Society for Industrial Archeology · New England Chapters

Volume #44 Number 2 2023

Contents

NNEC President's Report

David Dunning

A digital fall tour will be sent in December as the planned physical tour got scrubbed. Please pay your dues if you're delinquent! Your co-members are wishing you would contribute your share. Benefits of reading newsletters online include color pictures that are crisp and clearer to see. Also, many articles have live links to websites with more pictures and more details about the sites. A third benefit is that you get to read it immediately, upon notice. You don't have to wait about two weeks to get it in the mail. Let Rick Coughlin know if we can drop your address from our (expensive) mailing list. Greatw@juno.com Thanks.

NNEC Treasurer's Report

Rick Coughlin

Bank balance on September 30, 2023: $2,763
Bank balance on September 30, 2022: $3,323
Thus, the bank balance has decreased $560 in the past year.
Annual paid membership as of September 30, 2023: 32; life members: estimated at 30.
Annual membership has been gradually increasing the past few years, which is great but annual membership dues are not enough to cover the cost of the twice a year newsletter. It has cost $522 and $512 the past year.

SNEC-SIA Treasurer's Report

Sara Wermiel

I take this opportunity to recap the activities of the Southern New England Chapter of the SIA this year. In April, SNEC hosted the New England Chapters SIA Conference, which was held at Lawrence Heritage State Park. Reports on the conference can be found in the first issue of this newsletter for 2023. In February, SNEC members toured the Buccacio Sculpture Studio in Canton, Mass.; a detailed report about the process by which sculptor Jeff Buccacio creates his pieces, written by tour organizer Betsey Dyer, can also be found in the first issue of the newsletter. In July, SNEC member Robert Tanner organized a tour of Old Schwamb Mill, Arlington, Mass., of which he is a member of the Board of Directors. A report on the tour is in this issue of the newsletter. In October, SNEC toured the historic former Boston Manufacturing Co. factory complex, with Bob Perry of the Charles River Museum of Industry and Innovation in Waltham, Mass.; afterwards, we held our annual meeting (see report in this issue). The SNEC management committee meets as needed over Zoom.

We encourage members to propose and help organize tours and other IA programs. Betsey Dyer is the contact for tours and will help make your tour idea a reality. SNEC member Robert Timmerman edits the newsletter for the chapters, which is published two times per year. Articles and items for the newsletter should be sent to him. Although he lives far away in Nevada, Marc Belanger continues to help the New England Chapters by maintaining the NEC website and sending out announcements to the NEC email list.

In the spring 2024 newsletter, I will provide an annual report on SNEC's finances for 2023. But I can say for now that dues and conference attendance fees have mostly covered SNEC's costs for the year, and the chapter's bank balance has been steady.

NNEC Spring Tour Report

David J. Dunning

It was a beautiful day in Portsmouth, N.H. on Friday, June 2. There were 17 members present, including spouses and friends from both chapters. We assembled at Albacore Park. The Naval Base Historian slipped us through the security gate into the shipyard, as we were preregistered. The first stop was the base museum. We spent about an hour there, seeing and learning the interesting history of the base. The tour didn't include the submarines being worked on, for security reasons.

Treaty Room at the shipyard, where the treaty ending the Russo-Japanese War was signed. (Chip Taylor)

NNEC members viewing an overview of the base. (Chip Taylor)

Following is a summary and history of the yard from installations.militaryonesource.mil:

Description

Portsmouth Naval Shipyard (PNSY) employs approximately 8,000 civilians and 1,000 officer and enlisted personnel. PNSY boasts an active apprentice and engineer recruitment program. Encompassing more than 297 acres, the installation includes the main base, as well as a family housing site off-base in Kittery, Maine. Many of the buildings located at the shipyard are in a historic district; of them, 50 are currently listed on the National Register of Historic Places.

Mission

We are Portsmouth. Together we are honor bound to support and defend the Constitution of the United States. We do so proudly by maintaining, repairing and modernizing our Navy's submarines so that they can go in harm's way, defeat our enemies in war and return their crews home safely.

History

Established by the U.S. government in 1800, PNSY launched its first product, the 74-gun warship USS Washington, in 1815. During World War I, the PNSY workforce expanded to nearly 5,000. At that time, PNSY took on a new and important role: the construction of submarines, in addition to the overhaul and repair of surface vessels. World War II saw the civilian employment rolls swell to more than 25,000. Over the course of World War II, more than 70 submarines were built, with a record 4 submarines launched in one day.

Following World War II, PNSY was the Navy's center for submarine design and development. The research submarine USS Albacore, with its revolutionary teardrop-shaped hull and round cross-section, set the standard for all subsequent submarine hull design worldwide. PNSY continued to build submarines until 1969, when the last submarine built in a public shipyard, the nuclear-powered USS Sand Lance, was launched. Today, the shipyard continues the tradition of excellence and service to the Navy and the nation by supplying the submarine fleet with high-quality, affordable overhaul, refueling and modernization work.

From the museum, the tour bus took us to the old naval prison, which is no longer used.

The Old Navy Prison (Chip Taylor)

PortsmouthNH.com tells this story:

The mysterious and massive building across the river from Portsmouth is a U.S. Navy prison, abandoned since the 1970s as too expensive to rebuild or to tear down. Built in the early 1900s, the prison on Seavey Island was a notorious and feared holding spot for American sailors. Up to 3,000 were housed there during World War II. Spanish prisoners-of-war also were kept there during the Spanish-American War, and scenes from the movie "The Last Detail," starring Jack Nicholson were filmed there.

A picnic lunch was served at the shipyard's outdoor pavilion, overlooking the harbor.

