"In the Spirit of Edison and Einstein..."

Hall of Fame
Induction Banquet
Thursday, February 17, 1994

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William Hazell Center
New Jersey Institute of Technology
Newark, New Jersey

Greetings

Chomie Persson, Principal, Business Dynamics Associates
Mistress of Ceremonies

Grand Entrance

Special Awards
1994 Inventors of the Year
1994 Members of the New Jersey Inventors Hall of Fame

Welcome

Dr. Saul Fenster, President
New Jersey Institute of Technology

Dinner

Chairman's Message

James H. Blow, Jr., *Chairman, New Jersey Inventors Hall of Fame*
Project Director, Newark Minority Business Development Center

Speaker

Kitta MacPherson
Science Editor, *The Star-Ledger*

Presentation of Awards

James H. Blow, Jr.
Harry Roman, *Chairman of Selection Committee*
Principal Engineer, Research, Public Service Electric & Gas

Special Awards

Young Inventor: Donald J. Sauer
David Sarnoff Research Center, Princeton

Donald Sauer designed and developed the first commercial charge-coupled device (CCD) comb-filter integrated circuits which established RCA leadership in color TV receiver signal quality. In addition, these patents are licensed world-wide for picture stabilization in camcorder, VCR, and videodisc products.

The CCD comb filter is one of seven integrated circuit design innovations in analog-digital applications, CCDs, and imaging/electro-optic processing applications Sauer has designed for the Sarnoff Center.

Sauer is a distinguished member of the technical staff in the Integrated Circuit Laboratory of Sarnoff's Solid State Division. He earned a bachelor's degree in electrical engineering from the University of California at Los Angeles and is the author of 21 technical publications and inventor or co-inventor of 25 U.S. patents.

In 1989, he received the David Sarnoff Award for Outstanding Technical Achievement – the prestigious award is Sarnoff's highest technical honor. He is a resident of Allentown.

Small Business Inventor: James T. Reynolds
Croll-Reynolds, Co., Westfield

Electrostatic precipitators are used to remove particles from air streams using a discharge wire mounted within a collection tube. A voltage is applied to the discharge wire establishing an electrostatic field. The field causes the particles in the air stream to ionize and become attracted to the wall of the collection tube where they slide down to an outlet and are removed. The devices work very well in applications where there is little or no moisture. However, in air streams with a high moisture content, the particles adhere to the sides of the collector and to the discharge wire, requiring frequent cleaning. In a manufacturing setting, this requires stopping the production activity.

James Reynolds developed a wet wall system wherein a liquid washes particulate down the side of the collection tube walls. The liquid is then treated and recycled to the top of the device for reuse. The wet wall electrostatic precipitator is a significant improvement on previous devices and is especially effective at removing particles from air streams such as meat smoke.

As designed, the invention was manufactured and used in the Oscar Meyer research pilot plant in Wisconsin. It is not yet commercially marketed. Its potential applications include the removal of particulate matter in the textile industry and where particulate

matter is electrostatically charged, such as the removal of acid mist. The invention has potential in any social or economic setting where emissions or environmental control regulations need to be met.

Reynolds earned a bachelor's degree in mechanical engineering from Duke University before joining his father's firm, Croll-Reynolds Co. He was elected president of the firm in 1979 and retired in 1988. He is a life member of American Society of Mechanical Engineers and the New Jersey Society of Professional Engineers. He is a resident of Island Heights.

Independent Inventor: **John J. Frins**

John Frins invented "TheraGrip," a hand strengthener capable of exercising all five fingers effectively and simultaneously through isometric and isotonic exercise. The device redefines state-of-the-art in hand strength conditioning products. It is the only exerciser that involves the thumb, which is one of the unique factors that was the basis for the patent. Through continued use of "TheraGrip" physically disabled individuals can work through their disabilities and continue to lead a more normal and productive life.

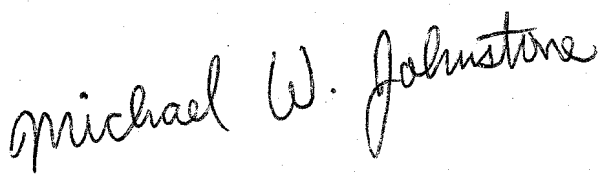
In speaking one-on-one to multiple sclerosis sufferers, Frins is able to teach the beneficial aspects of exercise therapy with his product. A daily therapy routine can restore lost hand and lower arm strength and increase mobility.

TheraGrip is manufactured by Baxter Rubber Co. and sold through Stronghands, which is owned by Frins. He is a resident of South Orange.

