THE 47TH ANNUAL

NATIONAL INVENTORS HALL OF FAME

Induction Ceremony

2019 Inductees

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

Chieko Asakawa

Home Page Reader

U.S. PATENT NO. 7,197,462

Chieko Asakawa invented the Home Page Reader (HPR), the first practical voice browser to provide effective internet access for blind and visually impaired computer users. Designed to enable users to surf the internet and navigate web pages through a computer's numeric keypad instead of a mouse, HPR debuted in 1997; by 2003, it was widely used around the world.

Asakawa and her team developed HPR at IBM Research - Tokyo, combining existing synthetic-speech technology with an understanding of HTML programming. HPR enabled users to independently navigate the web, and it could speak text, frames, images and text links; describe graphical elements like clickable maps; allow users to understand complex tables such as television listings; and differentiate content through devices like reading hyperlinks in a female voice and plain text in a male voice.

Asakawa's contributions to accessibility technology have helped change how visually disabled individuals communicate and interact. Blind since the age of 14, her experience informs her work, which includes a digital system to input and edit Braille; a network allowing Braille libraries to upload documents and books; aDesigner, a disability simulator enabling sighted web developers to mimic the experience of blind users; and most recently, the NavCog project, a collaboration between IBM Research and Carnegie Mellon University to use artificial intelligence, robotics, physical-positioning sensors and computer-aided vision to supply real-world accessibility through smartphone apps.

Born in Osaka, Japan, Asakawa earned her doctorate in engineering from the University of Tokyo. She joined IBM in 1985 and was named an IBM Fellow in 2009. She is the recipient of numerous awards, including the Achievement Award from the Society of Women Engineers, and holds more than 20 patents.

Born

Nov. 21, 1958

Primary Connections

- IBM: Distinguished Engineer; Chief Technology Officer, Accessibility Research; and Lead Researcher of IBM's Social Accessibility Project, Tokyo Research Laboratory, 1985–present
- Carnegie Mellon University: IBM Distinguished Service Professor, The Robotics Institute, 2015–present

Education

- Otemon Gakuin University (Japan): B.A., English Literature, 1982
- University of Tokyo: Ph.D., Engineering, 2004

Key memberships/awards

- National Academy of Engineering: Member, 2017
- Association for Computing Machinery: Special Interest Group on Accessible Computing, Impact Award, 2013
- Anita Borg Institute: Women of Vision Award, Leadership Category, 2011
- Information Processing Society of Japan: Kiyasu Special Industrial Achievement Award, 2009
- Women in Technology International: Hall of Fame, 2003

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

Jeff Kodosky

Virtual Instrumentation – LabVIEW™

U.S. PATENT NO. 4,901,221

In the 1970s, Jeff Kodosky and James Truchard were researchers at the Applied Research Laboratories at the University of Texas, responsible for automating acoustical instruments for the U.S. Navy. Frustrated by inefficient data collection methods of the time and determined to simplify their work, they imagined how computers might facilitate high-end testing. Along with co-worker Bill Nowlin, they founded National Instruments (NI) to develop the relationship between scientific instruments and computers through a concept called virtual instrumentation, where software and hardware combine to perform the functions of traditional instruments. LabVIEW (Laboratory Virtual Instrumentation Engineering Workbench) would become its flagship product.

Kodosky and Truchard introduced LabVIEW in 1986 as a graphical programming language that enables user-defined testing, measurement and control systems. It grew to be used by engineers, scientists, academics and students around the world. Based on structured data flow methods, Kodosky and Truchard's virtual instrumentation software is used in a variety of industries, including electronics, energy, aerospace and defense, wireless, automotive, heavy equipment, industrial machinery, academic research and semiconductors.

With LabVIEW, users program graphically and can design custom virtual instruments by connecting graphical icons with software wires to create block diagrams that are natural design notations for scientists and engineers. Users can customize front panels with knobs, buttons, dials and graphs to emulate control panels of instruments or add custom graphics to visually represent the control and operation of processes.

LabVIEW created a new paradigm for programming and has been recognized with more than 100 national and international awards. NI has grown to a multinational, billion-dollar company.

He holds the title of Business and Technology Fellow at NI and has more than 100 patents.

Born

Nov. 4, 1949

Primary Connections

- National Instruments Corp.: Co-founder, and Business and Technology Fellow

Education

- Rensselaer Polytechnic Institute: B.S., Physics, 1970

Key memberships/awards

- Rensselaer Polytechnic Institute: Presidential Lifetime Achievement Award, 2018; Trustee, 2002–present
- EE Times: Lifetime Achievement Award, 2012
- The Woodrow Wilson International Center for Scholars: Award for Corporate Citizenship, 2011
- Electronic Design: Engineering Hall of Fame, 2002

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

James Truchard

Virtual Instrumentation – LabVIEW™

U.S. PATENT NO. 4,901,221

In 1986, James Truchard and Jeff Kodosky introduced LabVIEW (Laboratory Virtual Instrumentation Engineering Workbench), a graphical programming language that enables user-defined testing, measurement and control systems, and is used by engineers, scientists, academics and students around the world. A new paradigm for programming, Truchard and Kodosky's virtual instrumentation software has been adopted across many industry sectors with varied applications, from controlling the CERN Large Hadron Collider to facilitating navigation of the FDA regulatory process to testing video game controllers.