Lunch at the pavilion overlooking the harbor. (Dave Dunning)

From there, we went back to our cars at the Albacore display park. The visitors' center there explained all about the Albacore.

The USS Albacore, streamlined submarine. (Dave Dunning)

In the afternoon, we drove a short way up to Kittery, ME, and explored the remnants of old Fort McClary. The following is from visitmaine.com:

Named after New Hampshire native Major Andrew McClary, who died in the Revolutionary War's Battle of Bunker Hill, Fort McClary stands at the southern gateway to Kittery – the same spot it has stood at for 275 years. Designed to protect approaches to the Piscataqua River, it currently preserves military history and the evolution of military architecture and technology.

Though Fort McClary was not involved in a major battle, it was manned during five significant wars: the Revolutionary War, War of 1812, Civil War, Spanish-American War and World War I, demonstrating the European settlers' strong determination to protect their country time and time again.

Fort McClary grounds. (Chip Taylor)

Inside Fort McClary. (Dave Dunning)

We enjoyed exploring the old fort's building, fortifications and tunnels. The many placards told the history in detail.

Annual Meeting of Southern New England Chapter-SIA

Betsey Dexter Dyer

The annual meeting of the Southern New England Chapter was held on October 21, 2023, at the Charles River Museum of Industry and Innovation in Waltham. About 18 attended and were led on a walk by Bob Perry, the museum's executive director, around the outside of the former mill buildings.

Bob Perry describing the mill buildings. (Betsey Dexter Dyer)

Then inside the museum, Bob operated several different pulley-driven machines, such as drills and lathes. No matter how many times we Industrial Archaeology members have seen such sights, we don't get tired of seeing them again.

Bob Perry demonstrates belt driven machines. (Betsey Dexter Dyer)

The business of the annual meeting included voting for officers and dues. The current officers were unanimously re-elected; the dues will remain at $10. Then there was some discussion about field trips and the logistics for planning those. Members (whether present or not) are urged to contribute in whatever way possible: making connections with factory owners, arranging behind the scenes tours, leading walks, etc. While we have a long list of possible tour sites, very few of these are fully formed with all the necessary arrangements. (See list below.)

Then Saul Tannenbaum, past president of SIA (and currently a SNEC management committee member) told us about some new SIA initiatives. One was the formation of a study group focused on iron and steel industries. Another was an examination of what ways SIA might branch out to include cultural and historical aspects of industry. There seem to be fewer academic programs in archaeology and therefore fewer new participants studying industrial sites. Saul also said that SIA is aware of the need to make more meaningful and helpful connections with the various chapters.

Finally, Robert Perry encouraged SNEC to develop a close relationship with the Charles River Museum, including getting publicity through museum channels and maybe participating in some programming.

Please look at the following list of possible tour sites, and if you have particular knowledge or connections that might make excursions to places happen, please contact us. Betsey Dyer mbdyer@wheatonma.edu has been serving as a point person for field trip logistics. Please consider leading a field trip yourself.

Possible SNEC Tour Sites, and Tour Ideas Collected by Marc Belanger

Process tours, being planned for 2024 and ideas for the future:

Where	When	Logistics
Henry Perkins foundry; Bridgewater Ironworks Park; worker housing, Bridgewater	April 2024	David Moore arranging some of this. Planning to choose a casting day.
Saugus Iron Works Site Saugus	TBD. Maybe Summer or Fall 2024	Possible talks by Betsey Dyer (microbiology of iron ore) and Sara Wermiel (history).
Annual Meeting, SNEC	Spring 2025	Various ideas including Attleboro Industrial Museum.
Johnson and Johnson (DePuy Synthes) in Raynham	TBD	Aluminum Foundry for orthopedics. Suggested by David Moore. Connections need to be made

Where	When	Logistics
Lawrence Trousers at Everett Mills, Lawrence MA	TBD	Manufactures trousers Connections needed "Southwick Social Ventures"?
Rolls Royce Walpole MA	TBD	Manufactures and tests large propellers: Betsey Dyer might connect
Hub Box Folding Mansfield MA	TBD	Manufactures boxes Connection needed
Alden Labs, Holden MA	TBD	Connection needed
Westfield Whip Co. and Museum, Westfield MA	TBD	Connection needed
United Shoe Machinery Co./Cummings Center Beverly MA	TBD	Connection needed – Historic Beverly

Museums possibly good for SNEC tours if made behind-the-scenes or special:

Museum	Location	Notes
Chester RR Museum	Chester MA	And Keystone Arch Bridge Trail
Little Red shop museum (various themes)	Hopedale MA	And walk around Hopedale
Lynn Museum	Lynn MA	Lynn Heritage State Park
Leatherworkers Museum	Peabody MA	And George Peabody House Museum
Cordage Museum	Plymouth MA	
Baxter Grist Mill	Yarmouth MA	And Baker Windmill
Conn Antique Machinery Assoc	Kent CT	And Sloane-Stanley Tool Museum and Kent Furnace and Eric Sloane Museums
D'Elia Antique Tool Museum	Scotland CT	
Willimantic Textile and RR museums	Willimantic CT	
Windham Textile Museum	Windham CT	
Museum of Work and Culture	Woonsocket RI	And walk around Woonsocket

Trails or walking tour venues, requiring someone to research and guide tours:

Trail or Venue	Location	Notes
Steam Line Trail	Fitchburg, MA	
WW II bunkers Assabet River Refuge	Sudbury MA	Kate O'Brien 207-337-0054 Kate_Obrien@fws.gov Knows a connection for the bunkers
Guided walk	Worcester MA	
Shoe Industry area	Brockton MA	And Stonehill College, Brockton Shoe Museum

Some venues that are now re-developed for condos, razed, etc.:

Venue	Location	Notes
Robin Rug	Bristol RI	
Byfield Snuff Mill	Newbury MA	
Watershops Armory	Springfield MA	There is an Armory Museum

SNEC Tour of Old Schwamb Mill, Arlington, Mass., July 18, 2023

Betsey Dexter Dyer

Located on one of the first mill privileges in Massachusetts Bay Colony, Old Schwamb Mill still stands, with most of its 1864 infrastructure and antique machinery intact. That is thanks to Patricia Fitzmaurice, who managed to intervene when the mill stopped operating and was sold in 1969. It would have been razed by its new owners; however, Fitzmaurice formed the Schwamb Mill Preservation Trust to save the property. As a result, the mill has been preserved and remains beautifully unaltered, and is the oldest continuously operating mill in the United States.

