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“The Maine Record of Invention”

by Andrew H. Wilson

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THE MAINE RECORD OF INVENTIONS

by Andrew H. Wilson

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Abstract

A record of men and women born in the American State of Maine was published in 2021 by Earl H. Smith and titled *Downeast Genius: From Earmuffs to Motor Cars: Maine Inventors Who Changed the World...* some 50 people, or more, dating from the beginning of the 19th century. Maine became a state in 1820, with 300,000 people, after the beginning of the first Industrial Revolution. The first U.S. Patent Office was established in 1794. This book also covers the post-Civil War years that brought electrification and railroads to the United States.

This book - the first I have come across, based on *State* information - tells who they were and what they invented. Not all of them did their inventing in Maine, or even spent their lives there. And not all sought patents for their inventions.

This book has undoubtedly been replicated elsewhere in the United States, so others must now be found, and the search extended to the Canadian Provinces.

(The reader may notice that, from time to time, I have spelled words the Canadian way, and not the original American one.)

About the Series

Principally, the Cedargrove Series is intended to preserve some of the research, writings and oral presentations that the author has completed over the past half century or so, but has not yet published.

About the Author

He is a graduate in mechanical engineering (1949) and the liberal arts (1954) and has held technical and administrative positions in industry in the United Kingdom and technical, administrative, research and management positions in the Public Service of Canada, from which he retired over 30 years ago. He became active in the history of engineering when invited (in 1975) to chair the first History Committee of the Canadian Society for Mechanical Engineering (CSME). He was later president of CSME and of the Engineering Institute of Canada (EIC), and chaired the Canadian Engineering Manpower Council (CEMC) and the Canadian Association for the Club of Rome (CACOR).

By Way of Explanation ...

This unusual book, the first I have come across based on a U.S. State, came my way thanks to another enthusiast for the history of engineering, Pat Donnelly, whom I met in Almonte, Ontario, in mid-2022. It is, therefore, a welcome addition to my source material, and hopefully the harbinger of other unusual sources of it. My thanks must also be extended to the author for his historical research and writing. His book was published by Islandport Press in Yarmouth, Maine, in 2021.

First, two paragraphs from Earl Smith's *Author's Note*:

Beyond having ties to Maine, a common theme amongst all the inventors in this book is that most began as ordinary folks, untrained farmers and laborers who chased their dreams in cluttered barns and crude workshops...and they created some astonishing things the world had never seen. Each of these inventors also possessed the traits of practicality and persistence, two habits often ascribed to Maine people...

Not every Maine invention was born of necessity, and there were some enduring creations that were simply pleasing. Many are now taken for granted, but fairness suggests that some Maine credit is due when we ever enjoy a chew of gum, eat a tasty doughnut, sip a Moxie, or use a wooden toothpick to dig out the last morsel of lobster when a meal is done...

An important date to remember: March 16, 2013: the date that the basis for awarding U.S. Patents changed from "first to invent" to "first to file."

The Inventors...

Obed Hussey: 1790-1860... invented the horse-drawn reaper in 1833. He wore a patch over his left eye, the result of an accident while working on a whaling ship in the Pacific.

Originally from Hallowell, Maine, he left for Nantucket, Massachusetts, before making his invention. His original patent was granted in 1834, while he was in Baltimore. He was in competition for 25 years, with Cyrus H. McCormick, who had begun his inventing career as a blacksmith in Virginia and claimed he and his father had invented a similar reaper in 1831. In fact, this reaper may have been invented even earlier in Scotland. But Hussey got the U.S. patent!

Hiram Pitts: 1799-1860...and twin brother John Pitts: 1799-1859...invented a grain separator attachment for a horse-drawn reaper.

It was invented at the Buffalo Pitts Company, New York, in 1837. It won a gold medal at the Paris Exhibition of 1855. The inventors later licensed their inventions to the J.I. Case Company and others...

William Deering: 1826-1913...more harvesting patents.

Originally from South Paris, Maine, later of Portland...Deering, Milliken and Co. moved to Illinois where, in 1878, he partnered with E.H. Gammon, to manufacture grain harvesters. His own inventions included the first self-propelled steam farm machine, which won a gold medal at the 1900 Paris Exhibition. In 1902 his company merged with McCormick's Company to form International Harvester, the deal financed by J.P. Morgan.

