
EUREKA!



Statement by the President

Our Nation has a rich history of industrial innovation. The United States has been the world leader in developing new products, new processes, new technologies, and in ensuring their wide dissemination and use.

Many of these innovations – half of all the new products in this century – have come from the workshops of small businessmen and women. Their imagination, their skill, and their willingness to risk money and reputation on untried products and ideas have made our economy prosper.

As we move into the 1980s, we face unprecedented challenges to our productivity and our economic well-being. The decade ahead will make new demands on the entrepreneurial spirit that sustained earlier pioneers of innovation and will test our national ingenuity in finding newer, better, and more efficient ways of doing things.

Much of this challenge will be met by the bold, resourceful small business people of this Nation, who, again and again through the years, have demonstrated the worth of ideas whose time had come.

Jimmy Carter

"EUREKA!"

An exhibition sponsored by the Office of Advocacy, U.S. Small Business Administration, Washington, D.C.

Developed and circulated by the Association of Science-Technology Centers, Washington, D.C.

Designed and built by Levy-Kennedy Design, Portland, Oregon.

The following firms assisted in the development of this exhibition:

Bifocal:	American Optical Corporation
Telephone:	American Telephone and Telegraph Company
Phonograph:	BIC/AVNET
Zipper:	Talon-Textron, Inc.
Safety Razor:	The Gillette Company
Ice Cream Cone:	The Isaly Company
Bakelite:	Union Carbide Corporation Stewart R. Browne Manufacturing Company
Light Polarizer:	Polaroid Corporation
Xerography:	Xerox Corporation
Heart Valve:	Edwards Laboratories
Music Synthesizer:	Moog Music, Inc.

Illustrations by Dale Champlin

"Eureka!"

Imagine the excitement that an inventor feels when years of tedious experimentation finally prove fruitful—when a crazy idea becomes a practical reality.

But "Eureka!" only marks the halfway point for the inventor, because even the best idea serves no one if it remains on the drawing board or in the laboratory. In the past two hundred years, American inventors have developed thousands of new ideas—and have begun thousands of small businesses to manufacture their innovations and distribute them to the public.

Sometimes an idea is an immediate success: few people could dispute the attractions of the ice cream cone.

Sometimes an idea needs improvement: the first zipper had a tendency to pop open unexpectedly.

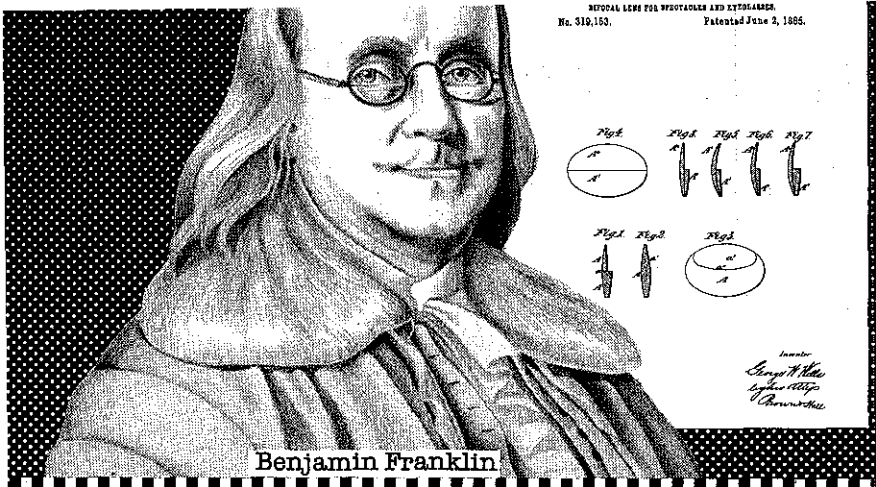
And, sometimes, an idea can founder: Edison's cylindrical phonograph records today are found in antique shops, not record stores.

But no matter what the setbacks, the innovative entrepreneur has always persevered.

This exhibition contains just a dozen of the bright ideas that American entrepreneurs have produced in the past. Their work has helped to change the ways in which we live and work today. Just as the innovative entrepreneurs of today will help improve our lives in the future.

American small businesses continue to contribute half of the technological advances that increase productivity, lighten the work load, improve our standard of living and contribute to the health and vitality of our economy.

As always, small business is an imaginative, creative, dynamic force that ensures the economic, and political, freedom of all Americans.



Bifocal

> "I imagine it will be found pretty generally true, that the same complexity of Glass, through which a Man sees clearest and best at the Distance proper for Reading, is not the best for greater Distances. I therefore had formerly two Pair of Spectacles, which I shifted occasionally, as in traveling I sometimes read, and often wanted to regard the Prospects. Finding this change troublesome, and not always sufficiently ready, I had the Glasses cut, and half of each kind associated in the same Circle . . . By this means, as I wear Spectacles constantly, I have only to move my Eyes up or down, as I want to see distinctly far or near, the proper Glasses always ready..."

So wrote Benjamin Franklin to a friend in 1784, explaining how he happened to combine two existing items into a new invention — his "Double Spectacle," or the bifocal.

