



Voting Machines, American Style

Americans are sometimes ambivalent about their technology. We love the ATM when it works--and hate it when it doesn't. A similar love-hate relationship applies to the invention and development of our voting machines. The recent past has shown how strained and tortuous that relationship could become, with a growing lack of confidence in the patchwork of vote-recording systems used throughout the United States.

Because the Constitution gives states the job of running elections, voting in the United States has developed into a hodgepodge of manual, mechanical, and electronic balloting. Almost every method of vote counting, from the paper-slip ballots used in rural New Hampshire to the gear-and-lever machines of New York to the Votomatic punch-card booklet pioneered in California, is used in some corner of the country today. If there is an advantage to the lack of conformity in what otherwise might be a national ballot, it is that this mix of systems cannot be easily "gamed." That, too, is a local matter. Like voting, politics is local. Thus the love-hate.

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Notes from the Director

With the inauguration just around the corner, we turn our attention to presidents and invention. In these perilous economic times, practically everyone agrees that the nation will need strong presidential leadership to regain its edge in innovation. I can't wait to see what Barack Obama does to fulfill his campaign pledge to spur innovation and improve American competitiveness in business and technology. In the communications area, where he has promised next-generation broadband and universal Internet access, the incoming president has already demonstrated his innovation credentials. With his creative use of the Internet to raise funds, he ran one of the most technologically sophisticated presidential campaigns since FDR turned radio into a formidable political tool and flew into the 1932 Chicago Democratic convention in a Ford Tri-Motor, nicknamed the Tin Goose.

Since the beginning of the republic, Americans have expected their political leaders to support and stand for innovation. A number of technophile chief executives have occupied the White House, starting with George Washington, a strong promoter of roads, canals, and military technology, and continuing with technical experts and engineers such as Herbert Hoover and Jimmy Carter. But what about presidents as inventors?

In that department, Thomas Jefferson has no rivals. Not only was he one of the fathers of the U.S. patent system, he was an estimable inventor in his own right, as any visitor to Monticello can attest. Among the devices that he improved or created himself are the Great Clock in the entrance hall, a novel moldboard for a plow, and a wheel cipher for sending coded messages. On display in the exhibit [The American Presidency: A Glorious Burden](#) here at the National Museum of American History are his improved polygraph, which creates simultaneous copies of a writer's manuscript, and a portable lap desk of his own design, on which he penned the Declaration of Independence.

Although the polymathic Jefferson encouraged invention in every office he occupied, including serving on the first committee of patent examiners when he was secretary of state, he held no patents himself. Despite these official roles, he was openly skeptical of patenting, because he believed it undermined every man's right to invent, a violation of his deeply held democratic values. You might say he was a forerunner of today's "open source" advocates, though for somewhat different reasons.

Our sixteenth president, whose two hundredth birthday we celebrate this year, had no such compunction about patenting. A staunch upholder of the patent system, the mechanically inclined Abraham Lincoln in fact was the only U.S. president ever to hold a patent. One of the treasures of the National Museum of American History is the [patent model](#) Lincoln submitted for buoying riverboats over the shoals that obstructed the shallow waters of western rivers. The innovation was based on a set of inflatable chambers attached to a ship's hull just below the waterline. Although [patent no. 6,469](#) was awarded in May 1849, Lincoln never attempted to market his invention. His patent model, early versions of which he apparently whittled himself, is now on view with explanatory animation in the Museum's new Lincoln bicentennial exhibition, [Abraham Lincoln: An Extraordinary Life](#).

Lincoln's inspiration reputedly came from many years of navigating the Mississippi, Illinois, and Sangamon rivers, where on occasion he himself ran aground. His technological enthusiasm carried unabated into his presidency, where he engaged with scientists and inventors on a regular basis. Vigorously promoting military inventions during the Civil War, his administration oversaw a "Permanent Commission" of scientists, set up to screen proposals from independent inventors for the Navy Department. In 1863, he signed the bill establishing the National Academy of Sciences, which advises the government on matters of science, technology, and invention. In the end, a lifelong engagement with technology and invention translated into presidential policy.

While we may not expect him to add inventing to a daunting to-do list, it will be fascinating to see whether President Obama, who has publicly identified himself with Lincoln, remains as strong an advocate of inventors and invention in pursuing his ambitious technological agenda.

Happy New Year,
Art Molella
Jerome and Dorothy Lemelson Director



Have You Seen?

The moment that victory was declared for Barack Obama, many of us watched live celebrations from around the world on our television sets. We often take for granted the ease and speed with which we can communicate with others around the world. So we invite you to learn more about the inventor whose work was crucial to launching the global communications revolution: Samuel Morse. He is featured in our *Invention at Play* exhibit, now on view at the Museum, and also on the [Invention at Play](#) website.



Trivia Challenge

In each edition of *Prototype*, we offer a question about an invention or inventor that you and your friends and family can try to answer. Sometimes the answer can be found on the Lemelson Center's website, where you can also learn a little more about the subject. Email your answer to us at prototype@si.edu along with your name and mailing address. Each month we'll select winners randomly to receive a small prize from the Center.