Leonard Norcross: 1798-1865...Maine was ripe for inventors who sought new ways to deal with water.

Norcross' father died in 1801, when Leonard was 3. By the age of 21, he had trained as a millwright and was working at a Livermore (Maine) sawmill. At 25, he patented a machine for shaping and finishing cut stones. At 26, he patented a machine that made wrought iron nails. In the early 1830s, at Dixfield, Oxford County, Maine, he became interested in making a suit that would allow divers to recover lost objects from deep river water. His first suit, of cloth backed by India rubber, with iron in its boots, was tested in the Webb River in 1834. Since it was the first to use rubber, he received a patent for it in June of that year. It set the scene for much later scuba diving.

On June 15, 1835, Norcross received two more patents, one for an accelerated spinner for hand-woven wool, the other for a mechanical device for extracting stumps and rocks. In 1837, he created an improved threshing and separating machine, but the patent was won by fellow Mainer, Hiram Pitts (see above).

His favorite invention, apparently, was the diving suit. This advance had eventually to wait till 1839 for a vulcanized rubber suit to be invented by Charles Goodyear, in Philadelphia.

Robert B. Lewis: 1802-1858... was born at Gardiner, Maine, and later lived in Bath. his patent for 'an oakum and hair mill,' was based on discarded rope and tar and was used to caulk the planking of wooden boats and ships. It was issued in 1836.

Of mixed African and Native American ancestry, Lewis was among the first black Americans to obtain a U.S. patent. In his youth, he was a whitewasher and a sailor on ships on the Atlantic Rim and the Caribbean. He was also an author. As a young man, he had some training for missionary service and for farm work. His first invention was a hair oil, which was not patented, but he made and sold a lot of it over the years. He also received a patent for a machine that cleaned and restored the feathers used

to adorn high-fashion clothing and for one that improved the brushes used for whitewashing. His book, *Light and Truth*, was considered a fundamental text for Black Nationalism.

Joseph Peavey: 1799-1873...a blacksmith, of Stillwater, Maine, invented a tool - the peavey - to help 'unscramble' logjams on Maine rivers (for example, the Penobscot) in 1857. That year, Maine supplied the world with 150 million board feet of sawn lumber through Bangor, Maine, then the largest lumber port in the world.

Essentially, Peavey's invention was a redesigned operating hook fitted to the 'business' end of a six-foot pole - later produced and marketed by Peavey's Bangor Edge Tool Company, founded in 1873 by his two sons, James H. and Charles A. Peavey.

The invention and improvement of another wood-shaping tool, the circular saw, was credited by the author to Maine, in 1845 to William Kendall of Waterville, and later to James Emmerson of Lewiston.

The years following the American Civil War also saw the beginnings of women's participation in the business of inventing. However, the author has written that, "the patent playing field for women did not begin to level out until 1839 when Mississippi...adopted the Married Women's Property Act, which allowed women to own property." Maine's enabling Act was also passed in 1844, and improved upon by another Act in 1857. By 1865, there were enabling Acts in 29 States.

The first female American (and not Maine-related) patent-holder was Mary Kies (1752-1837), then of Killingly, Connecticut, in 1809, involving weaving straw and silk together to make hats. Kies' hats eventually went out of fashion and, in spite of everything, she died a pauper.

More fortunate was Maine-born Margaret E. Knight: (1838-1914) ... of whom the author suggested, was possibly the most famous American woman inventor of the 19th century, claiming over 80 patents.

She appears to have made her first invention while living in neighbouring New Hampshire. Among her early (unpatented) inventions was a safety device for a textile loom, which automatically stopped the loom when a weaving thread broke. Knight never married, but was always tinkering and building to support herself. In 1870, she designed a revolutionary machine that cut, folded and pasted square-

bottomed paper bags, essential for carrying - for example - apples. But a competing inventor had patented the machine, and it was quite a while before she overcame this infringement. Her invention lasted in the marketplace until the invention of plastic bags in the 1960s. And as the author wrote, "She was inducted into the Inventors' Hall of Fame in 2006."

Helen A Blanchard: 1840-1922... a contemporary of Margaret Knight, also born nearby, in Portland, Maine...

But into a prosperous business family, which became much less prosperous after the global economic downturn/panic of 1866, and the death of Helen's father. The family sold up in Portland and moved to Boston, where Helen turned to invention to survive. In 1873, with borrowed money, she got her first patent, for a sewing machine that made buttonholes. She also invented a machine that made buttonholes with zigzag stitches.

