

# NEW JERSEY

INVENTION STATE THE INVENTION STATE THE INVENTION STATE THE INVENTION STATE

by *Harry T. Roman*

It is one of the smallest states, yet ranks 4th in total U.S. patents issued. Since 1979, its inventors have been awarded over 80,000 patents. Many of the things we see and use every day, come from New Jersey's talented inventors past and present, male and female. The state is a microcosm of the national invention scene. New Jersey is home to many of corporate America's research laboratories. In fact, it is the place where Thomas Edison created the first research laboratory in Menlo Park. Arguably, his laboratories may have been the great man's most significant invention—through them he showed us how to organize our thinking and creativity so that we may profit from them. Even today, there is a direct link between the state's robust economy and its inventive output.





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**INVENTION:  
IT'S ABOUT MAKING WISHES**

About 60% of the nation's annual economic growth is directly attributable to technological advances. Invention is the engine of capitalism, and its fuel is human intellect and creativity, empowered by a free market economy. This strong relationship between technology and economic progress was built into the fledgling United States by its Constitution. The Constitution empowered the first Congress to create the U.S. Patent Office in 1792. Our founders knew the importance of invention to a young nation. They had witnessed England's industrial revolution and realized the need to be able to productively harness a resource rich and growing nation and to be able to sell products overseas. How insightful those constitutional authors were!

It took 143 years (1792 to 1935) for the first two million patents to be issued. Just 41 years later, in 1976, the total doubled to four million. A scant 23 years later, in 1999, the six millionth was issued. Almost 70% of all the patents have been issued since 1935. There has been a huge acceleration in the pace of invention that corresponds directly to America's rise as a world economic force. What makes all this economic activity work is our capitalist market economy. Basically, it's really all about making wishes.

Make a wish and say it loudly and often enough and that wish may come true. That is all it takes for the invention process to get started. Inventors listen to

what wishes are being made, and if they believe they can make that wish come true, and can be adequately rewarded for their efforts, they will devote their creative energies and resources to fulfilling those dreams. You have the potential to end up with the products and services you want, and inventors have a chance to make money. Not all of them will be successful, but the winners will be those who did the wishing in the first place. Inventors seldom invent because they can. They invent because they can make a profit at it. That's capitalism in a nutshell.

For inventors to be successful, they must listen to the wishes being made—very carefully—so they can ask themselves hard questions about the problems and difficulties they might face trying to make those wishes come true. They need to understand the market and who might buy their invention. They must be able to establish a price for invented products and services that people can afford and from which they can make a living. By the way, only 1 product in 50 ever becomes a commercial success. Inventing is a tough business.

**THE NEW JERSEY INVENTORS  
HALL OF FAME**

<http://www.njinvent.njit.edu/>

In 1987, the New Jersey Inventors Hall of Fame was created to honor the state's inventors and to show the powerful link between invention and our economic progress. In 1989, the first inventors were honored. To date, this special

The New Jersey Inventors  
Hall of Fame



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invention family has over 200 members in the Hall located at the New Jersey Institute of Technology (NJIT). The inventors come from large corporations, small businesses, or are self-employed. Some work from their home, garage, or basements. Some even work in universities. It does not matter. What ties them all together is a compelling desire to solve real problems; and what motivates them is the possibility of being rewarded for their efforts.

From June through September, the Hall of Fame Board of Trustees solicits nominations for potential inductees into the Hall of Fame. Nominees must have lived in New Jersey and performed the majority of their work on their relevant invention(s) in New Jersey.