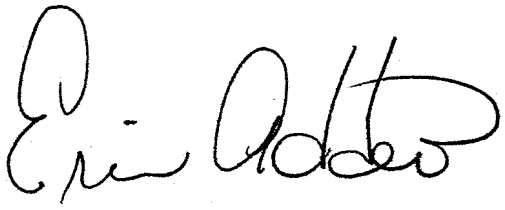
Enduring Popularity: **James Edward Johnstone (1875-1927)**
Newark

James Johnstone, born in Ireland, was a minor league pitcher from 1894 to 1897 and a professional umpire from 1902 to 1915. The baseball catcher's mask in use at the time featured a wire frame which could not prevent the occasional broken nose or lost tooth.

In 1922, Johnstone developed a new full vision design in which the frame was a solid one-piece aluminum casting that was unbreakable yet lighter in weight than previous models. Called "The Original Full Vision Mask," it was distributed by the Johnstone Baseball Mask Co. located on Central Ave. in Newark. His mask was adopted immediately by major league catchers and the original design is still in use today.



1994 Inventors of the Year



Eric J. Addeo, Ph.D.
Bellcore, Morristown

While working at AT&T Bell Laboratories in Whippany, Eric Addeo sought the technical solutions that could provide reliable, cost-effective and tetherless communication services for routine use by a large number of subscribers for personal, social, and business applications. He conceived, prototyped and developed key technical solutions that have contributed to the widespread deployment of today's cellular telephone systems.

Addeo's patent for suppression of co-channel interference allows substantially higher numbers of cellular telephone subscribers to have access to a relatively limited number of scarce communication channels. His invention was first applied in cellular radio trials conducted in Chicago. The equipment used was manufactured by AT&T and OKI Electric of Japan. Since then, his work has been applied to virtually every cellular radio system in the U.S. and in most systems used in other countries.

Addeo's patent related to data communications holds promise for enabling new data communication services that could allow people on the move to access information in various forms at any time and virtually from any place.

He earned both bachelor's and master's degrees in electrical engineering at New Jersey Institute of Technology and a doctorate in electrical engineering from Stevens Institute of Technology. He has earned four patents and four additional patents are pending. He is a resident of Long Valley.

Robert E. Kerwin, Ph.D.
Donald L. Klein
John C. Sarace
AT&T Bell Laboratories, Murray Hill

The self-aligned gate process that is the basis for very large integrated circuits has been used by all manufacturers of dynamic RAM memories and microprocessors since 1970. These include AT&T, IBM, Intel, TI, AMD, Siemens, NEC, Mitsubishi, etc.

The inventive act of using polycrystalline silicon as the first layer "metallic" interconnect material for these circuits permitted perfect alignment between the gate, source and drain components of unipolar transistors. The use of this material allowed one to diffuse or implant source and drain doping after the gate was in place to control alignment. The process has permitted increasing the scale of integration ever since.

Worldwide production of such transistors exceeded several trillion units in 1992, making these silicon-gate transistors the single most ubiquitous man-made product. The economics of scale of their manufacture has fueled the development of computer and communication technologies.

Kerwin earned bachelor's, master's and doctoral degrees in chemistry from Boston College, Massachusetts Institute of Technology and the University of Pittsburgh, respectively. He spent 22 years contributing to the development of integrated circuit technology before moving to AT&T corporate headquarters where he now is Intellectual Property General Manager. Kerwin holds 10 U.S. patents and is a Bell Laboratories Fellow. He is a resident of Westfield.

Klein earned a bachelor's degree in chemistry from Polytechnic University and a master's degree and doctorate in chemistry from the University of Connecticut. He had successful research or management careers with Sylvania Electric Products, Bell Laboratories and IBM until his retirement. He earned seven patents. Klein is a resident of Poughkeepsie, N.Y.

Sarace earned a bachelor's degree in metallurgy from the University of Michigan. He had successful research careers with Bell Laboratories, Harris Semiconductor, David Sarnoff Research Center, and Rockwell International until his retirement in 1989. Sarace holds five U.S. patents and received the Jack A. Morton Award for "Outstanding Contributions in Solid-State" from the Institute of Electrical and Electronics Engineers. He is a resident of Grass Valley, Ca.

Kuo-Yann Lai, Ph.D.
Colgate-Palmolive Co., Piscataway

Traditional dishwashing liquids had been harsh to the human skin. Kuo-Yann Lai's task was to make nonionic surfactants good in foaming, mild to the skin and efficient in cleaning. His invention achieved all of this and represented a discontinuity in the industry. Palmolive Sensitive Skin Dishwashing Liquid was introduced as a clear liquid in a clear bottle and many other companies were forced to follow the lead.