Helen moved to Philadelphia in the early 1880s, and a decade later to New York City. In 1884 she patented a hand-cranked pencil sharpener. Meanwhile, she had problems with the Patent Office...and with infringers. But she persisted, in spite of the prejudice against women inventors. She returned to Portland in 1901, where women's issues occupied much of her attention, but at the same time accumulating 28 patents in 45 years.

Milton Bradley: 1836-1911...was born in Vienna, Kennebec County, but moved to Lowell, Mass., in 1847 (and later attended Harvard). By 1859, he was living and doing lithography in Providence, Rhode Island. In 1860, he moved to Springfield, Mass., entered the board game industry, and began creating games, one of which sold 45,000 copies in its first year. His company eventually became part of the Hasbro Company and owned board games such as *Battleship* and *Candy Land*.

Hansen C. Gregory: 1832-1921...was born in what then was Clam Cove, Maine, nowadays a section of Rockport.

He was for many years the captain of a lime ship that sailed out of Rockport. His claim to fame was that he invented the hole in the doughnut, but there are apparently several accounts of how this came about. Its purpose was to eliminate what was usually the soggy centre of the otherwise cooked doughnut. Clam Cove's people, however, have no doubt *WHO* put the hole in the doughnut, and have erected a plaque to honour Gregory's achievement.

The deep-fried (solid) doughnut originated, apparently, in the Middle East.

John B. Curtis: 1827-1897...was born in Hampden, Maine, but grew up in Bangor. He was a woodsman and invented chewing gum.

Apparently, woodsmen in Maine originally chewed spruce gum scraped from spruce trees, but found this tough and tasteless, and stuck to their teeth. Around 1850, Curtis developed his *State of Maine Pure Spruce Gum* in the family kitchen in Bangor. He boiled in an iron kettle a mixture of spruce gum, maple syrup and some sugar, and poured the boiled mixture onto a tin sheet with some sprinkled cornstarch, allowing it to cool and harden. When hard, he cut it into small squares, and sold it. He later added flavours to the gum. And moved his commercial operations, successfully, to a bigger market at Portland, where he developed a machine to manufacture his gum.

Augustin Thompson: 1835-1903...was a Maine native who served as a medical officer during the Civil War, and later 'invented' the carbonated drink called *Moxie*...

After the War, he practiced medicine at Lowell, Mass., where he was visited in 1884, by a former army colleague, Lt. Clyde A. Moxie who brought with him a sample of a patent medicine (which was not *patentable*!) called *Moxie Nerve Food*, of South American origin. By 1886, Thompson had closed his practice and begun selling *Moxie* as a carbonated drink, with a unique flavour. It quickly became popular and was one of the first mass-produced soft drinks in the United States. But by the second half of the 20th century sales had declined substantially. Even so, *Moxie* became Maine's drink in 2005 and, in 2018, its long-time competitor, *Coca Cola*, bought out the Moxie Company.

Chester Greenwood: 1858-1937...was born in Farmington, Maine, where he lived his life and where he invented earmuffs.

As a youth, and an enthusiastic skater, he had 'flirted' with frostbite too often not to want to look for a solution for his frozen ears. So with his grandmother's help, he designed a pair of earmuffs, from beaver fur, with a connecting piece of wire that went over his head. He was only 19 when, in 1877 he applied for a patent for part of his invention - earmuffs had already been patented - for the hinge that kept the muffs tight to his ears, and set up a workshop in West Farmington to assemble earmuffs. It became one of Farmington's leading industries. By 1936, it was making 500,000 pairs a year. Eventually, earmuffs by themselves were replaced by hooded jackets and by caps with earflaps.

Over his lifetime, Greenwood created some 130 devices, many of them patented. When he died in 1937, the Smithsonian named him "among America's 15 most outstanding inventors." His wife, Isabel Whittier, also gained fame, as a suffragist on behalf of women's right to vote.

Charles Forster born in 1826 at Charlestown, Massachusetts, did not invent the toothpick. He did hold the first U.S. patent for a machine that made them, and found ways to get people to use them. He copied his toothpicks from experience during a trip to Brazil, where they were already in use. In 1869, he turned to Benjamin F. Sturtevant for help...