In October, the Selection Committee reviews the nominations. This panel, comprised of former honored inventors, members of the Board and distinguished members of the scientific and engineering community, evaluates the submissions and determines their suitability for induction. Each nominee is evaluated on four key metrics:

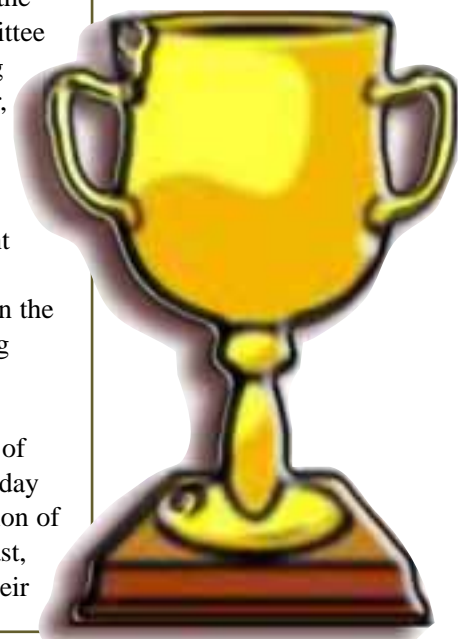
1. Importance of the problem solved by the invention(s)
2. Novelty and contribution to advancing the state-of-the-art
3. Utility and/or socio-economic value
4. The marketing of the invention

Here are the award categories:

- **Hall of Fame** awards are granted to past and present inventors who have made extraordinary contributions to

the advancement of knowledge and human welfare. These contributions may constitute any number of inventions of lasting social, technical, or economic importance. The special designation of Invention Pioneers is reserved for those who opened completely new areas of technology.

- **Inventor of the Year** designees are judged on the basis of one or more inventions, which are covered by current (not expired) U.S. patents, and the designee must be living.
- **The Corporate Invention Hall of Fame** award goes to a company that has demonstrated an outstanding commitment to innovation—fostering the development of inventions among its employees.
- **Special Awards** may be given at the discretion of the Selection Committee to honor such categories as Young Inventor, Small Business Inventor, Independent Inventor, and Enduring Popularity
- **The Non-Profit Award** is a recent addition, and as its title suggests, honors a non-profit organization in the state that is committed to fostering invention and innovation. Honorees are feted with a formal banquet held at NJIT in the middle of February, to coincide with the birthday of Thomas Edison and the celebration of National Engineers Week. In the past, New Jersey Governors have sent their





congratulations to the awardees, and the event is given local and state coverage.

#### **SOME OF NEW JERSEY'S FINEST**

The most prolific inventor of all time, Thomas Edison (<http://www.tomedison.org>), lived in New Jersey, first at Menlo Park, and later in West Orange. Edison was my boyhood hero and the reason I invent today. He accumulated 1093 patents, a number never equaled by anyone else, and created a veritable cornucopia of products and systems. His work has been heralded in many books and articles. I'll come back to him later, but first I would like to feature other New Jersey inventors who are not as renowned, but who certainly are important to our lives. Edison inspired many of these inventors and even predicted some of the things that they created.

Every time you walk into a store to buy something, you are probably looking at products or services invented in New Jersey. When you pick up that soap to get oily stains out of your synthetic clothes, you can thank Sue Wilson, now retired from Colgate-Palmolive, for her work that gave us such products as Dynamo, Punch, and special formulations for Fab and other recognizable detergents. While you are standing at the checkout counter, think about N. Joseph Woodland and his work with bar codes and bar code readers. When the clerk passes your product across a laser scanner, or uses a laser wand to determine the purchase price, know that C. Harry Knowles made that

possible. The tags on clothing that set off door alarms preventing folks from walking out of the store without paying? Philip Anderson of Ramapo College invented those little plastic watchdogs.

Log onto the Internet using a high speed DSL (digital subscriber line), and you can thank Irwin Gerszberg ("Mr. DSL" to his friends at AT&T). He has 65 patents, and more on the way. Pick up your cell phone and make a clear, interference free phone call and thank Eric Addeo for his past work at Bell Communications Research. Those high capacity lithium batteries that allow you to talk on your cell phone for hours—give a nod to the team of Antoni Gozdz, Jean-Marie Tarascon, and Paul Warren of Telecordia for their pioneering work. When speaking on today's phone, Jim West of AT&T Bell Laboratories and his foil-electret transducer make it possible for you to clearly hear and transmit your voice.