In the 1970s, Truchard and Kodosky were researchers at the University of Texas Applied Research Laboratories, responsible for automating acoustical instruments for the U.S. Navy. Frustrated by inefficient data collection methods of the time and determined to simplify their work, they imagined how computers might facilitate high-end testing. Along with co-worker Bill Nowlin, they founded National Instruments (NI) to develop the relationship between scientific instruments and computers through a concept called virtual instrumentation, where software and hardware combine to perform the functions of traditional instruments. LabVIEW would become its flagship product.

With LabVIEW, users program graphically and can design custom virtual instruments by connecting graphical icons with software wires to create block diagrams that are natural design notations for scientists and engineers. Users can customize front panels with knobs, buttons, dials and graphs to emulate control panels of instruments or add custom graphics to visually represent the control and operation of processes.

After leading NI for four decades as CEO and chairman, he retired in 2017.

Born

June 25, 1943

Primary Connections

- National Instruments Corp.: Co-founder; President, CEO and Chairman of the Board (retired)

Education

- University of Texas at Austin: B.S., Physics, 1964; M.A., Physics, 1967; Ph.D., Electrical Engineering, 1974

Key memberships/awards

- National Academy of Engineering: Member, 2017
- IEEE: Fellow, 2014
- EE Times: Lifetime Achievement Award, 2012
- The Woodrow Wilson International Center for Scholars: Award for Corporate Citizenship, 2011
- Electronic Design: Engineering Hall of Fame, 2002

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

Rebecca Richards-Kortum

Medical Devices for Low-Resource Settings

U.S. PATENT NO. 7,365,844

Rebecca Richards-Kortum develops low-cost, high-performance medical technologies for poor communities where standard medical equipment isn't an option. As an engineer and educator focused on improving access to quality healthcare, she teaches students to be technological innovators who think in human terms.

While a professor of biomedical engineering at the University of Texas at Austin, Richards-Kortum learned that early screening programs for cancer were beyond the reach of many. So she created a battery-powered, low-cost imaging system to detect precancerous tissues without a biopsy. This was further developed to detect oral cancer with Ann Gillenwater at the University of Texas MD Anderson Cancer Center, and clinically tested with Baylor College of Medicine's Sharmila Anandasabapathy and MD Anderson's Kathleen Schmeler. A study in the United States and China showed the system could eliminate unnecessary and costly biopsies for about 90 percent of patients with benign esophageal cancer lesions, and a study in El Salvador, Brazil and Texas' Rio Grande Valley showed it could improve early detection of cervical cancer.

Richards-Kortum moved to Rice University in 2005, and during a visit to Malawi saw under-equipped neonatal wards where premature babies died daily due to the lack of equipment and infrastructure that was commonplace in high-income countries. With Rice colleague Maria Oden, she founded the Rice 360° Institute for Global Health and began working with students on low-cost, low-power devices to save newborn lives. The team's successes include the Pumani CPAP system for newborns with breathing problems; BiliSpec, a tool that measures bilirubin to detect jaundice; and DoseRight, for accurate dosing of children's liquid medication.

Richards-Kortum received her bachelor's degree in physics and mathematics from the University of Nebraska-Lincoln, and her master's degree in physics and a doctorate in medical physics from the Massachusetts Institute of Technology. Her many honors include a MacArthur Foundation Fellowship.

Born

April 14, 1964

Primary Connections

- Rice University: Professor of Bioengineering; Director, Rice 360° Institute for Global Health; and Founder, Beyond Traditional Borders Undergraduate Global Health Program, 2005-present
- University of Texas at Austin: Professor of Bioengineering, 1990-2005

Education

- University of Nebraska-Lincoln: B.S., Physics and Mathematics, 1985
- Massachusetts Institute of Technology: M.S., Physics, 1987; Ph.D., Medical Physics, 1990

Key memberships/awards

- U.S. Department of State: U.S. Science Envoy for Health Security, 2018
- AIMBE (American Institute for Medical and Biological Engineering): Pierre Galletti Award, 2016
- Lemelson-MIT Award for Global Innovation (with Maria Oden): 2013
- National Academy of Engineering: Member, 2008
- National Science Foundation: Presidential Young Investigator, 1991

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

Edmund O. Schweitzer III

Digital Protective Relay

U.S. PATENT NO. 4,300,182

Edmund O. Schweitzer III brought the first microprocessor-based digital protective relay to market, revolutionizing the performance of electric power systems with computer-based protection and control equipment, and making a major impact in the electric power utility industry. Previously, utilities relied on bulky relays made of springs, magnets and coils. Schweitzer's more precise, more reliable digital relay was one-eighth the size, one-tenth the weight and one-third the price.

Schweitzer became intrigued with electric power system protection and protective relays as an electrical engineering student, earning his bachelor's and master's degrees at Purdue University and, in 1977, his doctorate at Washington State University. In 1982, he started Schweitzer Engineering Laboratories (SEL) in Pullman, Washington, today an employee-owned company, to develop and manufacture digital protective relays, which exist to make electric power safer, more reliable and more economical.