Franklin's insatiable curiosity and creative mind prompted him to constantly investigate the world and invent ways of adapting to it. Among his ideas were the Franklin stove, the U.S. postal system, the lightning rod, daylight savings time and the first volunteer fire company. He was a printer, a scientist, a patriot, a diplomat, a civic worker, a philosopher, a writer — and a small business man.

In the last two centuries, dozens of other small business people have pioneered with innovations in the optical industry. One of them was George Washington Wells, of Southbridge, Massachusetts. Although Franklin's bifocals were convenient for the user, they were difficult to make commercially. Wells, treasurer of the nascent American Optical Company, helped to develop bifocal technology in the 1880's — first, by cementing a small lens to the bottom of a larger one, and, later, by heat-fusing the two lenses together.

Franklin's idea — splitting the lens in half horizontally — had always been the best optical design. But it was not until the 1950's that it could be commercially produced, by grinding two different prescriptions into a single lens.

10:05 a.m. Outline events.

Introduce

ANDY LUFF
Entrepreneur-in-residence

SHEILA GRINELL
Association of Science-
Technology Centers

JOY ASCHENBACH
National Geographic

DON PERRY
SBA Public Information

SMALL BUSINESS WEEK SCHEDULE

Two items: Innovation panel Monday, May 12, 1980
2:30 - 5:00 p.m.
Presidential Room
Capital Hilton
16th & K NW

Reception 6:30 - 8:30 p.m.
Geographic Society
1145 17th St. NW

PRESS INVITED - Don Perry

10:10 a.m. MILTON D. STEWART
Chief Counsel for Advocacy
SBA

10:15 a.m. LEONARD J. GRANT
Associate Secretary of
the National Geographic Society

10:20 a.m. Adjourn to roped off area of Explorer's Hall (south section of building).

REMARKS OF A. VERNON WEAVER
ADMINISTRATOR, U.S. SMALL BUSINESS ADMINISTRATION,
BEFORE PRESS PREVIEW OF EUREKA! EXHIBITION IN
MAIN MAST DINING ROOM, 10TH FLOOR,
NATIONAL GEOGRAPHIC SOCIETY, 17TH & M STS., N.W.,
10 A.M. FRIDAY, MAY 9, 1980

I want to thank you ladies and gentlemen of the news media for coming out this morning to see our EUREKA! exhibition, which is, by the way, the first time that our Agency has undertaken such an ambitious exhibition. We will, as you know, be travelling to 10 cities over the next two years with this exhibit which we hope will gain such public empathy for the many contributions that small business people have made, are making today, and will continue to make in the future, for the economic prosperity of this country.

I want also to thank Mr. Grant, the Associate Secretary of the National Geographic for the Society's cooperation and service in making exhibition space possible for this opening.

Most of us recognize that our country has a rich heritage of industrial innovation and that our free enterprise system has, over the years, developed many new products, new processes, and new technologies and have put these processes to work for the benefit of the entire world.

But what we are not so aware of is that half of all the new products developed in this century have come from the workshops of small business people. It is their imagination, their skill, and their willingness to risk money and reputations on untried

ideas and products that make a story worth telling. This is what led the SBA to create this exhibition and show what was in back of the creativeness of 12 small business people featured in this exhibit.

It's our hope that perhaps this exhibition will inspire others to come forth with technological innovations. We will need these new ideas and products, particularly in the decade ahead, as new demands are put on our ability to perform in the world that makes up small business.

Now, I would like to turn this over to Mr. Grant.

SCHEDULE OF EVENTS

Monday, May 12, 1980 - Innovation Day

2:30-5:00 p.m.	Panel: Small Business and the Innovation - Productivity Crisis. The Vital Partners: Inventors; Entrepreneurs; Venture Capitalists. Capital Hilton Hotel (Presidential Room) 16th & K Street, N.W. Washington, D.C.
6:30-8:30 p.m.	Reception "Eureka: A Celebration of American Small Business Innovations" Exhibit Hall, National Geographic Society, 1145 17th Street, N.W., Washington, D.C. (admittance by invitation)

Tuesday, May 13, 1980 - Procurement Day

2:30-5:00 p.m.	Contracting Conference Sheraton-Washington Hotel 2600 Woodley Road, N.W. Washington, D.C.
6:00-7:00 p.m.	Procurement Reception
7:00 p.m.	Procurement Awards Banquet

Wednesday, May 14, 1980 - State Small Business Winner's Day

8:00-8:40 a.m.	V.I.P. Tour of White House
9:00 a.m.	Breakfast Capital Hilton (South American Room) 16th & K Street, N.W. Washington, D.C.
	Briefing SBA Programs-A. Vernon Weaver, Administrator Introduction of SBA Management Board
	Pictures of Winners with Mr. Weaver (Lobby of Capital Hilton)
Noon	Luncheon Trader Vic's Restaurant Outrigger Room Capital Hilton
2:00 p.m.	Tour of U.S. Capitol
3:00-5:00 p.m.	SBA Open House 1441 L Street, N.W. Washington, D.C.