Lai's invention has been manufactured and marketed by Colgate-Palmolive in the United States, France, Germany, Canada, Australia and New Zealand. In the U.S. alone, it has captured $50 million in business.

The product has revolutionized the industry and Lai's invention will have applications in many other products.

Lai is associate director of Household Surface Care Product Development at Colgate-Palmolive. He earned a bachelor's degree in chemical engineering from the National Cheng Kung University in Tainan, Taiwan; a master's degree in chemistry from the University of Texas at El Paso; and a doctorate in chemistry from Clarkson College of Technology. He is a resident of Plainsboro.

June D. Passaretti, Ph.D.
Minerals Technologies Inc., Bethlehem, Pennsylvania
(Formerly Specialty Minerals Division of Pfizer Inc., N.Y.)

Ninety percent of recycled paper is remanufactured into mechanical paper grades which are produced under traditionally acidic paper making conditions. These conditions are necessary to prevent fiber darkening which occurs as pH is increased to alkaline levels. Calcium carbonate, which has been used for years by fine paper makers to foster higher brightness and improve printability, color reproduction and paper performance, readily dissolves in acid and therefore could not be used to improve the quality of these paper grades.

June Passaretti developed a process in which calcium carbonate could be used in acidic conditions without dissolving. Her "buffer" system opens the doors for groundwood papermakers to use calcium carbonate to improve the quality and brightness of mechanical paper grades and improving market acceptance of recycled paper.

The invention was commercially developed at a paper mill in New Jersey that uses 100 percent recycled paper as their wood fiber source. Passaretti's patents have grown into a comprehensive program employing at least 20 people at Minerals Technologies with many more to be employed at numerous locations throughout the United States. The patents have the potential of doubling the current size of the company while keeping U.S. groundwood papermakers competitive with European papermakers.

Passaretti earned a bachelor's degree in chemistry from William Paterson College and a Ph.D. in chemistry from Brown University. She is a resident of Liberty Corner.

Milan R. Uskokovic, Ph.D.
Hoffmann-La Roche Inc., Nutley

Milan Uskokovic's inventions involve the conception, design and synthesis of cellular antiproliferative and differentiation inducing molecules for use in psoriasis and cancer therapies. Through his inventions, the company was able to develop new drugs useful for skin diseases and cancer. He is well known for his novel concepts of molecular design and has earned some 13 patents.

In addition to his post as a research chemist at Hoffmann-La Roche, Uskokovic is a Regents Professor at the University of California and an adjunct professor at Stevens Institute of Technology.

He earned a Diplome in Chemical Engineering from the Polytechnic Institute of the University of Belgrade and a doctorate in organic chemistry from Clark University. He is a member of the American Chemical Society and the New York Academy of Sciences, and serves on the advisory or editorial boards of six professional journals. He is a resident of Montclair.

Gilbert Zweig
Glenbrook Technologies, Dover

Gilbert Zweig developed an x-ray camera system of high resolution and high sensitivity for converting x-ray images of electronic components into real-time video images. This has resulted in a product line of comparatively low cost x-ray inspection systems for the printed circuit board industry.

The manufacture of electronic components such as multi-layer printed circuit boards and surface mounted integrated circuits on printed circuit boards, require x-ray inspection as an essential part of the manufacturing process and quality control. Real time x-ray inspection systems used for these applications were, historically, expensive to purchase ($150,000 to $500,000) and operate. Original x-ray inspection systems employed cameras of low sensitivity, requiring more expensive microfocus x-ray tubes working at closer proximity and higher voltages which produced rapid deterioration of the tubes and frequent replacement.

Zweig's systems, using high resolution and high sensitivity cameras brought system prices down to $25,000 to $50,000 range, opening the market to the some 500 small to medium sized firms which dominate the U.S. printed circuit board fabrication industry.

Zweig and his wife, Claire, founded Glenbrook Technologies in 1983. The company develops and manufactures x-ray inspection and imaging systems for use in the electronics fabrication industry worldwide and has become the leading supplier of x-ray inspection systems to the North American printed circuit board industry.

Prior to founding Glenbrook, Zweig helped found and was vice president of MCI Optonix, Inc., a division of Mitsubishi Chemical Industries that manufactures x-ray intensifying screens. Zweig is the author of a number of articles in the area of x-ray and Diazo imaging systems and holds 15 patents.

Zweig earned both bachelor's and master's degrees in engineering from New York University. He is a member of the American National Standards Subcommittee that set national standards for evaluation x-ray film-screen systems and is a member of the American Association of Physicists in Medicine and Sigma Xi. Zweig is a resident of Morris Plains.