Schweitzer's multifunctional digital relay, the SEL 21, not only protected power systems; it recorded data, helped locate faults and provided additional innovations that have since become standard features of protective relays. The SEL-PRTU, a later device, was the first to enable communication to multiple relays.

Schweitzer's digital technology led to reduced design work in protection and control systems, flexible operation options and increased reliability, resulting in reduced cost. SEL equipment is in service worldwide at voltages from 120 volts through 765 kilovolts, protecting feeders, motors, transformers, capacitor banks, transmission lines and other power apparatus for customers including utility companies, and operations using large amounts of power, like mines, factories, hospitals, universities and data centers. SEL products can be found in 163 countries around the world.

A member of the National Academy of Engineering and an IEEE Fellow, Schweitzer received the IEEE Medal in Power Engineering in 2012.

Born

Oct. 31, 1947

Primary Connections

- Schweitzer Engineering Laboratories Inc.: Founder, President, Chairman of the Board and Chief Technology Officer, 1982-present
- Schweitzer was a member of the faculty at Ohio University and Washington State University

Education

- Purdue University: B.S., Electrical Engineering, 1968; M.S., Electrical Engineering, 1971
- Washington State University: Ph.D., Electrical Engineering, 1977

Key memberships/awards

- Washington State University: Regents' Distinguished Alumnus Award, 2014; Alumni Achievement Award, 2001
- Purdue University: Outstanding Electrical and Computer Engineer Award, 2003
- National Cryptologic Museum Foundation: Board Member

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

Dennis Ritchie

UNIX Operating System

U.S. PATENT NO. 4,135,240

Dennis Ritchie and Ken Thompson's creation of the UNIX operating system and the C programming language were pivotal developments in the progress of computer science. Today, 50 years after its beginnings, UNIX and UNIX-like systems continue to run machinery from supercomputers to smartphones. The UNIX operating system remains the basis of much of the world's computing infrastructure, and C language — written to simplify the development of UNIX — is one of the most widely used languages today.

Thompson and Ritchie met at Bell Labs in 1967. Ritchie came from Harvard University with a Bachelor of Science degree in physics. It wasn't long before their differing, yet complementary backgrounds spurred the development of UNIX, a multitasking, multiuser operating system alternative to the batch processing systems then dominating the computer industry.

Thompson and Ritchie's collaboration was a game-changer. In 1972, Ritchie completed the original version of the C programming language; Thompson then rewrote the UNIX kernel in C. This made UNIX portable — that is, easily adapted for different computer platforms, unlike previous operating systems that ran on only one type of hardware — and allowed it to be used almost without change across a wide span of computers. From UNIX came an influential design philosophy emphasizing simplicity and clarity, and the introduction of a hierarchical filing system and pipes to connect processes together.

After 40 years with Bell Labs, Ritchie retired in 2007 as head of the System Software Department. His many honors include the Japan Prize, the National Medal of Technology and the A.M. Turing Award from the Association for Computing Machinery.

Born
Sept. 9, 1941

Died
Oct. 12, 2011

Primary Connections

- Bell Labs: 1967–2007, Led the System Software Department

Education

- Harvard University: B.S., Physics, 1963

Key memberships/awards

- Computer History Museum: Fellow, 1997
- IEEE Computer Society: Computer Pioneer Award, 1994
- IEEE Hamming Medal, 1990
- National Academy of Engineering: Member, 1988
- ACM Software Systems Award, 1983
- IEEE Emmanuel Piore Award, 1982

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

Ken Thompson

UNIX Operating System

U.S. PATENT NO. 3,568,156

During the late 1960s and early 1970s, Bell Labs colleagues Ken Thompson and Dennis Ritchie developed UNIX, a multitasking, multiuser operating system alternative to the batch processing systems then dominating the computer industry. With smartphones to supercomputers running on UNIX and UNIX-like systems, Thompson and Ritchie laid the foundation for much of the world's computing infrastructure.

To run early computers, users had to load programs and data — typically in the form of punched paper cards, or magnetic or paper tape — into the machine. Computer operating systems were specific to the vendor-supplied hardware, and even different operating systems from the same vendor could require different commands, operating procedures and debugging.

In 1972, Ritchie completed the original version of the high-level C programming language; Thompson then rewrote the UNIX kernel in C. This made UNIX portable — that is, easily adapted for different computer platforms and allowed it to be used almost without change across a wide span of computers. UNIX further introduced an influential operating system design philosophy emphasizing simplicity and clarity, and concepts like the introduction of a hierarchical filing system and pipes to connect processes together.

Thompson's many notable contributions to computer science include Belle, the world champion chess-playing computer, built at Bell Labs in 1977 with Joe Condon, and the UTF-8 multibyte character encoding scheme, developed in 1992 with Rob Pike. It is the most widely used encoding on the World Wide Web.

Thompson graduated from the University of California, Berkeley, with bachelor's and master's degrees in electrical engineering. With Bell Labs from 1966 to 2000, he is currently a Distinguished Engineer at Google. The Japan Prize, the National Medal of Technology and the A.M. Turing Award from the Association for Computing Machinery are among his many honors.