Benjamin F. Sturtevant: 1833-1890... born at Norridgewock, Maine, went into business for himself in 1856 when he invented a spiral lathe that made the wooden pegs used to attach shoe soles to uppers.

His machine could rapidly slice thin strips of wood that could then be cut and finished. In 1860, he opened his own plant in Boston, before the Civil War. In 1864, he invented an exhauster to suck the clouds of wood dust away. In 1869, after the War, he bought Forster's patent to allow him to adjust *his* machine to make the thin strips needed for toothpicks. They were then finished off in a heated drum with talcum powder, and finally packed in small boxes. In 1887, Forster set up a toothpick factory in the Strong railroad depot in Maine, and began making millions of them - so many he could not sell them - something a man could make with a jackknife! So he moved to a better market in Boston, and an aggressive sales strategy. He was successful, his factory was at one point turning out 20 million toothpicks a day for what became the toothpick habit! He later expanded into other wood products, such as clothes pins and candy sticks. His companies operated for more than 100 years. Meanwhile, Sturtevant became a significant participant in the fan industry and, much later, in 1945, his company was sold to Westinghouse.

Hiram Maxim: 1840-1916... was born in Sangerville, Maine, but lived mostly at locations within the Piscataquis River Valley, and much later invented/designed the Maxim machine gun.

After only five years of formal schooling, Hiram - at fourteen - was apprenticed to a carriage-maker in Corinth, and later in Starks, where he learned to paint the wooden dashboards...and tend sheep. In 1861, when the Civil War began, he declared himself a pacifist and joined his uncle's engineering firm in Fitchburg, Massachusetts. He may not have been a true pacifist, but he was a true atheist. By 1866, he had obtained his first patent: for an electric hair-curling iron. Over the next few years, he created several more devices, including the world's first fire sprinkler system and, in a New York City building, the first electric light system, after which he took on Thomas Edison in a patent dispute (which Edison won). In 1878, when it was formed, Maxim was appointed chief engineer of the Electro-Dynamic Light Company of New York.

In 1881, Maxim moved to England to organize this Company's European Division, and to design his efficient machine gun, which he and his father had begun to design in the U.S., but lacked the funds to build it. He obtained a patent for his gun in 1883, and the first demonstration was given in England in 1884. However, the early models often jammed, and the U.S. Army was, at first, wary of it. But Maxim

sold it to European Powers, who had wars on their hands...while working on this problem. The British Army adopted the gun in 1888. Its eventual use during World War I was devastating!

By the way, Richard Gatling had patented a rapid-fire gun in 1861, but it was awkward to use. Maxim's was one-man, and fully portable. The British Vickers gun was a revision of the Maxim, by Hiram himself, and the Russian one, a Maxim copy. It has been estimated that 50 versions of Maxim's gun were used during WW I.

Hiram Maxim became a British subject in 1899, and in 1901 was knighted by King Edward VII. He died in London in 1916. At the time of his death he apparently held over 200 U.S. patents.

Incidentally, Maxim was not the first Maine man to design a weapon. John Hancock Hall (1781-1841) made a breech-loading, flintlock rifle in 1811, with uniform parts. It was adopted by the U.S. Army. Just before the Civil War, Lorenzo Dow invented a waterproof cartridge. In 1871, Edward Very invented the Very Pistol for firing flares. Hiram Maxim's brother, Hudson, invented the first smokeless gunpowder. And Hiram's son, also Hiram, patented a noise-suppressing gun silencer.

Harry Oakes: 1874-1943... was born at Sangerville, Maine, attended Bowdoin College, and mined gold in Canada. To escape U.S. taxes, he became a British citizen in 1935. He was soon made a Baronet, but was murdered in the Bahamas in 1943. So there were two 'Sirs' who were born in Sangerville, in Maine!

George B. Grant: 1849-1917... of Farmingdale, Maine, was educated at Dartmouth and at Harvard where, in 1869, he became aware of Babbage's work on calculating machines. By 1876, he had raised funds to build the first full-scale machine - the Grant Difference Engine - which had 15,000 parts and weighed a ton. It was exhibited at the 1876 Philadelphia Exhibition, and became one of the first steps into the computer age. It was made at Grant's plant at Lexington, MA, where he built several more models. His work on the accurate gearing of these machines was notably innovative and earned several patents. He eventually moved his plant to Boston, with branches in Philadelphia and Cleveland.

