objects on light-sensitive paper. When Anna K. Weaver created her picture, many accomplished women botanists were struggling in vain to join the nation's ranks of male professionals. Even the eminent Elizabeth Britton, author of hundreds of botanical articles and founder of two botanical societies, was awarded only an "honorary" curatorship at the New York Botanical Garden, which she also helped to found. In the context of its time, Weaver's innovative image makes a poignant connection to the plight of those who were challenging the convention that females should devote their talents to cooking, embroidery, and other domestic arts.

The Initials

1864

oil on canvas

Winslow Homer

born Boston, MA 1836--died Prout's Neck, ME 1910

Private collection

Winslow Homer used the subject of a tree to tap into emotions that were uppermost in the national psyche at the end of the Civil War. A pine, paired with a young woman who touches initials carved in its bark, dominates the center of the canvas. The crossed cavalry swords on the front of the tree serve as a reminder of men cut down in the war and a sweetheart who is gone. The woman reading what a tree says serves as a reminder of other struggles in American society. She stands for generations of female plant specialists who fought to claim botany as a viable realm of female endeavor. Homer's protagonist also evokes the many American women who spearheaded campaigns to protect heritage trees and safeguard local woodlands against indiscriminate logging.

Rubens Peale with Geranium

1801

oil on canvas

Rembrandt Peale

born Bucks County, PA 1778--died Philadelphia, PA 1860

National Gallery of Art, Washington, DC, Patrons' Permanent Fund

In 1801 Rembrandt Peale, son of the famous Philadelphia naturalist and museum founder Charles Willson Peale, painted this portrait of his brother. Rubens Peale was captivated by plants from early childhood, and the portrait shows him holding a potted geranium, one of the first in the United States. He was especially proud of his finicky exotic, which he had coaxed from seed to flowering maturity. Rubens was fluent in the scientific description of plants and knew the characteristic flower and leaf shapes of countless varieties. He is not looking at the geranium, however, and his unused pair of spectacles posits the possibility of insights unrelated to seeing. Rubens places two fingers at the plant's base to check the moisture of the soil. This gesture connects him to older ways of knowing plants and to practices related to medicine, healing, and magic. He is engaged in a kind of diagnosis, one that is rooted in an ancient human connection to the earth.

Asher Brown Durand

1857

oil on canvas

Daniel Huntington

born New York City 1816--died New York City 1906

The Century Association, New York

Asher B. Durand, one of the most successful American artists of the nineteenth century, made trees his artistic specialty. His beeches, chestnuts, and elms graced the morning rooms of wealthy industrialists and hung in fashionable New York galleries. Audiences praised the botanical accuracy of Durand's paintings, and amateur botanists used them to memorize the orbicular, lobed, and toothed leaf shapes described in botany texts. Durand said that the ability to describe a tree began an artist's training. He directed would-be painters to "observe particularly wherein [the tree] differs from those of other species; in the first place, the termination of its foliage . . . ; next mark the character of its trunk and branches, the manner in which the latter shoot off from the parent stem, their direction, curves, and angles."

Niagara Falls

*Whate'er I've been told of thy wonders is true!
All nature at once seems to rush on my view,
And, lost in the trance you occasion, I cry,
How stupendous the scene! what an atom am I!*
---"Lines Written at Niagara," *Port Folio*, 1807

Niagara Falls was one of the United States' most celebrated scenic wonders during the nineteenth century, a place for artists, poets, and sweethearts. The site was also a turbine for scientific insights and engineering innovations. With its immense power derived from the various bodies of water that converged at the falls, Niagara emerged as a symbol of a mighty nation founded on the idea of *E Pluribus Unum*.

The Great Horseshoe Fall, Niagara
1820

oil on canvas

Alvan Fisher

born Needham, MA 1792--died Dedham, MA 1863

Smithsonian American Art Museum, Museum purchase

Artist Alvan Fisher traveled to Niagara Falls during the summer of 1820 when formerly impassable roads were improving and tourism was booming. Fisher was careful to show in his painting that a visit to Niagara was not for sissies. His panoramic view includes a pair of men helping a companion over the bank as he returns from the dangerous flight of wooden steps leading down to the river. Contemporary newspapers were filled with stories about the harrowing ordeal of the stairs. Rickety and wet with spray, they subjected those fit enough to attempt them to buffeting winds and crumbling rocks that threatened to give way. Guidebooks touted the experience of the Niagara staircase as an immersion in God's power.