Born

Feb. 4, 1943

Primary Connections

- Bell Labs: 1966-2000, Distinguished Member of Technical Staff in the System Software Research Department
- Google: 2006–present, Distinguished Engineer

Education

- University of California, Berkeley: B.S., Electrical Engineering, 1965; M.S., Electrical Engineering, 1966

Key memberships/awards

- University of Pennsylvania: Harold Pender Award, 2003
- Computer History Museum: Fellow, 1997
- Institute of Electrical and Electronic Engineers (IEEE) Computer Society: Computer Pioneer Award, 1994
- IEEE Hamming Medal, 1990
- National Academy of Sciences: Member, 1985
- ACM Software Systems Award, 1983
- IEEE Emmanuel Piore Award, 1982
- National Academy of Engineering: Member, 1980

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

David Walt

Microwell Arrays

U.S. PATENT NO. 6,023,540

David Walt created microwell arrays that could analyze thousands of genes simultaneously, revolutionizing the field of genetic analysis. His development of single-molecule analysis, in which analytes are chemicals or protein molecules instead of DNA, is an extension of that work. Walt's technology accelerated the understanding of numerous human diseases and is now being used in diagnosis. It has also made DNA sequencing more affordable and accessible.

The development of microarray technology began when an etching procedure resulted in evenly spaced tiny wells on the ends of optical fibers. Walt realized their pattern and depths were highly reproducible and predictable, with sizes orders of magnitude smaller than anything previously reported: a fiber with a diameter of 0.5 mm could accommodate as many as 50,000 wells.

When the etched fibers were exposed to a suspension of tiny beads, one bead fell into each well. Walt attached fluorescent dyes to the beads that allowed researchers to determine the identity and location of each bead — the first self-assembled random bead array. This revolutionized the approach to sensor fabrication, and made arrays simple to assemble and easy to reproduce.

In 1998, Walt was the scientific founder of Illumina Inc., which focused on the random bead array technology for developing next-generation genotyping instrumentation. By the early 2010s, Illumina instruments had been used in 90 percent of all genetic analyses performed worldwide. He founded Quanterix in 2007 to develop his single-molecule analysis technology.

Walt is currently a faculty member at Harvard Medical School and the Pathology Department at Brigham and Women's Hospital. He is also a member of the Wyss Institute at Harvard and is a Howard Hughes Medical Institute Professor. He holds more than 60 patents.

Born

Feb. 11, 1953

Primary Connections

- Harvard University: Medical School Faculty Member, 2017–present; Pathology Professor; Wyss Institute Faculty Member
- Brigham and Women's Hospital: Principal Investigator at the Walt Lab
- Tufts University: Chemistry Professor, 1981–2017

Education

- University of Michigan: B.S., Chemistry, 1974
- State University of New York at Stony Brook: Ph.D., Chemical Biology, 1979

Key memberships/awards

- American Chemical Society (ACS): Kathryn C. Hach Award for Entrepreneurial Success, 2017; ACS Award for Creative Invention, 2010
- American Institute for Medical and Biological Engineering: Fellow, 2008
- American Association for the Advancement of Science: Fellow, 2000

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

William J. Warner

Digital Nonlinear Editing System

U.S. PATENT NO. 4,970,663

Television and film both must be edited to create a final program. Film editing always involved manually cutting and pasting strips of film, a simple and fast technique. But even by the late 1980s, video editing was severely limited because changes had to be done in sequence — in a linear fashion — making edits difficult. Bill Warner invented the Avid Media Composer, a digital, nonlinear editor that took over the industry for both video and film with its graphical interface. The result was the ability to make instantaneous changes anytime, anywhere in the program, setting a new standard.

Warner founded Avid Technology Inc. in 1987. By 2000, more than 100 television shows and movies such as "Titanic" and "The Matrix" were edited with Avid products. By 2018, Avid's solutions were used in 70 percent of commercially published music, 90 percent of original content from the leading streaming providers and nine of 10 leading international news networks. Avid has won a Grammy, 16 Emmys and two Oscars; it went public in 1993 and is listed on the Nasdaq under the symbol AVID.

Development of the Avid Media Composer was a significant challenge. Warner saw that the company needed to develop its own video compression and decompression. The industry was surprised when the first product ran at 30 frames per second, showing editors every frame of their original material. Avid pioneered the on-screen source and record monitor, and an interactive timeline. Most importantly, the system was extremely fast, allowing editors to find their footage, make edits and see the results instantly.

In addition to his digital editing work, Warner has worked over the years on improving hand-pedaled cycles. He founded Wildfire Communications in 1992, based on his invention of a telephone-based, voice-activated virtual assistant. Wildfire was sold to France Telecom in 2000. Referring to himself as an "engineering entrepreneur," Warner today is building a business around personalized maps. He received a Bachelor of Science degree in electrical engineering from the Massachusetts Institute of Technology.