5:30-7:30 p.m.	Reception Hosted by Council of Small & Independent Business Associations (COSIBA) Room 1318 Dirksen Senate Office Building 1st Street & Constitution Ave., N.E. Washington, D.C. (admittance by invitation)

Thursday, May 15, 1980 - Advocacy Day

9:45 a.m.	White House Rose Garden Ceremony
Noon	Advocacy Awards Luncheon Capital Hilton Hotel (South American Room)
2:30-3:15 p.m.	Briefing House Small Business Commitee Hearing Room, Rayburn House Office Building, Room 2361, Independence Avenue & South Capital Street, S.W., Washington, D.C.
3:45-4:30 p.m.	Briefing Senate Small Business Committee Hearing Room, Russell Senate Office Building, Room 424, Delaware Avenue & C Street, N.E., Washington, D.C.



Elijah McCoy

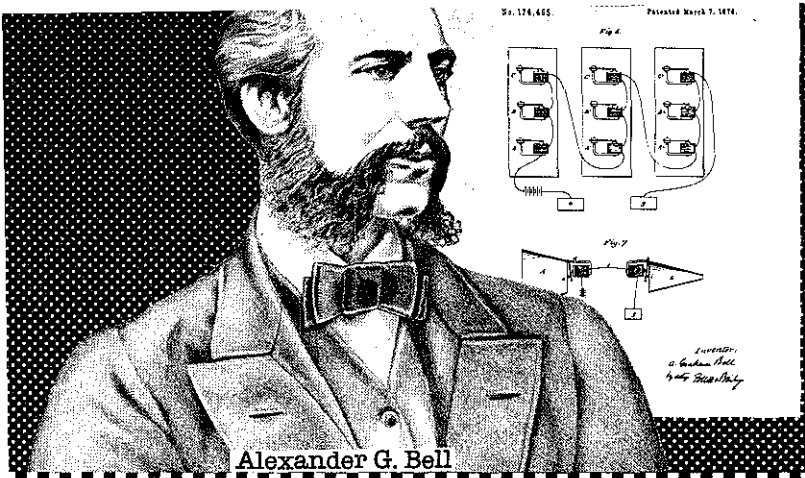
Lubricator

The Industrial Revolution saw the creation of thousands of new machines to help manufacture new products, to change the way old products were made, and to move both products and consumers from place to place. But most of the marvelous new machines had to be shut down and oiled by hand at frequent intervals, wasting time, money and manpower. Elijah McCoy helped change this.

The son of slaves who had escaped from Kentucky, McCoy was born in Canada and trained as a mechanical engineer in Edinburgh, Scotland. He moved to the United States at the end of the Civil War, but could find employment only as a railroad fireman, not as an engineer.

At that time, steam engines had to be stopped periodically so that their crews could get out and oil the huge machines. McCoy created an "automatic locomotive lubricator," and received a patent for his invention in 1872; it soon became widely used throughout the world. Railroad workers, when setting out with a new locomotive, would check to make sure that it was equipped with "the real McCoy."

McCoy received a total of 57 patents during his lifetime. In 1915, he developed a graphite lubricator, which he considered to be his best invention. It used powdered, solid graphite — rather than oil — to lubricate certain complicated engines. He organized the Elijah McCoy Manufacturing Company, and produced and sold his inventions until his death in 1929.



Alexander G. Bell

Telephone

Alexander Graham Bell was a Scotsman whose father and grandfather had been specialists in speech. In 1871, at the age of 24, Bell moved to Boston to teach his father's method of Visable Speech to deaf children. He opened his own school and became Professor of Vocal Physiology at Boston University.

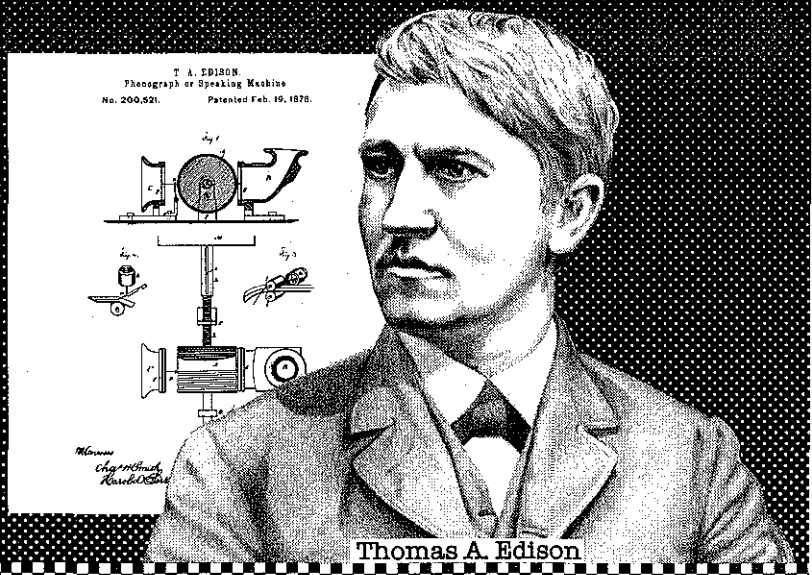
In his spare time, Bell experimented with finding a way to transmit several telegraph messages over a single-wire simultaneously. The fathers of two of his pupils gave him financial backing, and a young man named Thomas A. Watson was hired to help Bell build the electrical parts that he needed.