View of Niagara Falls in Moonlight
1872

oil on canvas

Hermann Herzog

born Bremen, Germany 1831/2--died Philadelphia, PA 1932

Michele and Donald D'Amour Museum of Fine Arts, Springfield, Massachusetts, The James Philip Gray Collection, with additional benefits from the bequests of Richards Haskell Emerson, Ethel G. Hammersley, and Henry Alexander Phillips

The artist Hermann Herzog created this unusual night view of Niagara from the vantage point of a highly innovative railroad suspension bridge erected at the falls in the 1850s.

Niagara
1893

oil on canvas

George Inness

born Newburgh, NY 1825--died Bridge of Allan, Scotland 1894

Hirshhorn Museum and Sculpture Garden, Smithsonian Institution, Gift of the Joseph H. Hirshhorn Foundation, 1966

When George Inness painted Niagara Falls in 1893, a group of engineers, financiers, and inventors were working out the final details of an immense hydroelectrical project to be located at the falls. The new system would generate and transmit electricity on an unprecedented scale. Many Americans deplored the plan as a desecration of a national icon, but others welcomed the new technologies. Inness connected to the inventive energies swirling around the falls and released his painting from the conventions that had guided artistic portrayals of the site for more than one hundred years. We discern the deluge of Niagara behind a sheet of aqueous colors and forms that sets our imaginations adrift. A red flag in the foreground and a smoking industrial chimney float like signal buoys in the painting's strange dreamscape, the artist's nebulous vision of the United States at the threshold of illumination.

Niagara

1857
chromolithograph
Day and Son, publisher
after Frederic Church
born Hartford, CT 1826--died New York City 1900
Castellani Art Museum of Niagara University Collection. Generous Donation from Dr. Charles Rand Penney, partially funded by the Castellani Purchase Fund, with additional funding from Mr. and Mrs. Thomas A. Lytle, 2006

Frederic Church was the United States' leading artist at midcentury. His landscapes encompassed a moral and scientific vision of nature. Word spread in 1856 that Church was at Niagara making studies for an important painting, and audiences nationwide waited with keen expectation. This lithograph reproduces in small scale the grand painting the artist completed in 1857. Church pared out almost all but water from the scene, leaving only a sliver of landscape in the distance as a life raft for the eye. The picture shows the view across Horseshoe Falls, beneath which a treacherous ledge awaited visitors brave enough to attempt to cross it. Church casts the viewer on the waters an instant before the plunge into the chasm below, creating a lover's leap that unmoors the sense of an individual self. One reviewer summed up the country's intensely patriotic response to Church's *Niagara* when he praised it as a "true development of the American mind; the result of democracy, of individuality . . . of the liberty allowed to all."

Railroad

The Americans are a restless, locomotive people.
---Captain Frederick Marryat, 1840

Nineteenth-century artists, scientists, and inventors joined hands in creating the railroad system of the United States---the largest in the world. While engineers and mechanical innovators refined the technologies of steam locomotion, the nation's image makers helped to elicit consensus among the citizenry about what railroads were and where they would take the nation. Painted landscapes of the nation's scenic wonders directed the location of railroad lines to remote places and inspired travelers to visit them. In popular prints of trains speeding across the countryside, the uncomfortable jerks and blanketing soot of early railway travel emerged as an exciting excursion aboard a technological marvel. One observer predicted in 1838 that the new system would "bind together with ribs of steel the whole of this great country."

Starrucca Viaduct, Pennsylvania

1865
oil on canvas
Jasper Francis Cropsey
born Rossville, NY 1823--died Hastings-on-Hudson, NY 1900
Lent by the Toledo Museum of Art, Purchased with funds from the Florence Scott Libbey Bequest in Memory of her Father, Maurice A. Scott

The Starrucca Viaduct at Lanesboro, Pennsylvania, was one of the nation's grandest engineering projects and a structure that Americans acclaimed as the Eighth Wonder of the World. Many American railroad bridges of the period were hastily built wooden affairs that routinely collapsed under the weight of locomotives. Jasper Francis Cropsey chose to portray a railroad bridge that had provided safe passage for years, nestled within an autumn landscape where technology and nature have reconciled.

The Lackawanna Valley

about 1856
oil on canvas
George Inness
born Newburgh, NY 1825--died Bridge of Allan, Scotland 1894
National Gallery of Art, Washington, DC, Gift of Mrs. Huttleson Rodgers, 1945.4.1

In the mid-1850s, the Delaware, Lackawanna, and Western Railroad hired George Inness to portray their line and roundhouse at Scranton, Pennsylvania. The artist created an unembellished vision of the railroad business, with a coal-hauling train at the center of the canvas and a field of tree stumps in the foreground. The company's directors initially rejected *The Lackawanna Valley*, but the painting was a confident endorsement of the railroad expressed in the terms of its day. George Inness said he preferred to depict the

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Wall Text, The Great American Hall of Wonders
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“civilized landscape” that showed “every act of man,” judging it “more worthy of reproduction than that which is savage and untamed.”