The oval turning lathes, driven by flat belts. (Betsey Dexter Dyer)

Twenty members of SNEC, NNEC, and the Cambridge Historical Commission had a tour on July 18, led by SNEC member (and mill board member) Bob Tanner.

A mill stood on the site of the Schwamb Mill as early as the late 1600s or early 1700s. The first well-documented mill burned down in 1861 and was rebuilt in 1864; fortunately, there has not had a major fire since. Since 1864, the Schwamb Mill has specialized in making picture frames, including oval and round ones, using a specialized lathe, which I

Sliding table saw to cut ends square. (Betsey Dexter Dyer)

will attempt to describe below. The mill still takes orders for frames and sells them.

The ground floor of the Schwamb is a well-organized, open woodworking shop (smelling of fragrant wood) and in the corner was David Graf, a volunteer who described and demonstrated the process by which an oval frame is made. Typical woods used for frames are butternut, tiger maple, mahogany, and birch. First Dave cuts out four quadrants of an oval from a plank, taking care to align the wood so that in each quadrant the grain runs mostly parallel to the tangent of the arc. Then finger joints are cut in the quadrants using a specialized antique saw. In a dedicated gluing room in the loft, the quadrants are assembled into an oval and glued; a modern wood glue is used, but this was originally done with hide glue. That gluing room used to be extremely hot, as hide glue had to be kept at a high temperature. The strong glue, finger joints, and alignment of wood grains keep the frame intact for the next steps on the spinning lathe.

Perhaps the reader can envision a lathe that could spin and create a round frame. But an oval is another matter. The mechanics might be envisioned as a sort of Spirograph (suggested SNEC member Curtis Maxwell Perrin). The machinery (which is far more compact than a Spirograph) generates two independent movements of the frame and thus a third movement is generated.

A frame being spun as an oval ought to flutter and be unworkable except that the movements are adjusted such that a sharp chisel held in one spot will miraculously (or logically) carve perfectly into the spinning oval. And that is how David Graf is able to make beautiful and precise grooves, curves, and lines. Until recently, such work could not be done by a router. Computer-controlled milling machines have to some extent accomplished what this 100s-of-years-old technology can do. Sanding the joints is also done on the lathe.

Not only does David have the skills to make frames of all different sizes (some more than 6-feet on the long axis) but he also keeps the machinery operating. When he first started the lathe, he warned that oil might fly off because there are no oil reservoirs. The machine must be regularly lubricated when it begins to emit a rough sound.

Bob Tanner outside the mill. (Betsey Dexter Dyer)

Antique leather belts overhead power the lathe and are shifted from one speed to another by sliding the belts onto wheels of different sizes. It is all very analogue and visible. The belts are regularly lubricated with neatsfoot oil. If a belt is worn, David patches it by cutting out the worn piece and using an antique belt-lacing tool to put in a patch. If a belt runs loose, David can tighten it.

Who are you training to replace you some day, I asked? Melissa H. Carr, a master conservationist who has a workshop in Schwamb, was Dave's good answer.

Back upstairs in the gluing room, Dave applies coats of oil and wax for a traditional finish, although pieces may also be varnished or gilded by an outside crafts person. In the basement of the mill was an enormous circular/oval lathe capable of making six-foot frames. In operation, it shakes the whole building, and thus there are extra reinforcing beams nearby.

At one time, the mill had several oval lathes and about three dozen people turning out frames. Rectangular and square frames (much easier to visualize) were also manufactured at Schwamb. A specialized job at the mill was making blades of all sorts for the many varieties of wood-cutting machinery.
David Graf's other job is restoring large antique tower clocks, such as those in church steeples and town halls. He also keeps eight town clocks wound every week, sometimes climbing steep stairs and ladders to arrive to the job.

After Dave's demonstrations, we had tours led by Dermot Whittaker (President of the Board of Directors of Schwamb Mill Preservation Trust), Bob Tanner, and Ellen Cohen (both members of the Board). Although the machinery currently is powered by electricity (via the overhead belt system), three other energy sources are still quite evident.

At first, the mill was water-powered, via water diverted from Mill Brook. In the 19th century, the town of Arlington impounded some of the brook's water supply in a reservoir, greatly affecting the downstream mill. The mill owners won a lawsuit against the town, but not before resorting to steam power, which, in any case was a good backup system for the seasonal variabilities of stream flow. Finally, in 1888, a water-powered turbine was installed.

The steam engine plant was built across the street from the wooden mill, so that a fire there would not spread easily to the rest of the mill facilities. That structure is the oldest building on the site, circa 1800; it was adapted to house the steam engine. In one room was a 20-horsepower steam engine (no longer extant) linked by a long belt under the street to the rest of the mill. In another room were the boilers. These were fired by coal as well as by sawdust (a byproduct of picture frame-making). The sawdust was "shot" under the street from the mill to the boiler room. A system of electric bells allowed workers in the steam plant to communicate across the street with the mill to adjust the power as needed.