On June 2, 1875, Bell was in one room of his laboratory, Watson in another. Both were tuning the reeds of a "harmonic telegraph" that Bell had designed. Watson had screwed his reed so tightly that it stuck to the pole of its electromagnet; he plucked the reed to get it loose. In the next room, Bell heard a distinctive twang coming over the wire, quite unlike the sound of a telegraph. The next day, Bell transmitted the sound of his voice, although not distinct words, over his new "telephone."

After months of further experimentation, he filed for a patent and was awarded his first in March, 1876. That same month, Bell and Watson were about to try out a new liquid transmitter one evening after work. Accidently spilling some acid on his leg, Bell said into the transmitter: "Mr Watson, come here. I want you." Watson, down the hall in another room, heard Bell's voice distinctly over his receiving telephone and rushed to help.

In 1877, the first Bell Telephone Company was established in Boston. At that time, only 778 telephones were in operation. With great salesmanship and enthusiasm, Bell officers convinced the public that the telephone was an essential means of communication. By 1881, a telephone company report stated that "...only nine cities of more than 10,000 inhabitants in the United States . . . are without a telephone exchange."

After his original telephone work, Bell himself retired from active association with the company, and spent the rest of his life in Washington, D.C. and Nova Scotia, working with deaf children and developing innovations in communications, aeronautics and other areas.



Thomas A. Edison

Phonograph

At the age of 21, a small-town boy from Ohio was issued a patent for an electrical vote recorder intended for use by the United States Congress and other legislatures. Within the next few years, he had perfected the stock market ticker, improved the telegraph, and set himself up in an "invention factory" in Menlo Park, New Jersey, to produce useful — and marketable — new ideas.

In 1877, the year after the invention of the telephone, Thomas A. Edison was hard at work in his "factory," developing a machine for recording telephone messages — a pin attached to a diaphragm which made marks on waxed paper. By substituting a grooved cylinder covered with tin foil, he discovered that the foil could mechanically record sound waves and play them back. "Mary had a little lamb" was Edison's trial phrase, becoming the first words in history to be captured by machine.

He was, as usual, confident of his genius. In his journal, Edison wrote: "There's no doubt that I shall be able to store up and reproduce automatically at any future time the human voice perfectly."

Edison quickly understood the multitude of uses that his idea could fill: talking books for the blind, dictation, musical recordings, language instruction, and more. But he was busily working on other ideas — his electric light bulb was first switched on just two years later — so that improvements on the Edison phonograph came from other inventors.

When Edison finally turned to manufacturing phonograph cylinders in the 1890's, another inventor had already developed a disc record, as we use today. Edison persisted in making cylindrical records, and eventually had to abandon that business effort.

The certitude and stubborness that helped Edison become an innovative genius did not always serve him well as a businessman, but others were able to transform his ideas into commercial realities. And Edison was the king of ideas. He holds the record for the number of United States patents issued to an individual — 1,093.



Witcomb L. Judson

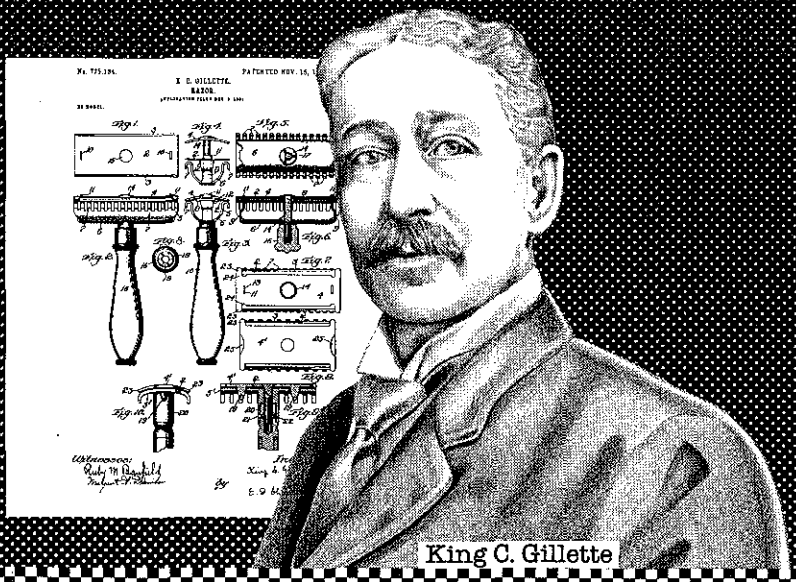
Zipper

The first zipper was invented for fastening shoes. Witcomb L. Judson, a mechanical engineer, was tired of the tedious task of fastening hooks and eyes on his boots every morning. He filed for patents for his idea in 1892 and 1894. Such an invention was unique; nothing even remotely resembling it existed in the patent files.