Doctors recommend that before bandaging that cut on your finger, you dab on antibiotic cream to guard against infection. For that protection, you can thank Selman Waksman and Hubert Lechevalier of Rutgers University. Gilbert Buchhalter invented a reliable gel that connects electrodes to the body for electrocardiographs and cardiac defibrillators. High blood pressure is a serious disorder that can be treated with relatively inexpensive drugs invented by George deStevens. Arthur Nobile gave aging baby boomers anti-arthritis drugs. Sidney Pestka is recognized for his early work with the anti-cancer drug



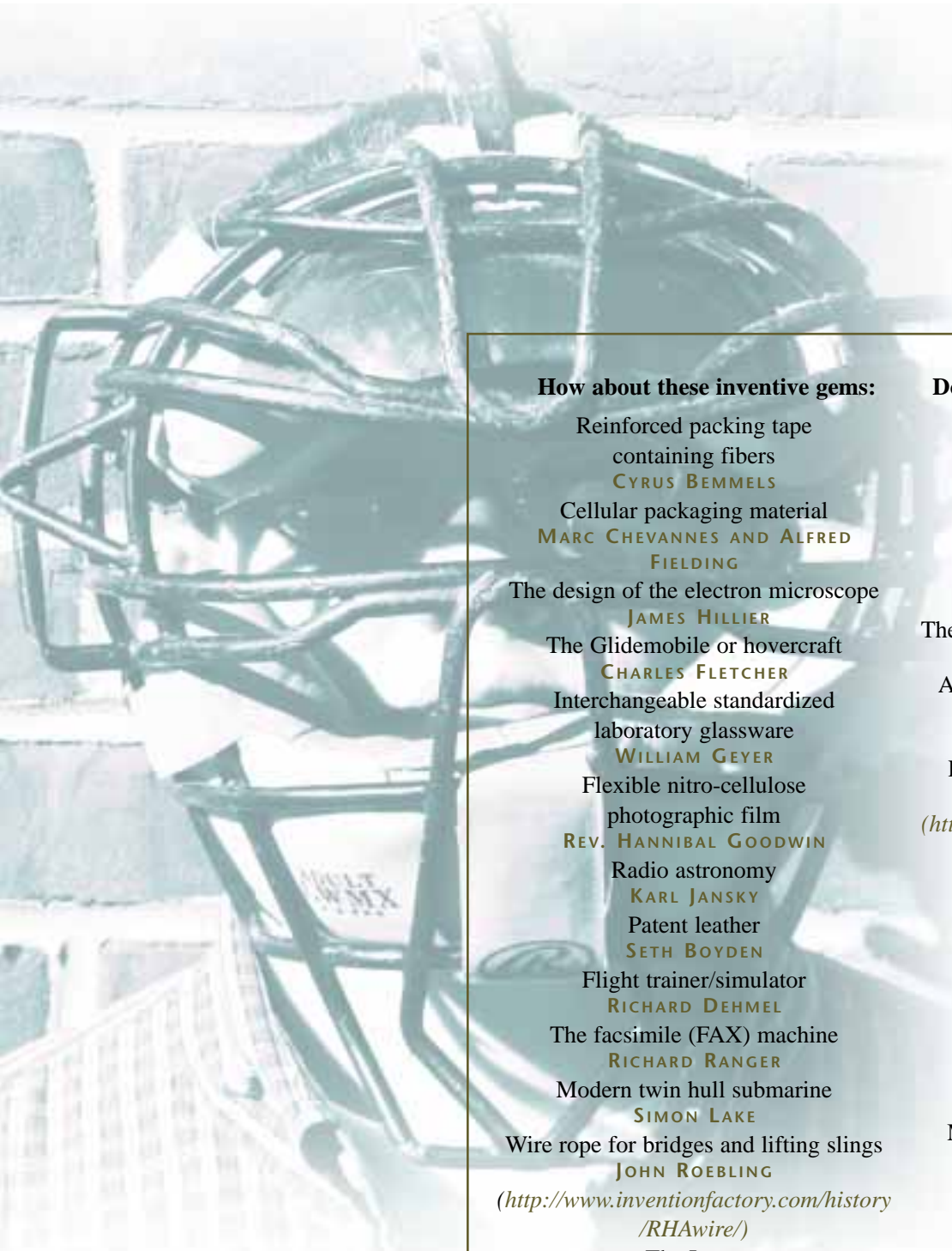
Interferon. Dominic Wiktor may be responsible for one of your relatives being alive. He invented the Wiktor-Stent used to reconstruct damaged coronary arteries.