Born

March 19, 1955

Primary Connections

- Avid Technology Inc.: Founder, President and CEO, 1987–91; Director, 1987–2005
- Wildfire Communications: Founder, 1991–2000

Education

- Washington University in St. Louis, 1973–74
- Massachusetts Institute of Technology: B.S., Electrical Engineering, 1980

Key memberships/awards

- Massachusetts Innovation & Technology Exchange: Hall of Fame, 2012
- Academy of Motion Picture Arts and Sciences: Scientific and Technical Award, 1994
- Academy of Television Arts & Sciences: Engineering Award, 1993

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

John Baer

Thiazide Diuretics (Chlorothiazide)

U.S. PATENT NO. 3,476,858

In 1951, pharmacologist John Baer joined Sharpe & Dohme — soon to become Merck Sharpe & Dohme — and became part of a research team that would revolutionize the treatment of hypertension. Together with fellow pharmacologist Karl Beyer and organic chemists James Sprague and Frederick Novello, Baer helped develop thiazide diuretics, the first class of drugs to safely and effectively treat hypertension.

Heart disease was the leading cause of death in the United States in 1958, the year chlorothiazide was introduced. Until then, the only effective medications for millions of Americans suffering various forms of hypertension were intravenous and intramuscular agents containing mercury that were both difficult to administer and toxic. Chlorothiazide was a safe and desirable alternative: the first diuretic to inhibit the reabsorption of sodium and chloride ions in the kidney, and increase urine production without upsetting electrolyte balance in the human body.

Today, thiazide diuretics remain a first-line treatment for high blood pressure and related heart problems, and are used to decrease edema.

Baer became a Fellow of the American Association for the Advancement of Science in 1966.

Born
April 25, 1917

Died
Aug. 17, 2003

Primary Connections

- Merck & Co. Inc.: Senior Director of Therapeutic Research and Executive Director of Drug Metabolism, 1951–84
- Carleton College: Assistant Professor of Chemistry
- Haverford College: Chemistry Instructor
- New York University: Chemist

Education

- Swarthmore College: Bachelor's Degree, Chemistry, 1938
- University of Pennsylvania: M.S., Organic Chemistry; Ph.D., Organic Chemistry

Key memberships/awards

- International Society for the Study of Xenobiotics: President, 1982–83
- Albert and Mary Lasker Foundation: Special Public Health Award, 1975
- National Association of Manufacturers: Honor Scroll, 1965

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

Karl H. Beyer Jr.

Thiazide Diuretics (Chlorothiazide)

U.S. PATENT NO. 2,789,938

During 40 years of pharmaceutical research, Karl Beyer led teams that pioneered new classes of drugs. In 1942, Beyer joined Sharpe & Dohme, which merged in 1953 with Merck. Beyer then became president of the Merck Institute of Therapeutic Research — and eventually senior vice president of research for Merck & Co. — where he rejected the traditional model of discovering drugs by chance and instead promoted drug discovery by a laboratory team.

Chief among Beyer's accomplishments was the creation of thiazide diuretics, the first class of drugs to safely and effectively treat hypertension, developed with the Merck Sharp & Dohme Research Laboratories team of fellow pharmacologist John Baer, and organic chemists James Sprague and Frederick Novello. When chlorothiazide was introduced in 1958, heart disease was the leading cause of death in the United States, with millions of Americans suffering from some form of hypertension. Chlorothiazide, a safe and effective alternative to existing medications, was the first diuretic to inhibit reabsorption of sodium and chloride ions in the kidneys, and increase urine production without upsetting electrolyte balance.

Beyer also developed probenecid, the first effective therapy for gout. Beyer's discovery of a method of inhibiting reabsorption of uric acid from the kidneys offered relief from the pain of gout disease.

In 1975, Beyer, Sprague, Baer and Novello received the Lasker Foundation Special Public Health Award for their individual contributions to the invention of thiazide diuretics.

Born
June 19, 1914

Died
Dec. 2, 1996

Primary Connections

- Merck & Co. Inc.: Senior Vice President for Research, 1942–73
- Pennsylvania State University: Visiting Professor, College of Medicine/ Pharmacology Department, 1973–96

Education

- Western Kentucky University (formerly Western Kentucky State College): B.S., Chemistry and Biology, 1935
- University of Wisconsin-Madison: Ph.M., 1937; Ph.D., Physiology, 1940; M.D., 1943

Key memberships/awards

- American Heart Association: Excellence Award for Hypertension Research, 1979
- American Society for Pharmacology and Experimental Therapeutics: Torald Sollman Award in Pharmacology, 1978
- National Association of Manufacturers: Honor Scroll, 1965
- Gairdner Foundation: International Award, 1964

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

Frederick Novello

Thiazide Diuretics (Chlorothiazide)

U.S. PATENT NO. 2,809,194

In 1943, scientist Frederick Novello embarked on a 38-year career with Merck Sharp & Dohme, working on compounds for the development of new drugs as a senior investigator in the Medicinal Chemistry Department. One of his key achievements — in collaboration with fellow organic chemist James Sprague and pharmacologists John Baer and Karl Beyer — was the invention of thiazide diuretics, the first class of drugs to safely and effectively treat hypertension.

When chlorothiazide was introduced in 1958, heart disease was the leading cause of death in the United States, with millions of Americans suffering from some form of hypertension. Until then, the only effective medications for treating hypertension were difficult to use and had toxic side effects. Chlorothiazide, the first diuretic to inhibit the reabsorption of sodium and chloride ions in the kidneys and increase urine production without upsetting electrolyte balance, was a safe and effective alternative.