1994 Hall of Fame Inductees

Jack Avins (1911-1992)
RCA Corporation, Princeton

Jack Avins was responsible for more than 50 patents in the area of television and radio receivers. His early inventions were in the area of FM detection, where his FM detector became the industry standard in domestic and foreign radio and television receivers.

From 1964 forward, Avins developed integrated circuits for consumer products. The use of integrated circuits in consumer products resulted in improved performance, cost reduction, reduced power consumption and improved reliability of those products.

Avins was a fellow of The Institute of Electrical and Electronics Engineers, a member of the administrative committee of the Broadcast and Television Receivers Group, and Chairman of its Standards Subcommittee. He received a David Sarnoff Award for his inventions and leadership in the "development of integrated circuits for use in television receivers."

He earned a bachelor's degree from Columbia University and a master's degree from Polytechnic Institute in Brooklyn. He was a resident of Princeton.

William O. Geyer (1893-1983)
Scientific Glass Apparatus Company, Bloomfield

William Geyer arrived in the United States from his native Germany in 1910 at age 17, earning his passage by peeling potatoes on the ship. He had no money or command of the language but put his skills to work as a glassblower at Westinghouse, making lamps for 15 cents an hour.

By 1918, at age 25, he established Scientific Glass Apparatus Co. in Bloomfield in the back bedroom of his home. After the business spilled onto other parts of his property, including the chicken coop, he established his first factory in Bloomfield, about 500 feet from his home. Several skilled craftsmen manned the plant, producing custom-made glassware for local laboratories.

Geyer was the inventor of automatic burettes, metal-clad joints, melting point thermometers and other items now considered standard equipment in laboratories. He was also responsible for the development and production of interchangeable glassware in the United States.

He was honored with the Kiwanis International Legion of Honor Award.

His son "Indian" Bill Geyer, who was an All-American running back at Colgate University and a professional with the Chicago Bears, succeeded his father as president of Scientific Glass, now an international company with annual sales in excess of $7 million. He was a resident of Bloomfield.

George R. Hansen (1910-1993)
Carborundum Company, Keasby

George Hansen developed a new casting process for the manufacture of silicon carbide refractory shapes that were competitive in terms of design and capability with ferrous metal parts used in high temperature applications. Many industries use silicon carbide, a very abrasion and heat resistant material, to reduce process down-time and manufacturing costs.

Development of this process enabled industries such as aluminum casting, chemical processing, ferrous metal and pollution control to use silicon carbide as part of their processes. Hansen personally trained employees at Carborundum manufacturering sites in Brazil and Europe.

Hansen attended both Rutgers University and Newark Technical School, forerunner of New Jersey Institute of Technology. Hansen was a resident of Whiting.

John Bardeen, Ph.D. (1908-1991)
William Shockley, Ph.D. (1910-1989)
Walter Brattain, Ph.D. (1902-1987)
AT&T Bell Laboratories, Murray Hill

The solid-state electronic age was born in 1947 when the AT&T Bell Labs scientists invented the transistor. The invention of the transistor resulted from basic research in the theoretical and experimental physics of solids, specifically on the properties of semiconductors.

Transistors detect, specify, rectify and switch electric currents. They are tiny, relatively cheap, highly reliable, and use very little power. These properties have made possible digital computers, space flight, electric guitars, pocket calculators, heartbeat regulators, hearing aids, electronic watches and solid-state television, radios and hi-fi sets among countless other consumer products.

The industries involved in these products employ millions of people worldwide, and their output amounts to many billions of dollars annually.

For their pioneering research, Bardeen, Shockley and Brattain were awarded the 1956 Nobel Prize in Physics. Dr. Bardeen won a second Nobel Prize in 1972 for co-developing a low-temperature superconductor theory.

Phillip H. Smith (1905-1987)
Bell Laboratories, Whippany

The Smith Chart, invented in 1941 by Phillip Smith, was an extremely important invention in the field of electrical and microwave engineering. It helped solve, in a graphical way, many of the mathematical equations used in transmission line theory. The Smith Chart matches transmission lines to antennas and allows the designer "to see" what must be achieved to obtain a better match.

Prior to the chart, two engineers had to go to the transmission line and manually pass a microvoltmeter over the line. When the transmission lines were elevated, the device would be attached to a pole and passed along the line while a telescope was used to read the signal measurements.

The Smith Chart remains in use today as the basis of all transmission line matching work, even with the introduction of the computer and network analyzers. The Smith Chart is still the ultimate display.