Together with Colonel Lewis Walker, Judson began the Universal Fastener Company in Chicago. The zippers were first made by hand. Then, in 1905, Judson designed a model that could be reproduced by machine. The company reorganized as the Automatic Hook and Eye Company of Hoboken, New Jersey. House-to-house peddlers sold its "C-curity" fastener. But it was considered a novelty item, in part because it had the unfortunate habit of springing open unexpectedly.

Near bankruptcy, the company hired Gideon Sundback, an electrical engineer, in 1906. Sundback experimented with several improvements on the Judson "hook and eye" invention. In 1913, he patented a "hookless" fastener that, in all essential respects, is the modern zipper. That year, Automatic Hook and Eye became the Hookless Fastener Company, and moved to Pennsylvania.

After developing a reliable product, the company had to create a demand for an item that few people even knew existed. Its first successes came with corsets, spats, driving gloves and military uniforms during World War I. After the war, the zipper quickly spread in popularity: overshoes, dresses, suits, tobacco pouches, sleeping bags — its possible uses were almost endless. In the late 1930's, the company was selling nearly 150 million zippers each year — and changed its name one more time. Like the claws of an eagle, Talon, Inc. fasteners promised to grip with firmness.



King C. Gillette

Safety Razor With Disposable Blade

Until the turn of this century, shaving was largely an inconvenient and sometimes unsafe chore for American men. Most either had to rely on trips to the barber shop or use their own straight-edge razors, which required periodic sharpening by barbers. It was because of such inconvenience that King C. Gillette, a salesman in the 1890's for Crown Cork & Seal Company of Baltimore, invented what we know today as the safety razor with disposable blades.

Encouraged by his employer and friend William Painter, Gillette was enthralled by the idea of developing a practical yet disposable product. None of his earlier inventions however, met with any great success. Then, one morning in 1895, he discovered that his straight-edge razor blade was dull and would have to be sent to a barber for sharpening.

"As I stood there with the razor in my hand, my eyes resting lightly on it, as lightly as a bird settling down on its nest, the Gillette razor was born. I saw it all in a moment..."

Gillette rushed to a hardware store, purchased brass, some steel ribbon, a small hand vise and other tools, and went home to make his safety razor with disposable blades.

But it took him six discouraging years of experimentation to find the right method for fashioning thin strips of steel for blades. He himself had limited funds, and prospective financial backers laughed at his notion, asserting that the metal couldn't be sharpened sufficiently. "But I didn't know enough to quit," said Gillette.

In 1901, he established a factory in Boston to produce his invention. In 1903, a grand total of 51 razors and 168 blades was sold. Most American men still were shaved at the barber shop. But diligent salesmanship convinced the public. The idea got a special boost during World War I, when the Army equipped each soldier with a razor and disposable blades. By the 1920's, most American men had been convinced of the convenience of shaving at home.



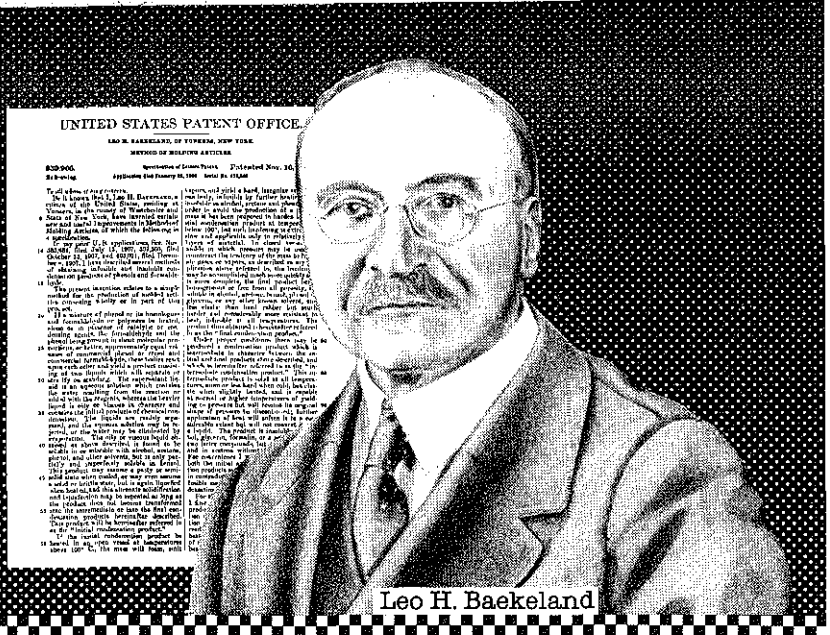
What was invented at a world's fair when a quick-thinking pastry salesman rescued an ice cream vendor whose business was in danger of melting away?

The ice cream cone! Simple in design, delicious to eat, it is perhaps the most ecologically-sound packaging devised by modern man.

The cone is such a good idea, in fact, that several people have claimed to be the first to invent it. But many historians agree that the ice cream cone was born at the St. Louis World's Fair in 1904. It was there that Ernest A. Hamwi, a Syrian-born salesman, opened a stand to sell "zalabia," a crisp, wafer-like pastry baked on a flat waffle iron and served with sugar.

Close to Hamwi's stand stood a merchant, selling scoops of ice cream in 5¢ and 10¢ portions. One day, the ice cream seller ran out of dishes. The resourceful Hamwi took one of his thin zalabia, rolled it into a cone, and scooped in some ice cream. Thus, the birth of the "World's Fair Cornucopia."