Wellington P. Kidder: 1853-1924... born at Norridgewock, made improvements to printing presses and typewriters.

In 1874, he built the first form of offset press that enabled the use of a continuous roll of paper and, within ten years had patented additional improvements, increasing the speed of high-volume printing fourfold. He later invented consecutive numbering machines (for banknotes and for tickets, for example).

Typewriters became commercially-available in the United States in 1874. Kidder's 1887 invention was a typewriter that allowed the operator to watch the key strike the paper. In 1895, he invented the first 'noiseless' typewriter, which Remington manufactured.

Thomas J. Mayall: 1828-1888... a native of North Berwick, Maine, in the same area as Kidder, invented a cylinder printing machine that could mass produce wallpaper, and wound up with 200 U.S. patents during his lifetime for inventions such as a steam-driven cannon and a railroad drawbridge.

Charles H. Emery: 1826-1925... a Portland native, who moved to Chicago in 1881 to work for the Libby food canning company, and who developed and patented a machine that soldered on the tops of round and rectangular cans of meat; this had previously been done by hand. And in Maine, the machine was used on rectangular sardine cans!

In 1890, Emery returned to Maine to install his machines. He also opened his own canning company. He later returned to Libby, and was sent to Alaska to can salmon, and to New Jersey to can tomatoes.

Leroy Starrett: 1836-1922... a carpenter (from Maine, in China) patented a combination square and ruler with a sliding head, which can still be found in woodworkers' toolboxes.

John Poland, an employee at Bates Mill in Lewiston, Maine, invented these parts of the modern washing machine: the centrifugal wringer (1884), the automatic reverse-spin mechanism (1885), and the two-roll press mangle (1886).

Edward B. Allen of Naples, Maine, at age 13 patented a can opener, and at 14 devised an improved loom shuttle.

He was then apprenticed to a locomotive manufacturer in Portland, before joining his father's shoe company, where he invented a machine for putting heels on shoes, but sold the patent to a company in Massachusetts, of which he became a partner. In 1888 he opened his own repair shop in Portland, where he invented a buttonhole clamp, which he took with him when he joined the Singer Sewing Machine Company in New Jersey and later in Connecticut, where he worked on many sewing machine improvements and collected many patents, including one for a machine that seamed carpets.

Leonard Atwood: 1845-1930... originally of Farmington Falls, Maine, served in the U.S. Navy but mustered out at the early age of 20, settled in Pennsylvania, and patented an improvement for a drilling rig that he first used near Titusville, tapping oil at 500 feet.

He was then associated with the world's first oil pipeline, and went to work for John D. Rockefeller Sr., who was about to establish Standard Oil. Within two years, Atwood patented the vertical railway, a pulley system that moved platforms up and down, and began installing these in freight warehouses and major hotels in New York and Washington, but sold his elevator patents to Elisha Otis.

In the early 1880s Atwood moved back to Farmington Falls. He never stopped inventing. In 1907, for example, he patented the first fishing reel with adjustable tension. Very expensive to make, it became the prototype for less expensive versions.

Otis (1811-1861) was a Vermont native, who began his career as a doll-maker, later inventing a train safety brake and constructing, in 1851, a moveable safety platform of his own design, to which he added a version of his safety brake, which led to the Otis elevator.

Frank B. Gilbreth: 1868-1924... was born in Fairfield, Maine, began his career as a bricklayer's apprentice, and later became a general contractor, building dams, mills and power plants in the United States and Europe. He also became involved with railroads, and invented a number of building tools. Finally, he became a world-renowned organization and efficiency expert, in partnership with his wife, Lillian, a psychologist. They were also famous for having a dozen children, since they were 'cheaper-by-the-dozen!'

The change in U.S. and other countries' transportation from horses and railroads began in 1859, when Belgian Etienne Lenoir developed the first internal combustion engine, followed in 1876 by Germans Nickolas Otto and in 1885 by Karl Benz. But by the early 1900s, American Henry Ford had built his 'quadricycle.'

There were some who still preferred steam to gasoline cars, among them identical twins Francis (1849-1918) and Freelan Stanley (1849-1940)...of Kingfield, Maine, who built a series of Stanley Steamers, with the boiler under the seat.