Let's talk radio and TV. Lee de Forest kicked off the electronic revolution with his invention of the triode audion tube that made practical amplification possible and set us on the path toward transistors. This all stemmed directly, believe it or not, from Tom Edison's work with light bulbs. Edwin Armstrong followed de Forest by inventing FM radio and the popular super heterodyne circuitry for early radio receivers. Jack Avins advanced Armstrong's work with his FM detector and improved radio receivers. Vladimir Zworykin built one of the first TV Kinescopes, a forerunner to the cathode ray tube, which was later improved upon by Albert Rose and Harold Law. Harold B. DuMont, a pioneer TV manufacturer, was also very active in cathode ray tubes, magic eye tuners, and a host of TV improvements. Then in 1947, the Bell Labs team of John Bardeen, Walter Brittain, and William Shockley invented the transistor, which ushered in a tremendous miniaturization of circuitry, leading to today's computers and integrated circuits. Much of today's integrated circuit designs lead back to Andrew Dingwall and his 100+ patents in the CMOS integrated circuit technology. Cable television? We can thank Isaac Blonder and Ben Tongue

for developing much of the electronics and systems for this communications medium.

Music and sound recording are closely allied with radio and TV. When we talk about the sound of modern music, we must recognize Les Paul, the man responsible for our modern musical sound. A pioneer in the design of the electric guitar and early tape recorders, Les also gave us multiple sound tracks and sound mixers that allow for the making of custom music recordings. Jim Flanagan of Bell Labs gave us the basis for acoustic signal processing and modern speech synthesis. Jim made it possible for throat cancer victims with larynx damage to once again speak by using a hand-held voice synthesizer pressed against their throats.

In the area of hygiene and public health, the state is also home to significant advances. Charles F. Wallace gave us chlorination of water, so essential to public health. Abdul Gaffar, with his many patents, was instrumental in bringing a variety of oral health care products to us. The most significant of which was the first anti-bacterial toothpaste, Colgate's Total. This simple toothpaste can save a billion dollars worth of dental care annually. Anthony Winston, another man with many patents in health and oral care products, has given us anti-tartar toothpastes, baking soda enriched toothpastes, fungicides to protect crops, deodorizers, and environmentally safe cleaners and laundry detergents.



**How about these inventive gems:**

Reinforced packing tape  
containing fibers

**CYRUS BEMMELS**

Cellular packaging material

**MARC CHEVANNES AND ALFRED  
FIELDING**

The design of the electron microscope

**JAMES HILLIER**

The Glidemobile or hovercraft

**CHARLES FLETCHER**

Interchangeable standardized  
laboratory glassware

**WILLIAM GEYER**

Flexible nitro-cellulose  
photographic film

**REV. HANNIBAL GOODWIN**

Radio astronomy

**KARL JANSKY**

Patent leather

**SETH BOYDEN**

Flight trainer/simulator

**RICHARD DEHMEL**

The facsimile (FAX) machine

**RICHARD RANGER**

Modern twin hull submarine

**SIMON LAKE**

Wire rope for bridges and lifting slings

**JOHN ROEBLING**

(<http://www.inventionfactory.com/history/RHAWire/>)

The Laser

**WILLIAM SCHAWLOW AND**

**CHARLES TOWNES**

Liquid crystal displays

**RICHARD WILLIAMS**

Telegraph dot/dash code

**ALFRED VAIL**

**Don't forget the many common and recreational inventions that are important in our lives too:**

The ice cream cone and  
manufacturing machinery

**ITALO MARCHIONY**

*(especially important if you are  
summering at the Jersey shore)*

The modern baseball catcher's facemask

**JAMES JOHNSTONE**

Aquarium pumps, filters, heaters and  
valves

**ALLAN WILLINGER**

Rascal scooter for the handicapped

**MICHAEL FLOWERS**

(<http://www.rascalscooters.com/scooters/index.html>)