In 1967, a landmark study of Veterans Administration patients with high blood pressure showed that thiazides dramatically reduced cardiovascular events, hospitalization and sudden death. Today, thiazide diuretics remain a first-line treatment for high blood pressure and related heart problems, and for decreasing edema. They are often used in combination with drugs from other classes to combat hypertension.

A graduate of Harvard University for his bachelor's, master's, and doctoral degrees, Novello held 64 patents. In 1975, Novello, Beyer, Sprague and Baer received the Lasker Foundation Special Public Health Award for their individual contributions to the invention of thiazide diuretics; Novello was recognized for being the first to synthesize chlorothiazide.

Born
1916

Died
Dec. 17, 1986

Primary Connections

- Merck & Co. Inc.: Senior Investigator, Medicinal Chemistry Department, 1943-81

Education

- Harvard University:
  Bachelor's Degree, Chemistry, 1938
  M.S., Organic Chemistry, 1939
  Ph.D., Organic Chemistry, 1941

Key memberships/awards

- National Association of Manufacturers: Honor Scroll, 1965

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

James Sprague

Thiazide Diuretics (Chlorothiazide)

U.S. PATENT NO. 3,097,204

Biochemist James Sprague was a member of the Merck Sharp & Dohme Research Laboratories team that pioneered thiazide diuretics, the first class of drugs to safely and effectively treat hypertension, during the 1950s. Sprague — who joined Sharpe & Dohme in 1937, then continued at Merck Sharpe & Dohme after the companies merged — developed chlorothiazide with fellow organic chemist Frederick Novello and pharmacologists Karl Beyer and John Baer.

Chlorothiazide was introduced in 1958, when heart disease was the leading cause of death in the United States and millions of Americans suffered from some form of hypertension. Previously, the only effective medications for treating hypertension were intravenous and intramuscular mercurial agents; both were difficult to use and featured toxic side effects. Chlorothiazide was a safe and effective alternative.

As early as 1959, the American Heart Association and the National Institutes of Health reported declining death rates resulting from cardiac events, which they partly attributed to the new thiazide antihypertensives. Today, thiazide diuretics remain a first-line treatment for high blood pressure and related heart problems, and to decrease edema.

In 1975, Sprague, Beyer, Baer and Novello received the Lasker Foundation Special Public Health Award for their individual contributions to the invention of thiazide diuretics; Sprague was recognized for directing the chemical search for sulfa compounds that promote the excretion of body salt.

Besides thiazide diuretics, Sprague made other important discoveries in the area of sulfa drugs, helping to develop benemid, a treatment for gout.

Born
1909

Died
Jan. 30, 2000

Primary Connections

- Merck & Co. Inc.: Vice President for Medicinal Chemistry, 1937–72

Education

- Franklin College: Bachelor's Degree, 1930
- University of Wisconsin-Madison: Ph.D., Organic Chemistry, 1934
- Yale University: Postdoctoral Work

Key memberships/awards

- American Heart Association: Excellence Award for Hypertension Research, 1979
- American Chemical Society: Division of Medicinal Chemistry Hall of Fame, 1970
- National Association of Manufacturers: Honor Scroll, 1965
- American Association for the Advancement of Science: Fellow, 1941

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

S. Duncan Black

Portable Hand-Held Electric Drill

U.S. PATENT NO. 1,245,860

S. Duncan Black and Alonzo G. Decker laid the foundation for the modern power tool industry with their invention of the portable hand-held electric drill. The company they co-founded, Black & Decker, became a world leader as they continued to innovate, introducing the first line of power tools designed specifically for the "Do-It-Yourself" consumer market in 1946, and the first cordless power tool in 1961.

Black, a draftsman, and Decker, a tool and die maker, met in 1906. In 1910, they pooled funds to open a small machine shop and began improving upon the world's first electric power tool — a combination DC electric motor and manual drill device requiring operators to grip side handles with both hands while pressing into a chest plate to help penetrate the work surface.

In 1914, Black and Decker devised a pistol grip and trigger switch that enabled power control with one hand. Moreover, their new ½-inch portable drill included a universal electric motor capable of running on alternating current (AC) or direct current (DC). They began manufacturing their drill in 1916; the following year, the company opened a 12,000-square-foot manufacturing plant in Towson, Maryland. By 1920, Black & Decker surpassed $1 million in annual sales and soon had offices in eight U.S. cities and a factory in Canada. Virtually all of today's electric drills descend from the original Black & Decker drill.

Black held 14 patents. He served as president of the company from 1910 until his death in 1951, when Decker replaced him. Through the years, Black & Decker acquired a variety of companies, and in 2010, Black & Decker merged with Stanley Works to become Stanley Black & Decker.

Born
Aug. 2, 1883

Died
April 15, 1951

Primary Connections

- Black & Decker Manufacturing Co.: Co-founder and President, 1910–51
- Rowland Telegraph Co., 1899–1910

Education

- Baltimore Polytechnic Institute

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

Alonzo G. Decker

Portable Hand-Held Electric Drill

U.S. PATENT NO. 1,245,860

Virtually all of today's electric drills descend from the original portable hand-held drill patented in 1917 by Alonzo Decker and S. Duncan Black, whose invention spurred the growth of the modern power tool industry. As the partners continued their innovations — including the first line of power tools designed for home users — the company they co-founded, Black & Decker, became a world leader.