Earlier, by 1889, Freelan had already made a small fortune helping his younger sister, photographer Chansonetta S. Emmons (1858-1937), exploit his 1886 patent for the dry plate photography process. With his brother, he established the Stanley Dry Plate Company, first in Kingfield, and then in Watertown, Mass., where, in 1897, they built their first Steamer, but transferred production quite soon

after to a larger factory at Newton, Mass., over the next two years manufacturing 200 vehicles. They were apparently the first in the U.S. to 'go commercial' with an automobile. This success prompted the twins to sell their dry plate business to George Eastman, who was then building Eastman Kodak.

The steamer had no transmission or clutch, but side-by-side cylinders that powered the rear axle through a differential gear at the end of the chain-driven crankshaft. In 1899, and in a new company, the twins began to develop a completely new design. But competition grew from gas-driven cars - Ransom Olds in 1901 and Henry Ford in 1903. By 1913, Ford had his Model-T on the market. But what really 'killed' the Steamer was, most likely, the time it took to raise a head of steam in its boiler. With a 'gas buggy' you could jump in, start the engine, and drive away, especially when cars were fitted with an electric starter, after 1912. As well, a Steamer cost nearly \$4,000, a Model-T under \$500. With Francis killed in an accident in 1918, Freelan sold the Steamer company, which closed for good in 1924.

Electric-driven cars were also in the picture in the early 20th century and 'gave chase' to their gasoline cousin. But, as we now know, gasoline won this early day, thanks largely to Ford.

Alvin Lombard: 1856-1937...was born in Springfield, Maine. Poor and unschooled, he began work at age 8, in the family shingle mill in Lincoln. He quickly mastered every woodland task. As a young boy, he built a miniature sawmill driven by steam and demonstrated its worth by cutting cucumbers into boards. Later, he devised a device for de-barking pulpwood and an apparatus that separated knots and sawdust from ground pulp. But the invention in which he took most pride was not his log hauler, but a device for maintaining the speed and power of water turbines.

In the summer of 1899, Maine was running out of giant virgin pines, normally taken to rivers by horse-transport or oxen for delivery to the mills, but both horses and oxen were now being used to haul the valuable smaller trees that had been left behind. Narrow-gauge railways were not the answer. They needed tracks, which were non-existent. From 1893, for six years, Lombard manufactured the devices he had devised for the turbines, but then decided to sell his patent and his business.

Feeling that using horses to haul the large logs was cruel, he then concentrated on designing and building more suitable mechanical, steam-powered log haulers, which ran on tracks. He did this at his Waterville, Maine, home and his country place at Vassalboro, with the participation of his friend E.J. Lawrence. A prototype was built at the Waterville Iron Works and, in May 1901, Lombard received a U.S. patent for the machine, which he had described as 'ubiquitous.' Interestingly, the hauler's tracks were copied for tanks in World War I (and, of course, so did the Caterpillar tractor some years later). The haulers were steered by an outsized bobsled, out front.

The haulers were exclusively powered by a well-established steam engine until 1917, when Lombard began experimenting with gasoline engines. But they apparently lacked the necessary power to be fully useful. Only one experimental hauler used a diesel engine, and it was the last one ever built - in 1934.

The author has noted that another Waterville man - O.C. Johnson - is said to have built one of the first snow machines in 1909. Steered by skis and driven by continuous belts, it was 10 feet long and had a single-cylinder engine.

(The author goes on to say that, in 1954, a Minnesota farm equipment company named Polaris sold its first snowmobile after extensive testing in Northern Maine. He obviously had never heard of Armand Bombardier - a Canadian, in nearby Quebec!)

Martin Keyes: 1850-1914...was born in Lemster, New Hampshire, and as a young boy worked in his father's sawmill before starting as a maker of sleighs and carriages in Lemster. He later worked in a veneer mill in New York State, where he apparently got the idea of making disposable plates. On his own at first, he moved to Maine to the Indurated Fibre Company in North Gorham.

There, he began experimenting with plates made from moulded wood pulp. It took several years of trying for Keyes to get the process 'right.' Finally, in 1902, he took his ideas to Edmund Sprague at the Portland Iron Works in Maine, who agreed to build a prototype machine - a noisy, complex piece of machinery, with flailing arms. To his dismay, he discovered that a co-worker had already patented it. But having very detailed notes of his own work, Keyes quickly won the Court's approval, and his patent.