Back across the street, in the cellar of the mill building, was a 20-horsepower Holyoke Hercules water turbine, deeply embedded into the ground. Water from a mill pond 500 feet away was channeled underground through 27-inch wooden pipes down a 30-foot incline. Thus, enormous waterpower was available to run a turbine. Shutting down the flow of water necessitated a tall standpipe so that the rush of extra water had a place to be channeled safely.

The generator was regulated by a governor of rather extraordinary design (as they tend to be). This was earnestly explained to our group by Bob Tanner, but I would be hard pressed to put it into words. The general principle was a system of oscillating gears adjusting oil pressure in a piston-like pipe that in turn controlled the amount of water pouring into the turbine. This particular governor was well designed to neither accelerate or decelerate too quickly, nor to oscillate between states. Possibly it is like a fly ball governor on a steam engine but much bigger, with many more gears and a formidable task of controlling great water pressure precisely.

Any SNEC members who would like to do a better job of explaining the operation of the governor are welcome to write a letter to the editor.

[Editor's note: due to a navigation error, the Editor missed the tour. As described on a video put out by the Schwamb Mill, this governor does not seem to be the typical one furnished with the Hercules water turbine. An example of this type of governor is on display in the Mayes Building of the Museum of Steam and Wireless in East Greenwich, RI. In its use of oil under pressure, it seems similar to the Lombard governor in the Charles River Museum of Industry and Innovation. A description of the action of that governor is on the museum's website.]

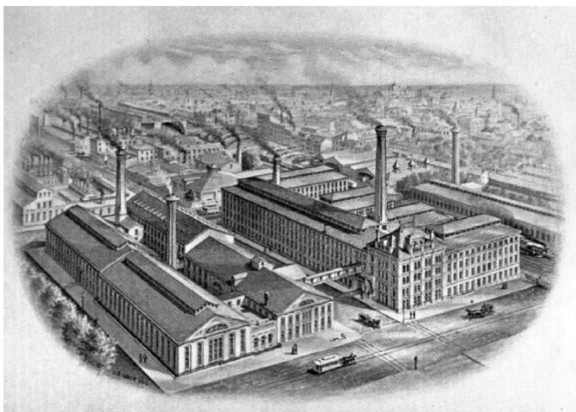
Although we were given extra attention and access to places not typically open, the mill is open to anyone Tuesday sand Saturdays 10-4 and is well worth a visit or return visit. It also hosts musical concerts in the summer and an October Fest in the fall. Phone or email ahead to make sure Dave is there at his oval lathe, typically on Tuesdays.

William Sellers, Machine Maker

Rick Ashton

William Sellers was a mechanical engineer, manufacturer, businessman, noted abolitionist, and inventor. He filed for over 90 patents, most notably the design for the United States screw thread, the standard bolt and machine screw thread still used today. For many years he led the machine tool firm of William Sellers and Company, a very influential machine tool builder during the latter half of the 1800s.

Sellers was born in 1824 in Delaware County, Pennsylvania into a Quaker family of industrial and manufacturing innovators. He was educated in a private school built by his father and two relatives, to educate their children. At age 14, he was an apprentice in his uncle John Morton Poole's machine shop near Wilmington, DE. After 7 years, at only 21 years of age, he moved to Providence, RI, to run the shops of Fairbanks, Bancroft and Company, which eventually became the Corliss Steam Engine Company.



The Sellers Works, Philadelphia.

In 1847 he began the manufacture of machinist tools and mill gearing in Philadelphia. In 1848 he formed a partnership with his brother-in law Edward Bancroft. After Bancroft's death in 1855, Sellers incorporated as William Sellers and Company. The company was an immediate success and within 10 years was the largest tool manufacturer in the Philadelphia area.

In 1868, Sellers formed the Edgemoor Iron Co., and in 1873 became president of the Midvale Steel Co., which, under his management became the first successful producer of material required by the government for its steel canon. Sellers was elected a member of the Franklin Institute in 1847 and was on its board of managers from 1857 to 1861 and again from 1864 to 1892. He was also president of the Institute from 1864-1867.[1]

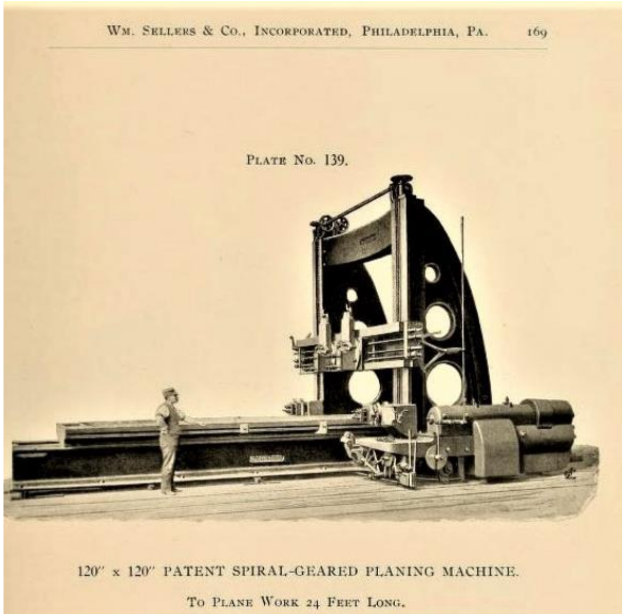
On Sept. 15, 1864, he presented a uniform system of screw threads with its angle and flat top and bottom that differed from the Whitworth's British standard. It soon became the standard in the United States under the names the United States, Sellers, or Franklin Institute systems. It embodied the 60-degree angle and a flat of 1/8 of the pitch at the top and bottom of the thread. Sellers stated clearly the need for some generally accepted standard, reviewed the various threads then used, particularly Whitworth thread, with its 55-degree angle and round corners, which he disapproved of on three grounds:

- first, it was difficult to secure a fit at the top and bottom
- second, the angle was difficult to verify; and
- third, the high cost of making cutting tools which would conform accurately to the standard.