Analog Instruments Co., owned and operated by Smith family members, continues to sell The Smith Chart, primarily to universities and large corporations. Sales have totaled more than $12 million.

Smith earned more than 20 patents in the area of antennas and microwaves including the "Cloverleaf" FM broadcasting antenna and the microwave radar antenna.

He earned a bachelor's degree in electrical engineering from Tufts College in 1928 before embarking on a 42-year career with Bell Laboratories which ended with his retirement in 1970. The Microwave Theory and Techniques Society of the Institute of Electrical and Electronics Engineers presented Smith with its Special Recognition - Microwave Award in 1970. He was a resident of Murray Hill.

Richard Williams, Ph.D.
David Sarnoff Research Center, Princeton

Today, liquid crystal displays (LCDs) are used in hundreds of applications including watches, calculators computer terminals and other electronic devices. Digital readouts on a host of products are so commonplace that they are no longer marveled at. Flat, low cost, low power and voltage displays have made these liquid crystal applications commercially viable.

Few people outside the scientific community are aware that liquid crystals were developed at the David Sarnoff Research Center in the 1960s and the basic patents issued to its researchers. Liquid crystals are organic compounds whose appearance and mechanical properties are those of a liquid, but whose molecules tend to form orderly arrays like those in solid crystals. They can be made opalescent and hence reflecting by applying an electric charge. In the early 1960s, only laboratory researchers were aware of liquid crystals.

In 1962, Richard Williams filed a patent disclosure on "electro-optic elements utilizing an organic nematic compound," more commonly known as liquid crystals. It was granted in 1967. His landmark paper, "Domains in Liquid Crystals," was published in 1963. The term Williams Domains has since become part of the scientific vocabulary.

Williams earned a bachelor's degree in chemistry from Miami University (Ohio) and a doctorate in physical chemistry from Harvard University. Fluent and self-taught in Portuguese, he was appointed a Fulbright lecturer at the Engineering School in São Carlos, Brazil in 1969. He wrote the first book on solid state physics in Portuguese, now used as a textbook in Brazil, and translated into Spanish for use in Mexico. He is a resident of Princeton.

1994 Corporate Hall of Fame Inductee

Mobil Research and Development Corporation of Princeton

Mobil's 60-year record of scientific and commercial successes in petroleum and petrochemical technologies, largely the product of technology centers in Paulsboro and Princeton, has made the company one of the industry leaders in technological innovation.

Mobil's success has focused on developing industrial catalysts and commercializing innovative catalytic processes that turn more of a barrel of crude oil into hydrocarbon products such as gasoline, lubricants and petrochemicals. Mobil's search for better gasoline yields led to zeolite – porous crystalline mineral with highly ordered structures used commercially as molecular sieves and ion exchange agents.

Mobil's commitment to catalysis research dates back to the 1920s when the company established a state-of-the-art research laboratory in Paulsboro. In the early 1930s, the company brought French inventor Eugene Houdry to the laboratory and supported his pioneering work in catalytic cracking. His process yielded a little more gasoline than thermal cracking, but Houdry's catalyst - a common clay - produced gasoline of a higher octane.

In the early 1940s, Mobil commercialized a moving bed process called Thermofor Catalytic Cracking (TCC) and a new synthetic catalyst, which provided high octane aviation fuel for the Allied air effort throughout World War II.

With peacetime, Mobil expanded its research in catalysis, employing a group of physicists, mathematicians and scientists from the war effort. This group eventually generated a second wave of innovation in the field that impacted the industry. The search for better gasoline yields led the Mobil researchers to zeolites - porous crystalline minerals with highly ordered structures used commercially as molecular sieves and ion exchange agents.

In 1962, Mobil researchers devised a unique process to manufacture Zeolite X, which had been developed by the Linde Co. Mobil used Zeolite X in the zeolite cracking catalyst which produced 40 percent more gasoline from a barrel of crude oil than was possible with the catalyst it replaced - the largest single advance in petroleum catalysis since the development of catalytic cracking. A national research council reported that zeolite cracking permitted a savings of more than 400 million barrels per year of oil, or more than $8 billion a year at $20 per barrel.

Since 1963, Mobil has synthesized and patented 42 zeolites – more than a third of all the synthetic zeolites in the world. The most important of these is ZSM-5, a zeolite with pore openings small enough to distinguish between molecules of different sizes and shapes. Since its discovery in the mid 1970's, Mobil has commercialized more than a dozen applications for ZSM-5 and it can be found in more than 100 reactors worldwide performing feats ranging from boosting the octane of gasoline to manufacturing chemical building blocks for polyester and converting methanol to gasoline - the first new synthetic fuels technology in more than 50 years.

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