Everyone loved the idea. Before the fair was over, factories were turning out cones for ice cream. Hamwi himself began the Cornucopia Waffle Company in St. Louis. The cone survives today in its basic simplicity, consumed at the rate of three billion a year in the United States alone.


UNITED STATES PATENT OFFICE.

LEO H. BAEKELAND, OF YONKERS, NEW YORK.

METHOD OF MOLDING ARTICLES.

Leo H. Baekeland

Bakelite

Many people had tried to make new plastics before Leo Baekeland created "Bakelite" in 1909. In fact, said Baekeland, "They should have succeeded, but they wouldn't." Baekeland's discovery was the result of five years of intensive effort, combining formaldehyde and phenol together under high heat and tremendous pressure. The result: a hard, clear insoluble solid that did not melt when heated, did not shrink when taken from a mold, and which could be formed or cut into infinite shapes and sizes.

Bakelite was an immediate success. At first, it replaced amber and hard rubber in items such as pipe stems. But it quickly became an important material for electrical insulation in automobile ignitions, subway "third rails" and countless other industrial uses. Baekeland established the General Bakelite Company in 1910, and remained active in the firm until it was acquired in 1939.

Born in Belgium, Baekeland received a Ph.D. in chemistry from the University of Ghent at the age of 21. On a trip to the United States a few years later, he was persuaded to leave his teaching post at Ghent to work for a photographic materials firm in New York. After two years, he set up his own independent laboratory in Yonkers, New York, and proceeded to spend the rest of his life in self-supporting research. At first, Baekeland experimented in several different areas, but soon learned that "I should concentrate my attention upon one single thing which would give me the best chance for the quickest possible results." In addition to Bakelite, he invented quick-drying photographic paper, and was a pioneer in air conditioning and the application of the electrolytic cell for industrial uses.



Edwin H. Land

Synthetic Light Polarizer

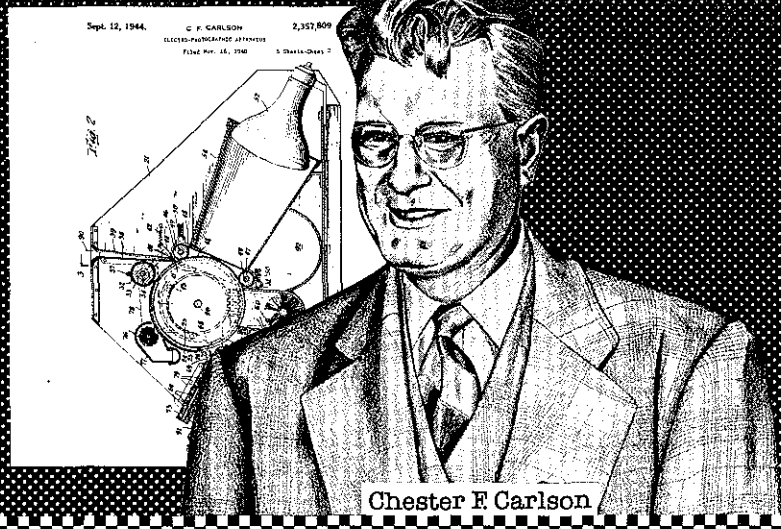
Ordinary light waves are made up of helter-skelter vibrations, moving in all directions. If the vibrations in one direction are made to predominate over the others, the light becomes "polarized."

As a freshman at Harvard in 1929, Edwin Land was preoccupied with the problem of producing a practical material that could be used to polarize light. Experiments had gone on for over a hundred years, but natural crystals that could polarize light were small and costly. In 1852, an English doctor had discovered a synthetic crystalline material that worked, but the crystals were difficult to grow to suitable size and they shattered into powder on the slightest impact.

Land approached the problem from a different point of view: instead of trying to construct one large polarizing crystal, he proposed that a transparent layer could contain innumerable submicroscopic crystals oriented to provide the optical equivalent of a large crystal. He took a leave of absence from his courses at Harvard College and experimented with making such a polarizer in his own laboratory for a year and a half. Land returned to Harvard with a successful polarizer, which he described in a 1932 presentation to the Harvard Physics Department: "A New Polarizer for Light in the Form of an Extensive Synthetic Sheet." Soon afterward Land left Harvard to devote his time fully to further research on polarizers and polarized light.

Applications for the new, convenient light polarizer were varied. Polarizing sunglasses and camera filters were among the earliest commercial products utilizing sheet polarizers. The polarizers were first manufactured by the Land-Wheelwright Laboratories, the predecessor to Polaroid Corporation established in 1932 by Edwin Land and George Wheelwright.

In 1937, Land formed Polaroid Corporation, which continued to produce polarizers for scientific, industrial and consumer use. Although he has served as the company's president, chairman and chief executive, as well as its director of research, business activities have not kept Land away from the laboratory. His continuous research has yielded many innovations, including specialized polarizers and optical elements for use in World War II, and, of course, the Polaroid instant films and cameras, first introduced in 1948. In more than fifty years of research, Land has been issued 524 U.S. patents.