In 1868, the system was fully endorsed and accepted by the U.S. Navy department and afterwards by other departments and soon became the nation's standard.

The excellence of his machinery soon brought him into contact with government engineers, and throughout his life, his influence in the U.S. War and Navy departments was great. In 1890, the Navy department called for bids on an 8-foot turning and boring lathe, with a total length of over 128 feet, to bore and turn 16-inch cannon for the Naval Gun Factory at Washington. Sellers disapproved of the design and refused to bid on it. He proposed an alternative of his own, argued its merits in person before the board of engineers, and secured its adoption and a contract for it. This great lathe, weighing over 500,000 pounds, has attracted the attention of engineers from all over the world.[2]

He was granted around 90 patents in the United States, the earliest in 1857. The patents included machine tools, injectors, riveters, boilers, hydraulic machinery, furnaces, hoists, cranes, steam hammers, steam engines, and other devices. One of Sellers' best-known machines was the spiral geared planer patented in 1862, which has always been associated with his name. The table of the planer was moved by a short section of screw with four or more threads placed on an inclined shaft. This led to

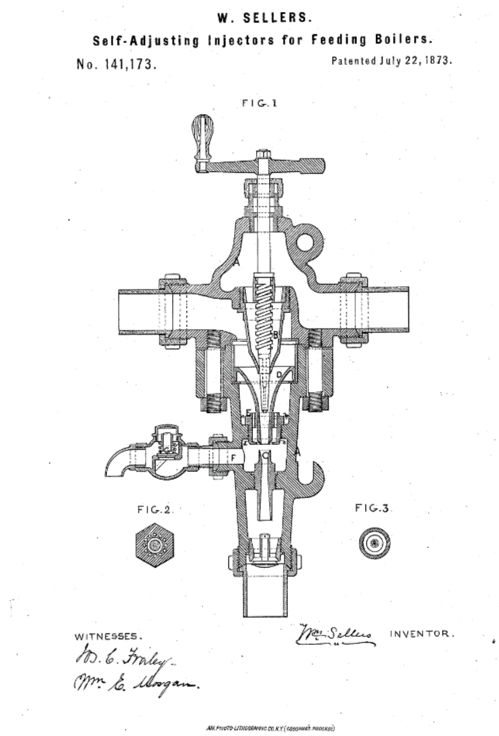


Sellers Spiral Geared Planer

a higher efficiency of action. He also invented a bolt making machine and various gear cutting machines, which were very popular.

Almost from the first, Sellers cut loose from the accepted designs of the day. He was among the first to realize that red paint, beads and moldings, and architectural embellishments were false in machine designs. He introduced "machine gray" paint, which has become universal; made the form of the machine follow the function to be performed; and freed it from all pockets and beading. He realized that American tools then being built were too light; and he put more metal into his machines than was the practice elsewhere. From the beginning, he adopted standards and adhered to them so closely that repair parts could be supplied for machines made almost 50 years ago.[3]

Sellers was in Europe in 1860 and became interested in the Giffard Injector for feeding water into boilers. The injector was considered a crude and impractical "toy." Sellers, realizing the potential of the device, modified the original design and in 1865 he patented a self-adjusting combining tube which automatically adjusted the supply of water to meet the requirements of various steam pressures. Sellers' design became so popular it was



Patent drawing for the Sellers injector

adopted by most of the railroads of France, the land where the Giffard injector was invented.

Sellers' company won medals in three World Fairs. In the 1867 Paris Exposition they won a gold medal. In Vienna in 1873 they were presented with a Grand Diploma of Honor and 5 gold medals. And in Paris in 1889 they landed another Grand Prix medal.

William Sellers died in 1905 in Philadelphia. He has been called "the father of the great machine tool industry of the world."

It's interesting to note that William Sellers, as well as his brother Coleman (considered by many to be right up there with William as an inventor), both rose to the highest pinnacle of mechanical art and scientific development without any technical or scientific schooling.

S. M. Vauclain, then the superintendent of Baldwin Locomotive Works (one of the largest locomotive manufacturers of its time), said of Sellers: "to me he has always been the acme of eminence in the machine tool section of mechanical engineering. His productions were always the very best of their respective kind, and he once very quietly remarked, 'one might object to the price, but never would to the machine'." Wilfred Lewis, president of Tabor manufacturing stated: "In many directions he was a pioneer, and the high standard of machine construction in America may be said to have been set by William Sellers."

Probably no single individual has had as great an influence on machine tools in America as William Sellers. Sellers described his own philosophy about machine tool production the following way: "It has been said that good workman can do good work with poor tools. Skill and originality may indeed accomplish great results, but the problem of the day is not only how to secure good workman, but how to enable such workman as are at our command to do good work, and how to enable the many really skilled mechanics to accomplish more and better work than heretofore, in other words, the attention of engineers is constantly directed to so perfect tools as to utilize unskilled labor." Sellers introduced uniformity into his own machine tool plant, in which "all the parts are made to standard gages, whereby each will fit its corresponding part in a hundred tools."[4]

He held the following positions in his lifetime:

American Philosophical Society, elected member (1864).

Franklin Institute, elected president (1864).

University of Pennsylvania, elected trustee (1866).

Fairmount Park, appointed member of the first commission (1868).

Edgemoor Iron Co., elected president (1868).

Philadelphia, Wilmington and Baltimore Railroad, elected director (1868).

Philadelphia and Reading Railroad, director.

Centennial Exposition, Board of Finance, elected vice-president (1873).