East and West Shaking Hands at Laying of the Last Rail

1869

ambrotype

Andrew Joseph Russell

born Walpole, NH 1830--died New York City 1902

Union Pacific Railroad Museum, Council Bluffs, IA

The United States' transcontinental railroad was completed in 1869 when the Union Pacific line and the Central Pacific's track met in the alkaline wastes of Promontory Point, Utah. A. J. Russell, official photographer for the Union Pacific, captured the moment that Americans celebrated as the fulfillment of the nation's grand destiny. The photograph shows railroad directors and state officials shaking hands and raising a champagne bottle as they gather with some of the gaugers, spikers, and bolters who built the line. The inventive Russell chose to crop out of his picture evidence of the day's dust storm and the Chinese laborers waiting to lay the last rail.

The Last Spike

1869

17 6/10 carat gold alloyed with copper

William T. Garrett Foundry, San Francisco

Iris & B. Gerald Cantor Center for Visual Arts at Stanford University, Gift of David Hewes

During the Civil War, Congress passed the Pacific Railroad Act to lay out the terms of what the *New York Times* called the “greatest undertaking of western civilization”: the building of the transcontinental railroad. After six years of backbreaking labor, crews of Chinese, Irish, and native-born laborers laid the last rails at Promontory, Utah. Central Pacific director Leland Stanford was nominated to drive the last spike of the transcontinental line, but he missed with the sledgehammer strike that was to mark the nation's crowning moment. Some of the assembled workers came to Stanford's rescue, and the spike was hammered home. A telegraph wire tapped out the news to crowds waiting across the United States, sparking three days of national festivities and the ringing of church bells from San Francisco to Boston.

The Gun

[Americans] may be considered as peculiarly distinguished for possessing the faculty of sight in a great degree of accuracy and perfection. . . . There is that skill in gunnery which may be almost regarded as a national characteristic.

---*Analectic Magazine*, 1815

The gun was a centerpiece of American invention for much of the nineteenth century and an essential tool in the national effort to settle the American continent from coast to coast. The United States' armories represented the leading edge of new machine technologies. Americans were fiercely proud of their reputation for expert marksmanship, and their innovations greatly increased the range and accuracy of firearms. While rifles and pistols became favorite subjects in paintings and prints of the frontier, the nation's ability to promote democratic consensus and equality among its citizens lagged behind the rapid development of gun technologies.

Colonel Samuel Colt

1856

watercolor on ivory

attributed to Gerald Hayward

born Port Hope, Canada 1845--died New York City 1926

Wadsworth Atheneum Museum of Art, Hartford, CT, Bequest of Elizabeth Hart Jarvis Colt, 1905.67

Samuel Colt invented a revolver that could fire six shots without reloading, and the Colt revolver became one of the most popular weapons in the United States. Its inventor gave a simple reason for buying his products: “The good people of this world are very far from being satisfied with each other and my arms are the best peacemakers.”

Marsh with Hunter

1874

oil on canvas

Martin Johnson Heade

born Lumberville, PA 1819--died St. Augustine, FL 1904

Private collection

The artist and avid hunter Martin Johnson Heade painted a scene of one of his favorite pastimes: wing shooting, the sport of shooting birds in flight. Heade was a longtime contributor to *Forest and Stream*, and he joined the growing ranks of late-century sportsmen who saw themselves as champions for the conservation of wildlife. "The pleasure of . . . shooting does not consist alone in the mere act of killing a bird," the artist explained. "The soul of the true sportsman is also keenly alive to the beauties of nature."

The Trapper's Last Shot

about 1850

lithograph

William Tylee Ranney

born Middleton, CT 1813--died West Hoboken, NJ 1857

Courtesy of the Bancroft Library, University of California, Berkeley, Robert J. Honeyman Jr. Collection

The Trapper's Last Shot shows a frontiersman in a fix. He sits on a horse standing up to its hocks in water, and the animal's pricked ears and wild eye show that it's afraid of something approaching in the tall grass. The title indicates that the trapper has one bullet left in his arsenal, and his aim with this "last shot" is all that stands between him and a violent death at the hands of the Indians who reside in the territory. The artist's visualization of a skirmish between a white westerner and Native Americans tapped into fears very much on the public's mind as eastern settlers moved into the homelands of Omaha, Blackfeet, Chippewa, and other native people.