Congratulations to Loyd R. of Ripon, California, and Karen M. of Whites Creek, Tennessee, who (among others) knew that in 1962, while working at General Electric, Nick Holonyak Jr. invented the first practical visible-light-emitting diode, a kind of laser that came to be common in wristwatch time displays. LED technology was used for the time display in the first solid-state quartz watch, the Pulsar, and in most digital watches until 1977, when the LCD (liquid-crystal display) became the preferred choice. You can learn more about Nick Holonyak in our online exploration, [The Quartz Watch](#).

Loyd and Karen will each receive a year's subscription to *Smithsonian* magazine. And thank you to everyone who entered.

This month's question: Only one president--Abraham Lincoln--received a patent, but which other president and farmer sought to use his name as a trademark for flour?



From the Archives

The recent presidential election was the most sophisticated to date in its use of instantaneous communications technology. From television to the Web, the candidates took their messages to prospective voters in multiple formats and with unprecedented speed--just like 1864.

Shortly before the presidential election that year, voters in Nevada accepted a state constitution for admission to the Union as an antislavery state. Time was short for President Lincoln to proclaim Nevada the newest state before his bid for

reelection, and when neither copy of Nevada's constitution (one sent by land, and one by sea) had arrived in Washington by October 24, Governor James W. Nye turned to the "Victorian Internet"--the telegraph. The 16,543-word constitution was relayed by telegraphers from Nevada to Chicago to Philadelphia and then to Washington. It took two days to complete the transmissions, cost an amazing \$4,303.27, and at that time was the longest telegram ever sent. President Lincoln issued the proclamation of statehood for Nevada on October 31, right before winning reelection.

The history of the telegraph unfolds in the Western Union Telegraph Company Records held in the Museum's Archives Center. Spanning the years 1820 to 1995, the collection comprises approximately 400 cubic feet of photographs, scrapbooks, notebooks, correspondence, stock ledgers, annual reports, and financial records that document the evolution of the telegraph, the development of the Western Union Telegraph Company, and the beginning of the communications revolution.

In 1832 Samuel F. B. Morse, assisted by Alfred Vail, conceived the idea for an electromechanical telegraph, and made a crude working model in 1835-36. This instrument probably was never used outside of Professor Morse's rooms where it was, however, operated in a number of demonstrations. This original telegraph instrument was preserved by the Western Union Telegraph Company, which presented it to the Smithsonian Institution in 1950.

The telegraph was further refined by Morse, Vail, and a colleague, Leonard Gale, into working mechanical form in 1837. In this year Morse filed a caveat for it at the U.S. Patent Office. It describes how the flow of electricity through a wire would be interrupted for shorter or longer periods by holding down the key of the device. The resulting dots or dashes were recorded on a printer or could be interpreted aurally.

In 1843 Morse received funds from Congress to set up a demonstration line between Washington and Baltimore. On May 24, 1844, in the U.S. Supreme Court chambers in Washington, Morse sent by telegraph the oft-quoted message to Alfred Vail in Baltimore: "What hath God wrought!"

At this time other telegraph systems based on rival technologies were being built. Some companies used the printing telegraph, a device invented by Vermonter Royal E. House, whose messages were printed on paper or tape in roman letters. In 1848 a Scottish scientist, Alexander Bain, received his patents on a telegraph. These were but two of many competing and incompatible technologies that had developed. The result was confusion, inefficiency, and a rash of suits and countersuits.

The first commercial telegraph line was completed between Washington, D.C., and New York City in the spring of 1846 by the Magnetic Telegraph Company. By 1851 there were over fifty separate telegraph companies operating in the United States. Rather than starting yet another company, Judge Samuel L. Selden, who held the House telegraph patent rights, and investor Hiram Sibley decided to acquire all the telegraph companies west of Buffalo and unite them into a single system. This led, in April 1851, to the organization of the New York and Mississippi Valley Printing Telegraph Company, which later evolved into the Western Union Telegraph Company.

Throughout the remainder of the 19th century the telegraph became one of the

most important factors in the development of social and commercial life in America. In spite of improvements to the telegraph, however, two new inventions--the telephone and the radio--eventually replaced the telegraph as the leaders of the communications revolution for most Americans.

To learn more about the Western Union Telegraph Company Records, [explore the collection finding aid](#).



Inventive Ideas for Schools and Families

Find a penny and make Abraham Lincoln shine! In this experiment, you will try to polish old pennies using lemon juice, milk, and cola. Before beginning an experiment, scientists have a hypothesis, or idea, about what will happen. Make a hypothesis, or guess, about how each liquid will work and write it down.

Scientists and inventors must maintain good records of the experiments they conduct. This helps them keep track of what they do and what happens. If they discover something new, they can go back to look at what they did and try it again! They also use the records to help them change and improve the experiment if something doesn't work.

[Download the experiment worksheet](#) and start testing your hypotheses!

--Steven Madewell, *Interpretive Exhibits Coordinator, Spark!Lab*



Our Podcast--Prototype Online: Inventive Voices

Can you teach someone to be an inventor? The folks who study invention and innovation at the Lemelson Center say yes, you can. Or at least you can give someone, particularly a young person, the tools to think more inventively. In fact, we have a new, hands-on space dedicated to it. It's called Spark!Lab, and it's for families and others visiting the newly renovated National Museum of American History. Go behind-the-scenes with Tricia Edwards, Education Specialist, and Steve Madewell, Interpretive Exhibits Coordinator, to learn more about Spark!Lab. [Tune in!](#)

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Contact us at prototype@si.edu

General Smithsonian Visitor Information: 202-633-1000

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