William Butcher Steel Works (reorganized it as Midvale Steel Co.), president (1873–87).

National Academy of Sciences in Washington, elected member (1873).

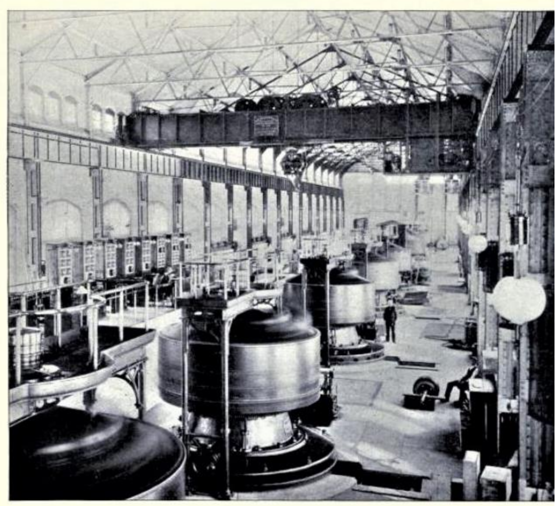
Société d'encouragement pour l'industrie nationale in Paris, appointed member (1875).

William Sellers and Company operated until 1947 when it was sold to the Consolidated Machine Tool Co., which is still in business.

[Editor's note: Sellers was also known for overhead cranes, as shown in the following examples from Rick Ashton.]

10-TON TRAVELLING CRANE.
IN WHEEL-SHOP, BALDWIN LOCOMOTIVE WORKS.

10-ton crane in Baldwin Locomotive Works



50-TON TRAVELLING CRANE.
IN POWER HOUSE OF NIAGARA FALLS POWER CO.

50-ton crane at Niagara Falls powerhouse

Links

www.vintagemachinery.com

www.archive.org

https://invention.si.edu/william-sellers-company-inc-records-1827-1947

Endnotes

[1] Joseph Roe, *English and American Tool Builders*, 1916.
[2] Ibid.
[3] *Journal of the Franklin Institute*, 1905.
[4] John Ingham, *Biographical Dictionary of American Business Leaders,* V2, 1983.

Iron Manufacturing in Bridgewater, Massachusetts

David R. Moore, Chairman
Bridgewater Historical Commission

[Editor's note: this article will run in two parts. The second part in the Spring 2024 newsletter.]

In this essay, I contend that Bridgewater, Mass., is the oldest site of continuous iron and iron products manufacture in North America. It was not the first place, but it has continued from about 1707 to the present day, at primarily two locations in what started out as Bridgewater's South Parish, presently the Town of Bridgewater.

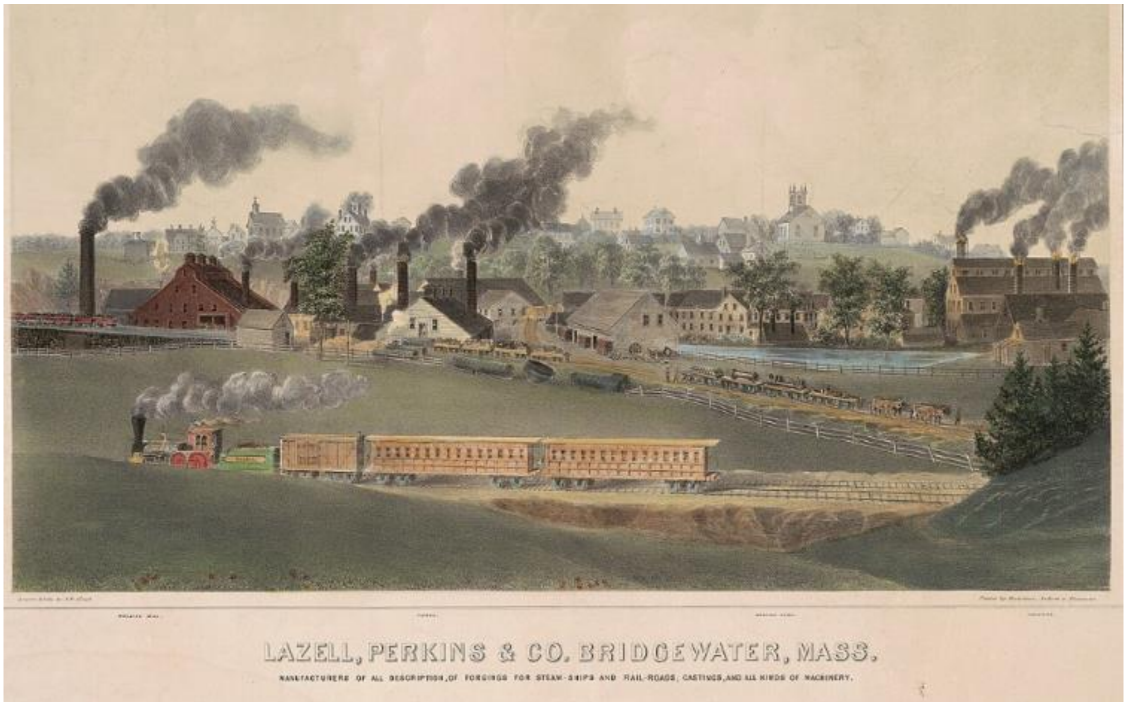
The primary mill site at the intersection of High Street and the Town River is probably the most significant and best documented, in its later years. It was a tremendous site for waterpower. Deeds today still show water rights to flow over 400 acres, a sizable reservoir of power. The river could be easily harnessed or dammed up as it passed through the deep valley. There are some deed references to an early dam or possibly a secondary river control structure, about a half-mile upriver off Ash Street in West Bridgewater.