On the Warpath

1851

oil on canvas

Arthur Fitzwilliam Tait

born Liverpool, England 1819--died Yonkers, NY 1905

American Museum of Western Art --- The Anschutz Collection

In the 1840s the frontiersman rode into artworks in urban galleries and magazine and book illustrations seen by millions of Americans. Artists discovered that satisfying the public's growing appetite for pictures of rough and ready westerners was refreshingly profitable. The new American hero emerged on canvas as a man who knew his way around a rifle. The blending of uncouth frontier ways with the cultivated sensibilities of art was something of a contradiction, but viewers embraced images of straight-shooting trappers and scouts as a fitting expression of the national character.

Filling Cartridges at the United States Arsenal at Watertown, Massachusetts, from *Harper's Weekly*, July 20, 1861

wood engraving on paper

Winslow Homer

born Boston, MA 1836--died Prout's Neck, ME 1910

Smithsonian American Art Museum, The Ray Austrian Collection, gift of Beatrice L. Austrian, Caryl A. Austrian and James A. Austrian

Mass-production techniques pioneered at the United States' armories allowed the Union to fabricate weapons in unprecedented quantities during the Civil War. The yearly production of small arms expanded from thirty thousand at the start of the war to more than seven hundred thousand at its conclusion. It is estimated that 620,000 men died in the Civil War. Firearms cannot be awarded full credit for these casualties---disease and infection were the most efficient killers---but they were the instruments of a military machine that Americans fueled with their hatreds.

The Army of the Potomac---A Sharpshooter on Picket Duty from *Harper's Weekly*, November 15, 1862

wood engraving on paper

Winslow Homer

born Boston, MA 1836--died Prout's Neck, ME 1910

Smithsonian American Art Museum, Gift of International Business Machines Corporation

Winslow Homer created an image of a Union sharpshooter while working as an artist-correspondent for *Harper's Weekly* during the Civil War. The soldier looks through the sight of a telescopic rifle as he searches for a target. Sharpshooters were called for duty when there was a lull in the action and weary soldiers from both North and South were resting. Reviled as "murderers" by both sides, sharpshooters usually were executed if captured. Years after the Civil War ended, Homer recounted his memory of peering through the scope of a telescopic rifle in a company of Union sharpshooters. "I looked through one of their rifles once when they were in a peach orchard in front of Yorktown in April, 1862," he recalled. "The . . . impression struck me as being as near murder as anything I ever think of in connection with the army & I always had a horror of that branch of the service."

Worker Using a Deburring Machine at the Colt Factory

1850s

photo reproduction

Unidentified artist

Museum of Connecticut History at the Connecticut State Library, Hartford

In the 1850s, the Colt factory in Hartford, Connecticut, was the largest and most advanced armory in the world. After a tour of the establishment, Mark Twain wrote about its "tangled forest of rods, bars, pulleys, wheels, and all the imaginable and unimaginable forms of mechanism." He noted that a visitor could "stumble over a bar of iron as he goes in at one end of the establishment, and find it transformed into a burnished, symmetrical, deadly [revolver] as he passes out at the other." Twain concluded, "It must have required more brains to invent all those things than would serve to stock fifty Senates like ours. I took a living interest in that birth-place of six shooters, because I had seen so many graceful specimens of their performances in the deadfalls of Washoe and California."

The Great Industries of the United States

(Chicago and Cincinnati: J. B. Burr, Hyde, and Co., 1872)

book, open to p. 947, The Gatling Gun

Horace Greeley (1811--1872), et al.

Private collection

Richard Gatling devised the first functional machine gun and unveiled it during the Civil War. He also created a broad-reaching promotional campaign to introduce the novel weapon to Union military leaders and the general public. The Gatling gun was advertised as a machine that helped soldiers by applying the efficiencies of peaceful production to the business of warfare. One promotion stated that the Gatling gun would "more than double the strength of our armies in the field" and thus "save lives, wounds and sickness, by lessening the number subjected to the perils of war."

The Clock

Wherever we have been in Kentucky, in Indiana, in Illinois, in Missouri, and . . . in every dell of Arkansas, and in cabins where there was not a chair to sit on, there was to be sure a Connecticut clock.