First commercial golf tee

**WILLIAM LOWELL**

Microwave cookware

**MELVIN LEVINSON**

Women's bra strap tensioner

**LISA GABLE**

Bulb and plant auger

for accurate planting

**WILLIAM GREELEY**

Model railroading track connectors  
and accessories

**STEPHAN SCHAFFEN, JR.**

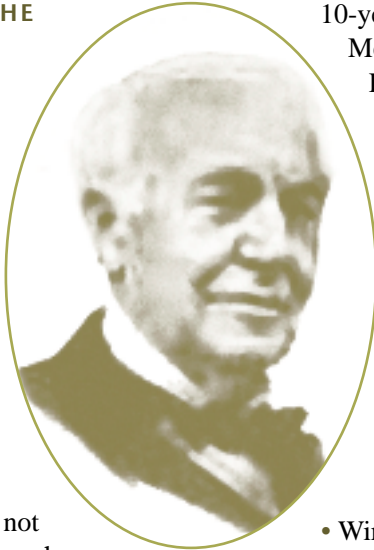


**THOMAS EDISON: THE WIZARD OF MENLO PARK**

Undoubtedly, Thomas Edison was the icon of the industrial revolution, producing an incredible array of inventions and systems that form the basis of today's culture. The one invention we immediately associate with him is the electric light bulb. While he did not invent the light bulb per se, he was the one who gave us the first commercially viable device that could be practically applied. That is what inventing is truly all about—taking the idea to the marketplace—and that is the real genius of Edison, making his things affordable and available.

About 120 years ago, Thomas Edison gave birth to the electric utility industry by generating power and distributing it by electric cables to a number of electric lights surrounding his Menlo Park laboratory in Edison, New Jersey. Two years later, the first commercial generating station, Pearl Street, went operational in New York City, lighting the evening with a soft, incandescent glow. Cities would never again be the same, and neither would our quality of life.

Electric lighting and power was not the only industry Edison invented in his



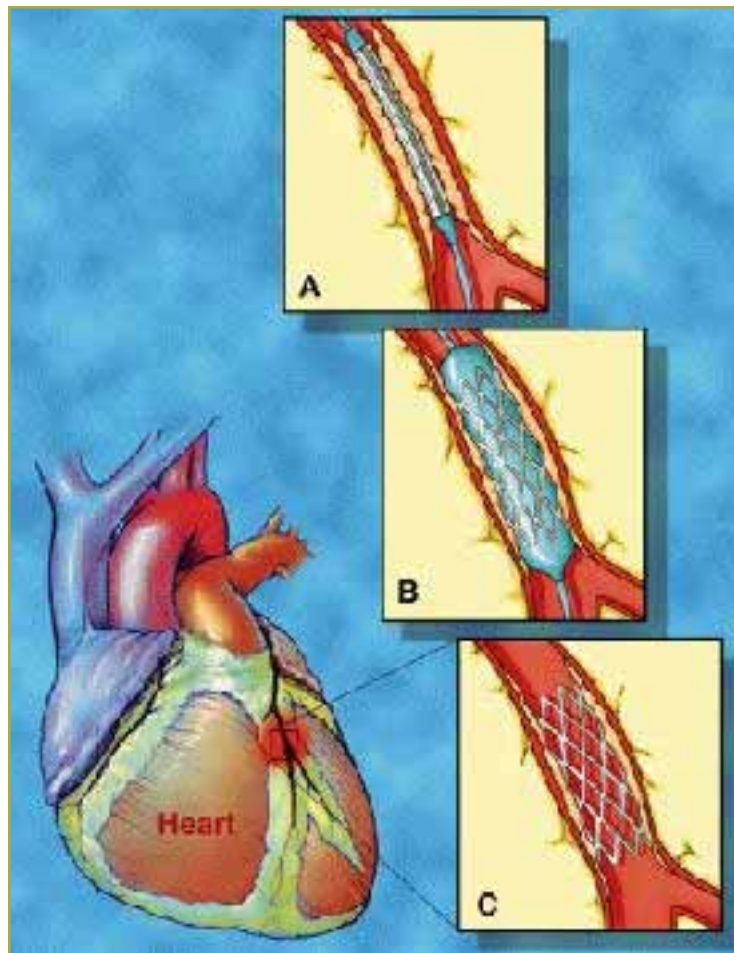
10-year occupation of the Menlo Park site (1876-1887).