In 1906, Decker, a tool and die maker, and Black, a draftsman, met as 23-year-old employees of the Rowland Telegraph Co. Four years later, Black sold his car for $600 and, with an equal amount from Decker, they opened a small machine shop in Baltimore. The initial focus of the new business was improving and manufacturing the inventions of others. While successful, they wanted to invent and produce their own products; their first was a portable air compressor designed for automobile owners to inflate their tires.

While pondering a Colt .45 automatic pistol, Black and Decker determined its features could improve the electric drill. In 1914, they devised a pistol grip and trigger switch enabling single-handed power control and began manufacturing their drill in 1916. In 1917, the company opened a 12,000-square-foot manufacturing plant in Towson, Maryland. By 1920, Black & Decker surpassed $1 million in annual sales and soon had offices in eight U.S. cities and a factory in Canada.

Decker, who had no formal education beyond seventh grade, held 41 patents. The Black & Decker Co. was a family business for decades. A Black or a Decker served in a direct leadership role as president, CEO or board chair from its founding in 1910 until 1978. In 2010, Black & Decker merged with Stanley Works to become Stanley Black & Decker.

Born
Jan. 16, 1884

Died
March 18, 1956

Primary Connections

- Black & Decker Manufacturing Co.: Co-founder, President and Chairman of the Board, 1910–56
- Rowland Telegraphic Co., 1906–10

Key memberships/awards

- Towson (MD) Town Association's "Man of the Year" Award, 1953
- Baltimore Urban League, Executive Board
- Office of Production Management (WWII), Adviser to the District Chief

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

Andrew J. Higgins

LCVP (Landing Craft, Vehicle, Personnel); Higgins Boats

U.S. PATENT NOS. 2,144,111 & 2,341,866

A major contributor to the Allied efforts in World War II, Andrew Higgins was touted as "The Man Who Won the War" by President Dwight D. Eisenhower.

Higgins was a New Orleans-based boat builder and inventor. His best-known boat was the Landing Craft, Vehicle, Personnel (LCVP), or Higgins Boat, that was used to land American troops on the beaches of Normandy on D-Day.

During the 1930s, Higgins developed the Eureka, a fast, maneuverable and rugged flat-bottomed craft. In competition with boats from other manufacturers prior to the American entry into World War II, the Eureka's superior performance resulted in the U.S. Navy awarding contracts to Higgins Industries to build landing craft for the military.

Higgins then evolved the Eureka into a series of boats including the Landing Craft, Personnel (Large), and the Landing Craft, Vehicle (LCV), which featured a ramp. Soon afterward, he combined the functions of the LCP(L) and the LCV into the LCVP. The LCVP carried 36 combat-equipped infantrymen, a Jeep and 12 troops, or 8,100 pounds of cargo. It featured a crew of four and could float in 3 feet of water, reach a speed of 12 knots, and was protected by two .30-caliber machine guns.

The Higgins Boat became the standard personnel landing craft for the military during World War II. Higgins was honored by the U.S. Army, Navy and Marine Corps for his work, which also included high-speed Patrol Torpedo (PT) boats. He was named on 18 patents, and he remained president of Higgins Industries until his death in 1952.

Born
Aug. 28, 1886

Died
Aug. 1, 1952

Primary Connections

- Higgins Industries: Founder and President

Education

- Creighton Preparatory School, Omaha, Nebraska
- Completed a correspondence course in boat design

Key memberships/awards

- Honorary degree from Creighton University, 1943
- Marine Corps Systems Command and the Marine Corps Association & Foundation: Andrew J. Higgins Award

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

Joseph Lee

Bread Machines

U.S. PATENT NOS. 524,042 & 540,553

Boston-area entrepreneur Joseph Lee was a pioneer in the automation of bread and breadcrumb making during the late 1800s. He invented machines for use in the hospitality industry that automated the mixing and kneading of bread dough and that created crumbs from day-old loaves.

The son of slaves, Lee spent much of his South Carolina childhood in bondage. He worked as a servant in Beaufort, then served for 11 years as steward in the U.S. Coast Survey, where he gave particular attention to bread making. By then a skilled chef and baker, Lee observed that the best bread was produced by evenly and thoroughly kneaded dough.

By the early 1880s, the self-educated Lee had become a successful hotel and restaurant owner and caterer in Massachusetts. In 1894, he filed for a patent on a machine that would produce uniform bread. Troubled by the enormous amount of unsold bread his kitchens discarded because it was a day or more old and believing that breadcrumbs were better than cracker crumbs for coatings, Lee developed — and, in 1895, patented — a device to mechanize the tearing, crumbling and grinding of bread into crumbs. By 1900, Lee's crumber was used by many of America's leading hotels and was a fixture in hundreds of the country's leading catering establishments. In 1902, he patented an improvement to his bread machine, hailed for superior kneading action that closely approximated the work of the human hand.