However, there were industry challengers, undercutting him on price. In 1907, he moved his plant to Waterville. His business was saved by a huge order from San Francisco, just after the 1906 earthquake and fire. When Keyes died, his son-in-law kept the business in the family, until 1927, when there was a corporate take-over, but the Keyes name was continued, and the company grew, thanks to new product lines, including Chinet, the first leak-resistant line of disposable paper dinnerware. It is now owned by the Finnish company, Huhtamaki.

Charles H. Lamson: 1847-1930... was born in Augusta, Maine, was a successful jeweller and watchmaker in Portland when he developed a passion for building kites. And, like those other aviation pioneers, the Wright Brothers, he also owned a bicycle shop, which he, too, ignored when the flying 'bug' really hit him!

Lamson's kites were large flying machines, capable of lifting a man. His August 1896 kite, for example, was based on one designed by Australian Lawrence Hargrave. It had two large rectangular boxes, attached in the middle with struts that held a seat which, for the first flight held a bag of sand. On cue, the kite was released to the wind when its tethering rope was cut...and the kite rose slowly into the wind, to about 600 feet, from which height it floated down to earth, undamaged and with its bag of sand unspilled.

Impressed, the U.S. Congress voted some more money for experiments with kites at Milton, Mass.

A year later, Lamson himself took two flights in Connecticut. Critics, however, said that a pilot could control the ascent, but not the descent. Lamson solved this problem by hinging the rear wings and providing a lever to operate them. Another advance allowed the 'driver' to sit while takeing-off. He later patented tilted wings, and built gliders/kites for others, including the Wright brothers.

Leon Leonwood Bean: 1872-1967)... was born in Greenwood, Maine, and, orphaned at 12, he went to live with relatives in South Paris, where the outdoors, rather than classrooms, gained his attention and he became a hunter, trapper and fisherman. His first claim to fame was that, in 1911, at the age of 39, he designed a new kind of waterproof boot with rubber bottoms and laced, soft leather tops.

Bean's first attempt to sell his new boot almost ended in disaster, but he learned a valuable lesson: always test your products before selling them to customers, which he then did, and he acquired the reputation of being a merchant who sold quality products! In 1917, he headed to Freeport, Maine, where he acquired new premises and improved his product, and where he teamed up with his brother, who was the town postmaster, and who helped handle the mailing of his brother's boots. In 1918, Bean patented his Maine Hunting Shoe in the United States and Canada.

Bean's second claim to fame was the establishment of his mail-order business, where he eventually sold much more than the boots. L.L. Bean died in 1967 at age 94, so it was his grandson, Leon Gorman, who supervised the major growth stages of Bean's, now iconic, product-guaranteed, company.

Time-wise, we should now pause and review some of the author's own words. He wrote, on pages 123/4:

Soon after the golden spike joined the nation's rails to create the first transcontinental railroad in May 1869, a second powerful industrial revolution roared in on the speed of assembly lines and the marvels of electricity. The second surge would also last a hundred years, and in that time more than three million new inventions would help to build the richest, most powerful nation on earth.

The second revolution began as a magnification of the first, but two world wars not only increased the flow of inventions but also the way they were created. Before, marvels like reapers and rifles... came out of quite ordinary workshops. The products could easily be seen, examined, and understood, and often prompted users to wonder why they had not thought of making such things themselves. In the new age, explorations slowly moved out of workshops and into laboratories, and new discoveries were often beyond the scope of ordinary understanding.

Many of the new developments were in medicine, and none was more impactful than the discovery of a way to make insulin. Charles Herbert Best (1899-1978) of West Pembroke (Maine) was a twenty-two-year-old medical student at the University of Toronto in 1921 when he and his mentor, Frederick Banting, were able to isolate the pancreatic hormone for the treatment of diabetes. It was a breakthrough discovery that would come to save countless lives far into the future.

Banting received the Nobel Prize for his work in 1924, but the committee declined to share the prize with Best because its rules forbade the honouring of a student. Banting did not agree, and promptly shared both the credit and the monetary prize with his young assistant.

The author went on to share information about these inventors:

William T. Bovie: 1882-1958... was born and schooled in Michigan, but was closely tied to Maine. Originally a botanist, he turned to physics and his work in it was ground-breaking. At Harvard, he was among the first to use radiation to treat cancer, and he used electricity in 1926 to develop the Bovie knife. Modern versions of this knife are still used in surgery. He also established the first biophysics course - at Northwestern University in 1927. In 1929 he moved to the Jackson Laboratory at Bar Harbour, Maine, and taught physics at Colby College until 1948.

