

DAYTON: INNOVATION CAPITAL OF THE WORLD

Information from the Engraved Pavers on Inventor's Walk

Charles F. Kettering and the Wright Brothers are Dayton's most famous inventors; however, Dayton's reputation as a world leader in innovation began even before the era of Kettering and the Wrights. Prior to 1900, Dayton had the largest number of patents per capita of any city in the United States.

In 1940, Dayton grabbed the spotlight when Modern Pioneers of the Frontier of Industry were honored in New York. Seven Daytonians were among the 28 honorees, including Orville Wright, Charles F. Kettering, Fredrick Kohnle, Harry M. Williams, Harry B. Hall, Harvey Dunn Geyer, William A. Chryst, and Charles A. Short.

VINCENT G. APPLE

1874-1932

Vincent Apple is one of the world's most prolific inventors. At his death, he held 350 patents, had 130 pending, and was working on 265 more inventions. From his lab on Broadway, Apple developed innovations for the automobile and airplane, contributing to the work of the Wrights, Henry Ford, and Charles Lindbergh.

1919

Among Vincent Apple's many inventions was an electrical system that could operate beyond the limits of the wiring strung through cities and towns in the early 20th century. This made electricity available to farms and rural residents for the first time.

JOHN BALSLEY

1862

Though area media have long reported that John Balsley of Dayton invented the stepladder, he actually patented an improved version, probably a safer or portable one. In 1862, the year of Balsley's patent, Beaver and Bott of Dayton already advertised a successful, patented stepladder. Whether their version was invented in Dayton is unclear.

JOHN BIRDEN & KEN JORDAN

1959

The radioisotopic thermoelectric generator vastly extended the limits of space travel. From Mound Lab, Birden and Jordan used a non-fissionable plutonium to develop a tremendous energy source. Standard equipment on all space missions since Apollo, RTGs are the only power source for missions where the sun's energy is out of reach.

HANK BOWER

1971

In the 1970s, "Super Knockers" were as popular as yo-yo's and string tricks. Two hard plastic balls hung at each end of a string. The user manipulated a ring at the middle of the string to start the balls swinging like a pendulum, clacking together. After building momentum, the balls hit on the upswing as well as the downswing. Remember?

GEORGE T. BROWN & LEWIS E. BLAKELY, JR.

1979

Working at American Thermometer on Bacon Street, Brown and his staff developed thermometers that were placed on the forehead. These liquid crystal thermometers turned shades of green to indicate temperature with remarkable

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accuracy. Because they were safe and easy, they became popular for monitoring fever in babies and small children.

RICHARD CECIL

1982

While removing his carburetor on Orchard Hill Drive, Dick Cecil couldn't reach the engine's confined spaces. He developed a hexagonal cap to attach to a conventional socket with an end or box end wrench to reach previously inaccessible areas. Cecil sold the invention to Easco Corp., which made Craftsman tools for Sears Roebuck & Company.

DR. WILLIAM H. CHARCH

1930

Cellophane emerged from a long process of trial and error. Scientists had been close for decades, but none had solved the problem of moisture-proofing. Conducting over 2,000 experiments, Charch solved that problem, then made the product slightly adhesive. The result far outperformed kitchen wrapping material of that time.

E.R. CHURCHWELL

1949

Working for the Biltmore Hotel, Churchwell grew tired of assembling and repairing clumsy baby cribs. Churchwell developed a collapsible crib that could fold into a unit six inches wide and store easily in a closet. The bed could be set up or taken down in less than a minute, when it had previously taken a half hour.

LELAND CLARK

1950

Working from the Fels Institute in Yellow Springs, Leland Clark developed the first

heart-lung machine to sustain life in open heart surgery.

WALKER L. CROUCH

1919

Recording register lock

DR. L.E. CUSTER

1894

Dr. Custer invented an electric oven to fuse dental porcelain. Custer was the father of Levitt Luzern Custer, another prolific Dayton inventor, as well as a colorful aviator, pioneer, and world traveler.

LEVITT LUZERN CUSTER

1930

The Custer Car was a self-propelled wheelchair. It was quiet, had a small turning radius, and traveled 15 miles per charge. The transmission was unique: the driver moved the steering wheel forward or backward to move in that direction. Eventually, the Custer Car evolved into motorized sightseeing cars for New York's 1939 World's Fair.