David Perkins was born in Hampton, N.H., about 1645. He came to Bridgewater in 1688 and served as the first representative to the General Court, in 1692. By 1707 he was operating a blacksmith shop on the site.[1] His son Jonathan, born in 1714, was badly injured at the forge, losing his sight in an accident.[2] This may be the earliest evidence of iron manufacturing at the site.

In 1694, David Perkins was given permission by the colonial legislature to erect a dam across the Town River. This was later added with a deed from Thomas Washburn to connect the dam to his property.[3] The site was originally used as a saw and gristmill and afterwards a slitting mill and forging shop. The channel of the river on the west edge of the property was first constructed as a wood-lined sluiceway, leading to a wooden waterwheel that powered a bellows.[4]

In 1785, Perkins introduced the second slitting mill – for slitting bars of iron into rods from which nails were made – to open in the country, following the revolution. By 1795, this ironworks was rolling over 445 tons of iron per year (making flat plates of iron). The location of the works, away from seaports and before the railroad, suggests that there must have been bog iron at the site – a reason it was established there. Prior to the railroad, hauling bulky materials produced by this industry by wagon, over long distances, was not profitable. The nearest port to Bridgewater was in Taunton, seven to ten miles away. It wasn't until the railroad came up from Fall River in 1845, and then in 1846, from Boston, that the industry was able to flourish.

From 1810 to 1816, the business was carried on under the name of Lazell, Carey & Co. During the War of 1812 orders were filled for cannon, and great iron pots for the whaling ships were cast.[5] In 1816 Carey was dropped and the business continued until 1825 when it was named the Bridgewater Iron Manufacturing Company. However, the firm also continued to do business as the Lazell, Perkins & Co. for many years, having built an excellent reputation under that name. The use of this second name continued up through the Civil War; the company had an office at 83 Maiden Lane in New York City and advertised forgings, shafts, railroad wheels and castings of all descriptions. In the 1820's coal was imported from England. The new fuel provided a greater source of heat for the numerous processes associated with iron production.



In 1830, the Bridgewater Iron Co., or Lazell, Perkins, began to manufacture steam engines. This would indicate that they possessed a complete facility for rolling plate for boilers, and for manufacturing other iron parts. The steam engine venture was short lived, and the plant turned its energies toward the manufacture of heavy machinery for rolling mills, hydraulic presses, sugar mills, nail machines, and even heavier castings.

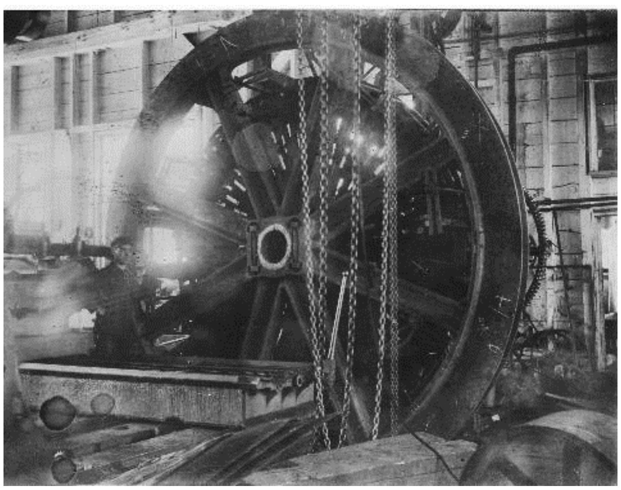
The rolling mills produced tack, nail, boiler, and shovel plate; one of the mills was steam driven and the other used waterpower. There were also two forges, one for producing iron with charcoal, and the other for forging (shaping) iron into anchors, locomotive cranks, axles, and the like.

In 1837, town records show that there were in Bridgewater two air furnaces producing 400 tons of iron, employing 40 men; a rolling mill with 60 men; two nail shops with 30 men; and two forge shops with 6 men.[6] There is no indication of where these facilities were but we could assume from other records that at least one air furnace, the rolling mill and a nail shop were at the High Street location. Records in 1845 show 125 men working in the iron industry in town.[7]

By the 1850's, with the coming of the railroad, the plant employed 250 men and consumed 4500 tons of coal, 6000 tons of iron to produce 50,000 casks of nails, 3000 tons of machinery and 4000 tons of iron plate. The Boston and Fall River Railroad brought coal, a superior fuel to charcoal, and higher grades and larger quantities of iron ore and scrap iron, along with limestone, a flux for purifying the molten iron. It also made shipping of all products much easier. Bridgewater Iron Company became one of the largest and most important iron producing concerns in the United States, specializing in heavy castings and forgings.

By 1858 the plant consisted of ten principal structures.[8] These were 1) an iron foundry, 50 by 140 feet, with a furnace capable of processing seven tons of ore a day; 2) a bloom shop, 40 by 70 feet, with the capacity of processing 300 tons of scrap into blooms or blocks of iron to be forged or shaped into plate or forgings; 3) a crane capable of lifting 75 tons, including shafts 24 inches in diameter and over 30 feet long; 4) a boiler shop, 30 by

40 feet, used for assembling locomotive and stationary boilers; 5) a forging shop, 140 by 60 feet, for the production of wrought iron products, including locomotive cranks, car and engine axles, and steamboat shafts (Bridgewater Iron Mfg. Co. manufactured and used the Willard Patent Steam Hammer.[9]); 6) a nail plate mill, 150 by 100 feet, which had a capacity of 15 tons per day and was powered by a 150 horsepower steam engine; 7) a nail shop, 140 by 45 feet, with 44 nail machines producing 1200 kegs per week, powered by a 60 horsepower waterwheel and a 60 horsepower steam engine; 8) a rolling mill, 90 feet square, powered by a 50 horsepower waterwheel, had a capacity of rolling 7 tons a day; 9) a machine shop, 100 feet square, had machinery sufficient to process all of the heavy castings and forgings (reportedly it had a lathe that could turn a 40-foot-long shaft and another had a faceplate capacity of 15 feet); and 10) a stone storehouse, 45 by 90 feet, that still stands, in ruins, today.