Chester F. Carlson

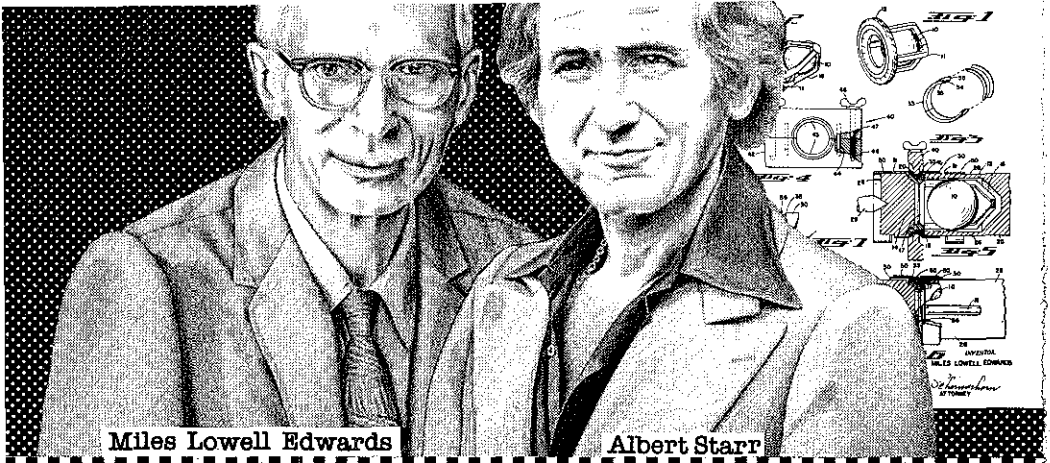
Xerography

While working in a corporate patent department in New York City during the Depression, Chester Carlson was alarmed by the amount of time and money it took to reproduce business documents. Manuscripts, for example, had to be completely retyped and patent drawings had to be sent out to be photographed.

Carlson, who had majored in physics in college, decided to experiment with possible techniques for copying such documents. He set up a laboratory, first at home and, later, in a rented room behind a beauty parlor in Queens, New York. One day, after three years of part-time research, Carlson wrote the date and place — "10-22-38, Astoria" — on a glass slide and successfully transferred that image to a piece of waxed paper, which he then heated over a hotplate to fix the image permanently. His technique bypassed conventional photography, using electricity to make images in a powder that were then heat-fused into a permanent record on paper.

Carlson patented the process, but lacked the resources to develop a workable copying machine. In 1944, he entered into an agreement with Battelle Memorial Institute, a non-profit research organization, in return for a majority of any ensuing royalties. In 1947, the tiny Haloid Company of Rochester, New York, acquired a license from Battelle, giving it the right to develop, produce and market any resulting machine. "Xerography" was coined from the Greek words for "dry writing" to describe the copying method. In 1950, Haloid marketed its first xerographic product. Ten years later it marketed the first automatic, dry-process copier, the pioneering Xerox 914 copier. In the following decade Carlson's concept revolutionized the way in which American business operated.

Chester Carlson earned hundreds of millions from his invention, according to his wife, but had given most of his fortune to charities before he died in 1968. Most of his gifts were anonymous. But he didn't manage to achieve his stated wish: "I would like to die a poor man."



Artificial Heart Valve

At first, it seemed to be an unlikely partnership: a retired engineer who had invented a centrifugal booster pump used by military aircraft during World War II, and a young heart surgeon who had recently joined the staff of the University of Oregon Medical School.

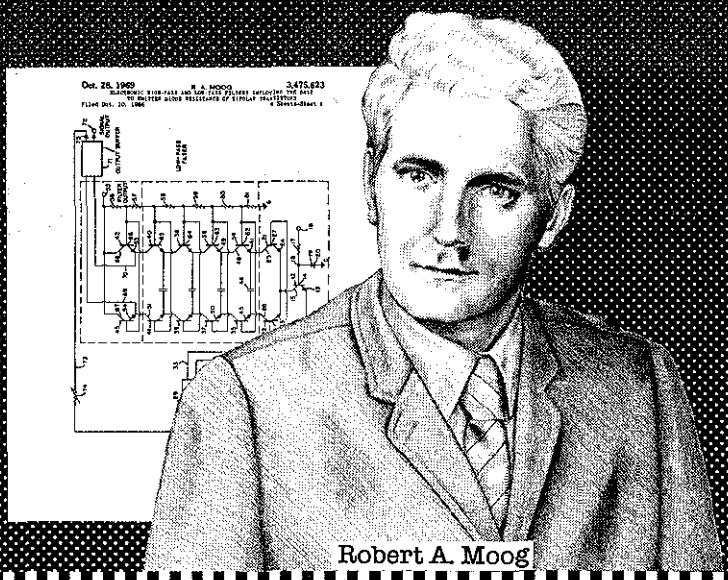
But both men were concerned with the same problem. Although modern science was eradicating rheumatic fever in the mid-1950's, thousands of former victims had developed defective heart valves as a result of the disease.