JOSEPH R. DESCH

1907-1987

In 1942, when German U-boats were sinking nearly 100 Allied ships a month, NCR was asked to decipher Nazi naval code. Desch combined mechanical and electronic components to develop such a machine. Continued refinement led to electronic machines that cracked the Japanese codes. For his work, Desch received the highest civilian honor of WWII.

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FRED DEWEAVER

1983

Fred deWeaver created an electric propulsion system that had eluded engineers for decades. After receiving American patents, deWeaver applied with the European Union, but they said his invention could not work. Luckily, deWeaver had demonstrated the system for local TV stations. He sent the videotape to Europe and was awarded the patent.

ALLEN B. FARQUHAR

1916

Seeder and fertilizer distributor

A. FISCHER

1858

Cabbage cutter

G.W. FISCHER

1872

Improved lawn mower

A. GEIGER

1860

Vapor lamp

MICHAEL J. & JANET M. GERACE

1992

Half the paint applied to automobiles never reaches the car. Recycling this paint sludge, the Geraces developed a spray-on membrane that could be applied to roofs as a sealant. This process not only made replacing a roof unnecessary, it also spared the environment the burden of absorbing additional waste products.

J.C. GENTRY

1839

Mill-spindle

ROGER GLASER

1982

Dr. Glaser was a driving force for rehabilitation techniques in paralysis victims. Using technology he and peers had developed, Glaser invented a wheelchair that could be propelled by the paralyzed person's legs. Through electrodes, the legs were stimulated to move the chair, allowing another means of self-propulsion and exercising the paralyzed muscles.

BARRETT K. GREEN

1953

Microencapsulation is a process of controlled chemical release that yielded time-release medication, digital thermometers, and carbonless copy paper. Barry Green, a Dayton native, worked for NCR as the founder and director of their Pure Research Department. Over the course of his career, Green garnered 150 patents.

WILLIAM AND MARY GRILLET

1986

Bill Grillet was a volunteer West Milton fire fighter. After spending all night at a fire, he could barely shed his coat for its weight and his exhaustion. He and his wife set to work on a new coat. It was long in back, short in front, allowing improved ventilation and increased leg mobility. It was also 25% lighter than the original coat.

PAUL HAMISCH

1972

Paul Hamisch maintained Monarch Marking's reputation as a world leader in price marking with his hand-held labelers. Credited with over 100 patents, Hamisch developed the first practical hand-held labeler. Lightweight and durable, the

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labeler was used to apply price tags in 90-95% of the nation's grocery stores in the 1970s.

MAJOR GENERAL ALBERT F.
HEGENBERGER

1932

At McCook Field, Major Hegenberger researched instrument flying and navigational systems that led to modern aviation equipment. His blind instrument landing system enabled planes to fly in almost all weather conditions. His system was adopted for both military and civilian use and became standard equipment in all larger airplanes and at all airports.

DR. W. F. HOCHSTETTER

1939

Hochstetter made a tremendous contribution to the environment, as well as the newspaper business. He developed the first method for recycling paper to make newsprint. "De-inking" wastepaper without destroying the fiber had been the problem. Hochstetter not only removed the ink, but the resulting paper was whiter than other newsprint and thus easier to read.

JOSEPH HOPKINSON

1916

Pendulum scale

MAX ISSACSON

Manually operated heart-lung machine

JOHN L. JANNING

1974

Janning's work led to the ubiquitous digital watches and pocket calculators. While liquid crystals were discovered in the late 19th century, no one had aligned them so that they held their position permanently.

Janning solved the problem in less than an hour. The technology was first applied to digital watches but has since spread to many common products.

JOHN M. JUSTON & JOHN P. BARBER

1991

Funded by the Strategic Defense Initiative ("Star Wars"), Juston and Barber worked from IAP Research in Kettering to develop a rail gun that could project an object at a velocity to potentially destroy nuclear missiles in the air. The rail gun, powered by electromagnetic energy, creates a force capable of launching missiles and rockets into space.

WARREN KAMPH

1981

Multiple array continuous ink jet printer

P. KERN

1871

Door and gate spring

MARVIN KIDD & BARBARA J. BAILEY

1979

Urinalysis method

FRED KOHNLE

1860-1944

Kohnle was a clerk in the 1880s when price tags had to be cut out, hand printed, and attached to merchandise with string. Frustrated, he spent his life developing price labeling machines. His company, Monarch Marking, was the undisputed world leader in price marking for decades. Kohnle was named Modern Pioneer by the National Assn. of Manufacturers.