Lee eventually assigned the rights to his bread-kneading machine to The National Bread Co., continuing to own stock and receive royalties. He also sold his breadcrumbing machine to The Goodell Co., a manufacturing firm located in New Hampshire.

Born	Died
1848	June 11, 1908

Key honors/awards

- Lee was included in Kareem Abdul-Jabbar's 2012 book "What Color is My World? The Lost History of African-American Inventors"
- Massachusetts Charitable Mechanic Association: Silver Medal, 1895

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

Joseph Muhler

Stannous Fluoride Toothpaste

U.S. PATENT NO. 3,445,567

During the early 1940s, when dentist and biochemist Joseph Muhler was an Indiana University undergraduate, he began studying fluoride and tooth decay at the suggestion of his biochemistry professor, Harry Day. Their research, in collaboration with inorganic chemist William Nebergall, would result in a cavity-preventing product using stannous fluoride. In 1956, Crest® toothpaste was introduced nationally. In 1960, it became the first toothpaste to be recognized by the American Dental Association (ADA) as an effective decay-preventing agent.

The idea of using fluoride in toothpaste surfaced in the late 1940s, around the same time research showed that fluoride ions made tooth enamel harder and more resistant to attack. Muhler researched more than 150 fluoride compounds before establishing stannous fluoride as the most effective hardening and protective agent for tooth enamel. In 1949, Procter & Gamble Co. began funding Muhler and Day's work; one year later, Nebergall joined the project.

In the 1950s, the team introduced a formulation containing stannous fluoride. Shortly thereafter, the product was licensed to Procter & Gamble, and stannous fluoride toothpaste was introduced in limited test markets in 1955.

Crest debuted in 1956, inspiring other manufacturers to develop their own fluoride formulas. The widespread use of fluoride toothpaste is credited as a significant factor in the nationwide decline in cavities that began in the late 1970s. Today, all toothpastes with the ADA Seal of Acceptance must contain fluoride.

Born
Dec. 22, 1923

Died
Dec. 24, 1996

Primary Connections

- Indiana University: Assistant Professor of Chemistry, 1951–72; Director, School of Dentistry's Oral Health Research Institute, 1972–84
- Held numerous consultant positions for the U.S. military, and companies including Coca-Cola and S.C. Johnson and Son

Education

- Indiana University: B.S., 1945; D.D.S., 1948; Ph.D., Chemistry, 1951

Military Service

- U.S. Navy, 1945–46

Key memberships/awards

- Indiana University School of Dentistry: Distinguished Alumni Award, 1980
- U.S. Navy: Distinguished Public Service Award, 1967

2019 NATIONAL INVENTORS HALL OF FAME INDUCTEE

William Nebergall

Stannous Fluoride Toothpaste

U.S. PATENT NO. 2,876,166

Inorganic chemist William Nebergall, and dentist and biochemist Joseph Muhler developed a cavity-preventing product using stannous fluoride, building on research begun in the 1940s at Indiana University by then-undergraduate Muhler and biochemistry professor Harry Day. In 1956, Crest® toothpaste was introduced nationally. Four years later, it became the first toothpaste to be recognized by the American Dental Association (ADA) as an effective decay-preventing agent.

At Day's suggestion, Muhler had begun investigating a recently published method for measuring the fluoride content of teeth and bones. By the late 1940s, research showed that fluoride ions made tooth enamel harder and more resistant to attack, and the idea of using fluoride in toothpaste took hold. In 1949, Procter & Gamble Co. began funding Muhler and Day's research; one year later, Nebergall joined the project. Nebergall worked on the inorganic chemistry aspects, producing high-purity stannous fluoride and compatible abrasives. Ultimately, Nebergall received three patents related to compounds created during his research.

The product was licensed to Procter & Gamble and, in the mid-1950s, the team introduced a formulation containing stannous fluoride. Stannous fluoride toothpaste was introduced in limited test markets in 1955. Crest debuted nationally in 1956. By the late 1970s, a steep nationwide decline in cavities was attributed in part to the widespread use of fluoride toothpaste. Today, all toothpastes with the ADA Seal of Acceptance must contain fluoride.

Nebergall was co-author (with Frederic Schmidt and Henry Holtzclaw Jr.) of "General Chemistry," a widely used first-year college chemistry textbook.

Born	Died
Dec. 12, 1914	Sept. 2, 1978

Primary Connections

- Indiana University: Assistant Professor of Chemistry, 1949–55; Associate Professor of Chemistry, 1955–75
- University of Minnesota: Taught there from 1944–49 while completing his doctorate
- University of Wisconsin at Superior: Chemistry Instructor, 1942–44
- University of Kentucky: Chemistry Instructor, 1941–42
- East Tennessee State University (formerly East Tennessee State Teachers College): Chemistry Instructor, 1939–41

Education

- Western Illinois University (formerly Western Illinois State Teachers College): B.Ed., 1936
- University of Illinois at Urbana-Champaign: M.S., Chemistry, 1939
- University of Minnesota: Ph.D., Inorganic Chemistry, 1949

Key memberships/awards

- Western Illinois University: Alumni Achievement Award, 1973
- National Science Foundation: Faculty Fellowship, 1959
- American Chemical Society: Member; Southern Indiana Section, Chairman, 1958-59