His industrial laboratory gushed forth with:

- The phonograph, which led to the recorded sound industry and the musical entertainment we enjoy via radio, television, and the movies
- The electric railway, which led to mass transit
- Wireless message transmission—patented 12 years before Marconi demonstrated it—led to the radio
- Discovery of the Edison Effect that later made possible vacuum tubes and the transistor—ultimately leading to the electronic and computer revolution we enjoy today
- Finally, what many believe was his most important invention, the process and discipline of systematic invention demonstrated in his Industrial Research and Development Laboratory

At his West Orange site, Edison created and moved to market motion pictures, storage batteries, improved sound recording and playing machines, improved mining techniques, synthetic rubber, concrete homes, and a fluoroscope.

The Wizard of Menlo Park  
THOMAS EDISON



- A.** A compacted stent is inserted into the blocked part of an artery wrapped around an angioplasty balloon catheter.
- B.** The balloon catheter is inflated, causing the stent to expand and lock.
- C.** The balloon catheter is deflated and removed leaving the stent locked in place.



John Bardeen, Walter Brittain, and William Shockley invented the transistor at Bell Labs in 1947. It was called a point contact transistor because amplification or transistor action occurred when two pointed metal contacts were pressed onto the surface of the semiconductor material.



The rascal scooter



Packaging & shipping tape



This sound mixing console is an example of improving upon someone else's invention. Les Paul was the first to blend multiple single recordings together to create a new sound.



Les Paul's first electric guitar was a piece of 4" x 4" lumber with strings fastened to a door hinge. This later version, the Sunburst, looks more like the solid body guitars that shaped the sound of many genres of music—from pop, country, R&B and rock and roll, to punk and rap.



These inventions, and the massive industries that resulted from them, have left a huge imprint on the world. This is another hallmark of Edison. He created both the products and the systems needed to support the industries that produce the products. He did not stop with making and selling the electric light bulb. He also assembled and marketed the infrastructure to support them, thus making money twice, once on the product, and once for the services to support them. Today, the annual revenues of the national electric utility industry are about \$215 billion. Worldwide, it is probably three to four times that amount, close to a trillion dollars!

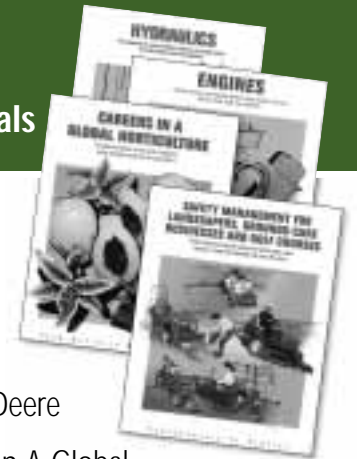
All major companies have research laboratories where their next generation of products are being envisioned and perfected. Edison gave us the keys to the industrial revolution and the means to perpetuate it indefinitely by showing us how to organize our thinking and creativity so that we may profit continuously from them. (Take a tour of the web-version of his factory: <http://www.nps.gov/edis/inventionprocess/ENHS.html>). The current annual expenditures for national R&D conducted by all industrial, academic, and governmental sources is in excess of \$200 billion, rivaling the size of the American utility industry. Worldwide, it is probably twice that amount. If we add the other industries he started like recorded sound, motion pictures, and the electronics revolution, we can probably account for another trillion dollars. So there we have it. Tom Edison's work back at the end of the 1800's and early 1900's, gave the world a productive legacy worth about two trillion dollars a year. Now you know why I call New Jersey: The Invention State! ●

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*Harry Roman*  
is an engineer  
and inventor who  
works from PSE&G  
(Public Service  
Electric & Gas,  
a New Jersey  
company).

# TIMELY TOPICS, PROVEN MATERIALS

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