---George Featherstonhaugh, 1844

The Declaration of Independence claimed for the people of the United States the right to pursue happiness and the freedom to define how and when they would pursue it. The American Revolution, when "thirteen clocks were made to strike together," was a revolution in the conception of time. As Americans threw off their obligations to foreign masters, Democratic Time dawned over the land. The new Time represented the value of the minutes, days, and weeks of individuals empowered by democracy, social mobility, and economic opportunity. Democratic Time also stood for the promise that the nation's bounty was there for the taking and that the rightful takers would be those that got there first.

Mother's Watch

about 1850

oil on canvas

James Goodwyn Clonney

born Liverpool, England 1812--died Binghamton, NY 1867

Westmoreland Museum of American Art, Greensburg, Pennsylvania, Gift of Mr. and Mrs. Norman Hirschl, 1975.102

James Goodwyn Clonney's painting comments on the responsibilities of American women. Mother has fallen asleep on her watch, and a pair of mischievous offspring have pilfered her pocket timepiece. Nineteenth-century females were charged with the physical and moral nurturing of their children, husbands, and extended families. Napping was not on the agenda. The homemaking expert Catharine Beecher warned of the divine wrath that awaited those who neglected their responsibilities: "A woman is under obligations so to arrange the hours and pursuits of her family, as to promote systematic and habitual industry; and if . . . she . . . refrains from promoting regular industry in others, she is accountable to God for all the waste of time consequent on her negligence."

Listening to Father's Watch

1857

oil on board

Lilly Martin Spencer

born Exeter, England 1822--died New York City 1902

Currier Museum of Art, Manchester, NH, Gift of Henry Melville Fuller

Lilly Martin Spencer, a prominent Ohio artist and mother of thirteen children, knew a thing or two about time management. The income from the sale of her paintings was the primary means of support for her family while her husband moved through a series of occupations. The Spencer household was highly unconventional in a period when middle-class women did not have careers. Spencer often used her husband and children as models for canvases like this one. By working for a living she questioned the prevalent mores that compelled women to devote their time to the domestic sphere.

New England Factory Life --- "Bell Time"

1868

wood engraving on paper

Winslow Homer

born Boston, MA 1836--died Prout's Neck, ME 1910

Smithsonian American Art Museum, The Ray Austrian Collection, gift of Beatrice L. Austrian, Caryl A. Austrian and James A. Austrian

In 1868, Winslow Homer took up the subject of people who worked in textile mills. Mill operatives' activities were organized by bells that rang throughout the day. Before mid-century, Americans viewed factories as places where respectable folk—mostly women—could earn a decent income and make a contribution to the nation's industrial transformation. By the time Homer created his picture, native-born farmwives and their daughters had long been absent from the mills. Recent immigrants and the desperately poor replaced them at the looms, the only takers for work that offered the barest sustenance.

Drawing for Patent Application for Samuel Applegate's Device for Waking Persons from Sleep

U.S. Patent No. 256265

1882

photo reproduction

Unidentified artist

National Archives and Records Administration

In 1882, an inventor named Samuel Applegate took out a patent for a device that would rouse even the heaviest sleepers. Applegate described the novel features of his Device for Waking Persons from Sleep in his patent application. "I suspend a light frame in such a position that it will hang directly over the head of the sleeper . . . whereby the frame is at the proper time permitted to fall into the sleeper's face. . . . The only necessity to be observed [in] the frame being that when it falls it will strike a light blow, sufficient to awaken the sleeper, but not heavy enough to cause pain." Applegate's device was premised on the idea that any American who slumbered as a new day dawned would appreciate a timely knock upside the head.

Landscape with Rainbow

1859

oil on canvas

Robert S. Duncanson

born New York State, 1821--died Detroit, MI 1872

Smithsonian American Art Museum, Gift of Leonard and Paula Granoff

The acclaimed African American artist Robert Duncanson was a wonder in his time. The doors of the art salon, the company boardroom, and the university were closed to black Americans when he created this painting. Most African Americans were slaves on southern plantations, but even free blacks in the North were confined to the most menial jobs as farmhands and porters. Duncanson envisioned something different, and, outfitted with his brush and tubes of paint, he explored the boundaries of what was considered possible in the United States. Critics hailed *Landscape with Rainbow* as a resounding success. One reviewer mused that he “could make almost any sacrifice to lay down by such a river.” In 1861, when a Cincinnati newspaper praised Duncanson as “the best landscape painter in the West,” it recognized his status as an inventor, that most esteemed of American professions. Duncanson’s creation had nothing to do with cams, levers, or patents, however. In claiming his right to participate in the nation’s most elevated endeavors, the intrepid artist had invented himself.