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MELROSE KOPF

1917

Portable fire extinguisher

GEOFFRY KRUESI

1935

Kruesi's auto pilot compass was a vast improvement over the old radio beam location-finder. With the new compass, a pilot was able to contact any two radio transmitting stations within 200 miles. Then using triangulation, the pilot could determine the airplane's exact position.

MAURICE KRUG

Space food and drink

B. KUHNE

1911

Grain drill

GEORGE H. LELAND

1933

Leland's first pair of glasses, made by an optician/ jeweler, were so painful he threw them away and decided to make his own. From his Siebenthaler Avenue home, he developed the Leland Refractor, "Tuned Vision" to measure eyesight much more accurately than in the past. Leland made glasses for over 300 people in his first few years of business.

GEORGE LOCKWOOD

1973

Working for the micro-electronics division of NCR, George Lockwood developed a semi-conductor memory device that didn't require power to maintain its memory. Though similar devices were available, Lockwood's semiconductor was impervious to the harmful effects of radiation that

occur in space. As a result, his device is uniquely effective for use on satellites.

WILLIAM LOCKWOOD

1986

As small bridges across the country deteriorated, Lockwood developed modular, three-sided, arch-shaped sections to span waterways. The arched design had the strength to support heavy truck traffic and the natural bottom greatly benefited the environment. One \$217,000 CONSPAN bridge project won an award for innovation in the \$15 million category.

D. L. LONG

1859

Sleeping berth for railway cars

F.G. MANSON

1937

Manson developed an inflatable high back chair, complete with armrests and attractive chintz. Easily portable, the chair weighed six pounds and fit into a cubic foot-sized bag. Manson, an engineer over the parachute and clothing unit at Wright Field, used a rubberized fabric that was inflated with a bicycle pump or pressurized canister of carbon dioxide.

R. M. MARSHALL

1861

Candy rolling machine

HOAKON A. MARTIN

1917

Ticket printing & issuing machine

JOHN B. MARTIN

1930

Parking meter enhancement

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ERNEST G. MCCAULEY

1939

Early airplane propellers were made of wood, and a good rainstorm could chip away " in a half hour. McCauley invented a solid steel propeller that was both light and durable. McCauley was called to Washington and ordered to provide propellers for the U.S. Army Air Corps Stearman primary trainer. This led to the McCauley Aviation Corporation and 55 patents.

J. B. MCCORMICK

1870

Harvester

JOHN V. MCMANIS

1915

Osteopathic table

D. E. MCSHERRY

1869

Dropping device for seeding machine

M. MELLINGER

1867

Cane stripper

THOMAS MIDGLEY

1889-1944

"Boss" Kettering called Midgley his greatest discovery. In response to Kettering's call for a safe refrigerant, Midgley took three days to invent Freon. Previous refrigerants had been flammable and toxic, so Midgley demonstrated Freon by inhaling it, then blowing out a candle. One of the nation's great chemists, he received five medals for scientific achievement.

THOMAS MIDGLEY

1921

Knocking in early auto engines wasted lots of energy and damaged the engine. After an unproductive hit-or-miss approach, Midgley worked his way through the periodic table to find an additive that was economical and would eliminate knocking. It took six years, but even before tetraethyl lead was tested, Midgley predicted it would work. He was right.

D. T. MILLER

1866

Sorghum evaporator

D. H. MORRISON

1867

Iron Bridge

D. SANFORD A. MOSS

1917

Working at McCook Field during World War I, Moss developed the exhaust gas-driven turbo-supercharger, which enabled an engine to produce the same horsepower at 14,000 feet as it did at sea level. Pilots were finally able to fly above the weather. The same invention also made pressurized cabins possible, greatly impacting commercial air travel.

SIDNEY ORTHWIN

1945

Orthwin made a mess of his wife's kitchen for years while developing the "Pin-It" skirt marker. This wooden device consisted of a ruler, a three-pointed base, and a coordinating arm to hold the fabric while the sewer pinned the desired skirt length. Manufactured on Linden Ave., Pin-It sold

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for \$1.98 in all 50 states and many foreign countries by 1949.