Joseph Stearns: 1831-1895... of Weld, Maine, was working for the Boston Fire Alarm Company in 1868 when he developed and patented a duplex system of telegraphy that allowed simultaneous, two-way communication, which changed the world of electronics. Stearns went on to lay many miles of telegraphic cables round the world.

William A. Rogers: 1832-1898... and another Colby College physicist, while working on a Waterville campus, measured the wavelengths of sodium light, to calculate the standard yard measure for the U.S. Bureau of Standards.

Neville M. Hopkins: 1873-1945... a Portland native, took degrees at Columbia before working for General Electric and forming his own consulting firm. After World War I, he proceeded to invent an array of military equipment dealing with rockets, missiles and ammunition. He also devised a method for identifying the numbers of radios tuned in to a particular station, which is still in use.

H. Henry Beverage: 1893-1993... from the Island of North Haven off the coast of Maine, studied electrical Engineering at the University of Maine. After University, for the General Electric Company, he invented a wave antenna that made it possible to receive multiple shortwave messages, sort them and relay them over landlines. For the U.S. Navy during World War I, he installed one of the first motorized radio transmitters and, at the end of it, prepared President Wilson's radio communications system for the Versailles Conference. Later, during his nine years as chief engineer at RCA, he received more than 20 antenna patents.

James A. Johnson: graduated from Portland High School in 1928, and enrolled at the Franklin Institute in Boston. During World War II, while in the U.S. Navy, he won an award for inventing a device related to 40-millimeter guns. After the War II, he invented an automotive exhaust emission device, a helicopter toy, a golf putter, and a wheel balancer for cars and trucks. Johnson also was the first African American to lead a Knights of Columbus group in Maine.

Edward L. Norton: 1898-1983... was born in Rockland and was a communications engineer and MIT graduate. He joined Western Electric/Bell Labs in 1922. His main contribution was the development of a means by which linear circuits were simplified (Norton's Theorem). He also received nearly 20 patents related to network theory and data transmission.

Percy L. Spencer: 1894-1970... physicist, of Howland, designer of radar tubes, in 1945 filed a patent application for what became the first microwave oven in 1947.

Charles Peddle: 1937-2019... was born in Bangor, Maine, and grew up in Augusta in poor circumstances. He has been called 'the father of the personal computer.'

He attended the University of Maine's engineering school and studied engineering physics. On graduation, he worked for General Electric in California on computer design, then moved to Motorola in Arizona where he worked on a low-cost silicon chip for personal computers. Failing to generate management's interest, he left to join MOS Technology in Pennsylvania, where he built the 6502 microprocessor, which was adopted in computers Apple I and II in 1977, the Commodore 64 in 1982, the Commodore PET in 2001, and in Acorn, Atari and Nintendo game machines...launching the personal computer revolution.

Paul A. Albert: 1928-2019... of Van Buren, Maine, a metallurgist and another graduate of the University

of Maine's engineering school, created custom alloys used to record data on magnetic films for computer hard drives. When he retired in 1982 he continued providing custom alloys in his own company.

To Conclude...

...with quotations from the author's *Epilogue*, (p 133/4):

It wasn't until the end of World War II and the Atomic Age arrived that new creations began to slip beyond the grasp of ordinary understanding...

... and the gap in understanding grew exponentially with the advent of the Computer Age in the 1980s. Everyone was astonished by what computers could do, but most had no idea of how it was done. Today's evolution into a new age of artificial intelligence, robotics, and cyber-physical wonders has only deepened the gulf of incomprehension; yet despite the mysteries, the world has rushed to the small black boxes, keyboards and clickers that give out a flood of information. With the help of small children, even conformed Luddites have surrendered to the digital age for fear of being left behind, and while many old industries have drifted away, the kinds of work that people do keeps changing, and the products of the nation slowly shift towards services, information and ideas.

Today, new inventions and discoveries are most often made in exotic laboratories and the bellies of computers, and U.S. patents grow at the rate of nearly 400,000 a year. The Maine footprint in this Age is as big as ever, albeit more centred at the growing number of scientific research centres around the State...

Sole Source: *DOWNEAST GENIUS: From Earmuffs to Motor Cars: Maine Inventors Who Changed the World*, by Earl H. Smith, Islandport Press, Yarmouth, Maine. 2021.