Undated photo of faceplate lathe. Worker barely visible at the left gives a sense of scale.

On Sunday, June 24, 1862, at 9:10 a.m., a terrible explosion of one of the steam boilers rocked the plant. Fortunately, being a Sunday there were only a few men present. This limited the casualties to 7 dead and 20 seriously injured. The explosion leveled one of the forge shops, toppled the stack and broke most windows in the plant and neighboring homes. The remains of the destroyed building were left on the site for over twenty years as a reminder to the men of the danger of the improper operation of the steam boilers. The disaster was recorded in Frank Leslie's Magazine on July 12, 1862. Other accounts of the explosion mention large pieces of iron being found over a mile from the plant. Insurance maps from the 1880 show the location of the ruins of the building to have been about in the center of the island, not far from the current bridge.

The cause of the tragedy was described in a letter printed in *The Scientific American* as follows: "From the best evidence I could obtain, and after careful examination of the collapsed flues, I think this case can be satisfactorily explained without calling in any gas, electrical or any other unknown theory. While the steam hammer was running, it was usual not to have the [feedwater] pump on the boiler as it deadened the steam. At the time of the explosion the hammer had just been stopped to give the iron a fresh heat. It is probable that while the hammer was running the water had gradually fallen below the upper parts of the flues. The upper side of the flues being intensely heated, and consequently weakened, was crushed down, and the arch of the flue being destroyed, they very readily collapsed, and the act of collapsing plunged the red-hot iron under water, thus causing the sudden generation of steam sufficient to produce the effects described above." [Stephen Moore, Natick, Mass., June 26, 1862.][10]

The use of scrap iron was a common supplement to the stock melted to make other products, as mentioned in these notes from *The Scientific American*, "Tuns (stet) upon tons of used-up, worn out 'hoops' are annually worked up in cannon, shafts for machinery, etc., at the iron works of Lazell, Perkins & Co., Bridgewater, Mass."[11]

Another article from those times spoke of the forgings at the plant: "Large Forging—New England may well be proud of her mechanics; they are the true source of her great wealth and influence. We are apt to give too little credit to our home influences, and to enlarge upon those farther away from us. We could not but think of this a day or two since, while at the works of Messrs. Lazell, Perkins & Co., of Bridgewater, Mass. Among other remarkable things, we saw a couple of shafts made for the Pacific Mail Company's new steamer Constitution, which showed as good work as one could well wish to see. These shafts are 28 inches in diameter, 34 feet 4 inches in length, and weigh about 25 tons each, finished. The connecting rods each weigh about 6 tons, and handsomer specimens of forging cannot be found in this country."[12]

[To be continued
in the Spring 2024 newsletter.]

Endnotes

[1] *The Bridgewater Book Illustrated*, 1899, Joshua E. Crane, p. 21.

[2] "An Account of Part of the Family of Abraham Perkins of Hampton, N.H., … " (NEHGR, 50 [1896]: 34-40).

[3] *History of Bridgewater*, Nahum Mitchell, 1840, p. 67.

[4] "Bridgewater's Oldest Industry," *Bridgewater Independent*, February 10, 1910.

[5] *Bridgewater Illustrated,* Arthur Willis, 1909, "Casting History of Bridgewater."

[6] *Statistical Tables, Exhibiting the Conditions and Products of Certain Branches of Industry in Massachusetts*, Secretary of State, Commonwealth of Mass., 1838.

[7] *Statistics of the Conditions and Products of Certain Branches of Industry … for the year ending April 1, 1845*, Secretary of State of the Commonwealth of Mass., 1845.

[8] *Scientific American*, Vol. 13, No. 52, Sept 4, 1858.

[9] Old Bridgewater Historical Society, *Bridgewater Independent* article.

[10] "A Fatal Boiler Explosion," *Scientific American*, NS Vol. 7, No. 3, July 19, 1862, p. 38.

[11] "Miscellaneous Summary," *Scientific American,* NS Vol. 12, No. 23. June 3, 1865, p. 353.

[12] "Large Forging," *Scientific American,* NS Vol. 4 No. 25, June 22, 1861, p. 389.

Advice to Newsletter Contributors

Robert W. Timmerman, Editor

I prepare this newsletter using Microsoft Word. The only source documents it can accept are Word documents. It cannot digest PDFs. If you send me a PDF, I will have to return it to you to be turned into a Word document.

The only form of photos that Word can accept are JPEG or JPGs. Using anything else is chancy. Word cannot digest photos in PDF form. Please send all photos as either JPG or JPEG.

I need captions for photos. Either include them with the photos or send a separate Word document with the photos and captions together, so I can sort them out. This is in addition to the JPG files with the photos.

The preferred text format is one space after a period, not two.

Please do not use the footnote function in Word. It is too clever by half. The footnotes in the text of the document are too small to read. When one edits the document, either to edit text, or to insert photos, it does all sorts of crazy things.

By necessity, this newsletter is built up one article at a time, so articles may not start at the top of a page. This confuses the footnotes in Word. Just use simple endnotes, and reference to the endnotes by number in brackets, thus [2]. If you use the footnotes built into Word, I will have to replace them with endnotes when I edit your work, which adds to the time to edit. If there are too many footnotes for me to deal with, I may have to return the document to the author.

Thanks for your attention!
We appreciate your contributions to the newsletter and your cooperation.