JOHN OSBORN

1947

In the 1940s, over half a million disabled Americans were confined to beds. Osborn, a paraplegic, knew their frustration. With a friend's help, he developed a bed that could be navigated by the patients themselves. Osborn's design featured a pulley system to propel and guide the bed, a hydraulic jack to raise the back, and even a shelf lavatory.

TOM PAYNE

1884

Mail chute for high rise office buildings

DR. JERROLD PETROFSKY

1980

Petrofsky's work in biomedical engineering led to computerized electrical stimulation for paralyzed muscles. A computer stimulated muscle groups with electrical impulses, resulting in smooth, directed movement. With 60 Minutes on hand at a Wright State lab, Petrofsky stimulated ten muscle groups in Nan Davis's paralyzed legs, allowing her to walk.

PERCY PIERCE

1919

Toy aero plane

H.L. & R.G. RATCHFORD

1946

Daytonians also invented a better mousetrap. In the Ratchford brothers' version, the unfortunate mouse was enticed by cheese and then received a lethal shock. This method avoided spilled blood and the distasteful task of

unwrenching the creature from its snare. Another advantage was that the mouse died next to the trap, leaving it ready for its next victim.

BERTON I. RIKE

1919

Garment bag/container

JOHN J. "JACK" ROSE

1930

1920s jet engines, started with a powerful spark plug, sometimes quit mid-flight. It was thought the flamed out engine must cool before relighting the blowtorch-like flame to avoid explosion. Rose visualized a low-powered plug that would keep sparking once the engine was running. With such a small spark, an engine could be restarted immediately and safely.

GINO P. SANTI

1950's

Early ejection seats were developed by Germans during WWII, but jet-powered airplanes quickly outstripped the crew's ability to bail out safely in an emergency. Santi developed an automatic opening lap belt for ejection seats and a propellant-inflated separation bladder that pushed the pilot from the seat after ejection.

DANIEL W. SCHAEFFER

Gas masks

JOHN D. SIEBENTHALER

1949

The first tree patented in the U.S. was developed at Siebenthaler Nursery. As American elms died out, Siebenthaler wanted a tree to take its place. It took 10 years of selection to develop the Moraine honeylocust, a thornless, seedless, vase-

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shaped improvement on the species. The original parent tree was located off Salem Ave. near Good Samaritan Hospital.

ALFRED SINCLAIR

1920

Tuning device for wind musical instruments

MARTIN E. SIEBER

1953

From his home on Sandhurst Drive, Sieber developed a cigar and cigarette lighter that could be worn on the wrist like a watch. With a hinged cap, the lighter could be flipped open, lit, and closed again to snuff the flame.

ROBERT H. STUDEBAKER

1969

Studebaker found a use for lasers when they were still a solution looking for a problem. Laserplane was a plane of laser light that controlled construction earthmovers so that exact elevations could be achieved. Lasers in surveying and construction quickly became common worldwide. The original Laserplane equipment is housed at the Smithsonian Institute.

ROMAN SZPUR

1963

Roman Szpur developed many medical inventions, but the one that gained the most notoriety was a dental repair kit. The kit, manufactured in Dayton, was contracted by the U.S. government and carried on all Apollo space missions.

WALTER STEINER

1921

Adjustable spotlight

LOUIS TAMBURINO

1982

Flying low at 600 mph, it was critical that pilots knew what was coming on the ground. Using electronic memory of terrain and manmade objects, Tamburino developed the technology to create real-time images in the cockpit. Responding to any change in direction the airplane would make, these images constantly projected a picture of the land ahead.

CHARLES E. TAYLOR

1868-1956

As the Wright Brothers' mechanic, Charlie Taylor designed the engines for all the Wright Flyers and taught the brothers to make their own engines. Taylor made the engine for the first flight with only a drill press and a lathe. The four cylinder, 12-horsepower engine was tremendously simple: it had no fuel pump, carburetor, spark plugs or distributor.

JOHN VIRAG

1917

Signal and gate operating means for railroad crossings

ROBERT WERT

1962

The traffic counter, the familiar pneumatic hose laid across streets, counts vehicles traveling a road. Bob Wert, a City of Dayton traffic engineer, expanded this idea, inventing the Gap Timer. This device recorded the frequency of safe gaps in traffic. From this, engineers determined whether a school crossing should have a traffic light or simple flashers.