Dr. Albert Starr was familiar with the medical problems presented by deteriorated heart valves. Lowell Edwards was familiar with pumps. And the human heart is an intricate pump that beats, on average, nearly 59 million times each year.

Together, Starr and Edwards developed an artificial valve that could be implanted in the human heart. It was an extraordinarily simple design — a small cage in which a plastic ball could fall when blood was pumped from the upper chamber of the left side of the heart through the mitral opening. When the lower chamber was filled, the ball closed the opening, preventing a backflow. To encourage the body to accept the artificial valve, the two inventors covered the cage's base with cloth so that the body's tissue would grow into it and hold the device firmly in place.

After experiments on dogs, Dr. Starr successfully replaced a 54-year-old man's defective mitral valve with an artificial one in 1960. Since then, thousands of such operations have been performed around the country.

Unable to find a company that would manufacture their innovation, Edwards began his own small firm to produce the Starr-Edwards mitral valve. Edwards Laboratories and other companies have since developed several variations on the original design, including a model to replace the aortic valve, as well as an aortic and mitral valve fashioned from an actual heart valve from a pig.



Robert A. Moog

Music Synthesizer

Recent innovations in the art world have sometimes been greeted with allegations that they aren't "natural." Responds Robert Moog, inventor of the electronic music synthesizer: "No music is natural. It is produced only after people invest strenuous and extended efforts to gain intimate control over a vibrating system — be it vocal chords, a violin, or a synthesizer."

Moog was working toward his doctorate in physics at Cornell University when he met composer and music teacher Herbert Deutsch in 1963. Deutsch had used the theremin, an early electronic instrument, in his ear-training classes; Moog, who had once studied at the Manhattan School of Music, was selling theremins to help support his young family while he was in school.

In the summer of 1964, the two men worked together for three weeks in Moog's workshop, experimenting with new forms for electronic instruments. With suggestions from Deutsch, Moog proceeded to construct his first "electronic music modules."

Moog also conferred with other musicians, who added new aspects to the concept of the music module. By 1967, he had developed a complete system for generating and modifying musical sounds electronically. With this system, musicians were able to easily shape sounds by interconnecting and manipulating the component parts of the machine.

The idea struck some listeners as a spaceage novelty. But, in 1968, a musician named Walter Carlos released his best-selling "Switched-On Bach" album and helped establish the Moog synthesizer as a legitimate — if unusual — musical instrument.

Robert Moog began making electronic instruments commercially in 1964. He introduced the Mini-Moog, a more compact version of his modular system, in 1969. Since then, synthesizers have been used by many musicians — from rock stars to classical composers — to create a new musical vocabulary with electronic sounds.

HAVE AN INNOVATIVE IDEA?

The Small Business Administration publishes several useful booklets for the innovative entrepreneur:

Introduction to Patents (MA 240)
Can You Make Money with Your Idea or Invention? (MA 248)
New Product Development (SBB 90)

They are available from the U.S. Small Business Administration, Post Office Box 15434, Ft. Worth, Texas 76119. The toll-free number is (800) 433-7212; in Texas (800) 792-8901.

In addition, the U.S. Patent and Trademark Office publishes a variety of booklets on patents, trademarks and copyrights. To obtain a list of these publications, write to: The Superintendent of Documents, Government Printing Office, Washington, D.C. 20402; request the "Patent and Trademark Publications" leaflet.

"Of all the little things that have been invented, it [the razor] is one of the biggest little things [for which a patent was] ever issued from the U.S. patent office."
– King C. Gillette

"We succeed not by imitating nature, but by manipulating her."
– Albert Starr

"I was greatly influenced by the success stories of Edison and others."
– Chester F. Carlson

"Being ignorant is not so much a shame as being unwilling to learn."
– Benjamin Franklin

"Invention is the process of searching through one's grab bag of unconventional ideas to find a simple way of fulfilling a given need."
– Robert A. Moog

"The need exists and eventually it will be met. This is the law that all nature follows."
– M. L. Edwards

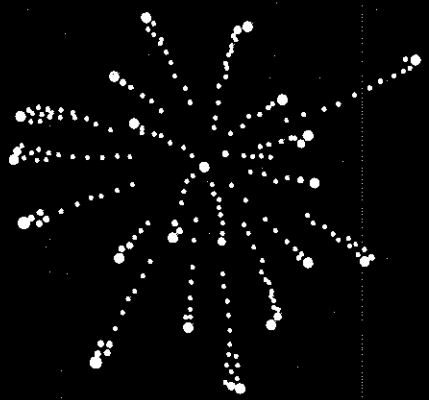
Experience taught me "to bow humbly before the facts, even if they did not seem to agree with my favorite theories."
– Leo H. Baekeland

"Our function is to sense a deep human need, then satisfy it."[1]
– Edwin H. Land

"Genius is one percent inspiration and ninety-nine percent perspiration."
– Thomas A. Edison

"Any product which is ninety-five percent perfect is still too faulty."
– Gideon Sundback

"Truth need not fear the logic of evidence. The more we scrutinize and the more we weigh the evidence of facts, the more likely it is that we shall arrive at the truth."
– Alexander G. Bell



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