SOCIETY FOR INDUSTRIAL ARCHEOLOGY
NEWSLETTER

Volume 53 Fall 2024 Number 4

New York Adds Eight IA Properties to State Register

NRHP Nominations to Follow

New York State recently supported industrial archeology by nominating eight properties with IA significance to the National Register of Historic Places (NRHP). The New York State Board for Historic Preservation and the Deputy State Historic Preservation Officer made the nominations on Sept. 12, 2024. The Deputy Commissioner approved the proposals, thereby listing the properties on the New York State Register of Historic Places and then nominating them to the NRHP.

Out of 24 properties nominated, the following feature IA subjects.

General Electric (GE) Building 31 on Erie Blvd. in downtown Schenectady was built ca. 1887 for the Westinghouse Illuminating Co. of the Westinghouse Electric and Mfg. Co. The five-bay-wide, two-story, brick industrial building with decorative Italianate-style features is a late-19th c. manufacturing and laboratory building that played an important role in Schenectady's electrical industry. The building later became the home of the Schenectady Street Railway Co., which was purchased by GE in 1898. In 1909, GE converted the building into an illuminating engineering laboratory, where lighting pioneer William D'Arcy Ryan led his team in researching and testing new products and lighting technologies. Ryan is known for designing the lighting scheme of the 1915 Panama-Pacific Exposition and for popularizing the use of floodlighting.

GE Building 32, also on Erie Blvd., was constructed in 1909 by the architectural firm A.G. Lindley Co. of Schenectady. The freestanding, four-story, commercial-style brick building used a steel-reinforced, cast-concrete structural system in the "daylight factory" style that allowed for an open floor plan with more windows and natural light. It was constructed in accordance with emerging fireproofing techniques of the early 20th c. GE acquired the building in 1915, first using it as a machine shop, then as a military educational center, civic meeting space, and, from the 1930s until the 1980s, as GE's educational building, until selling it

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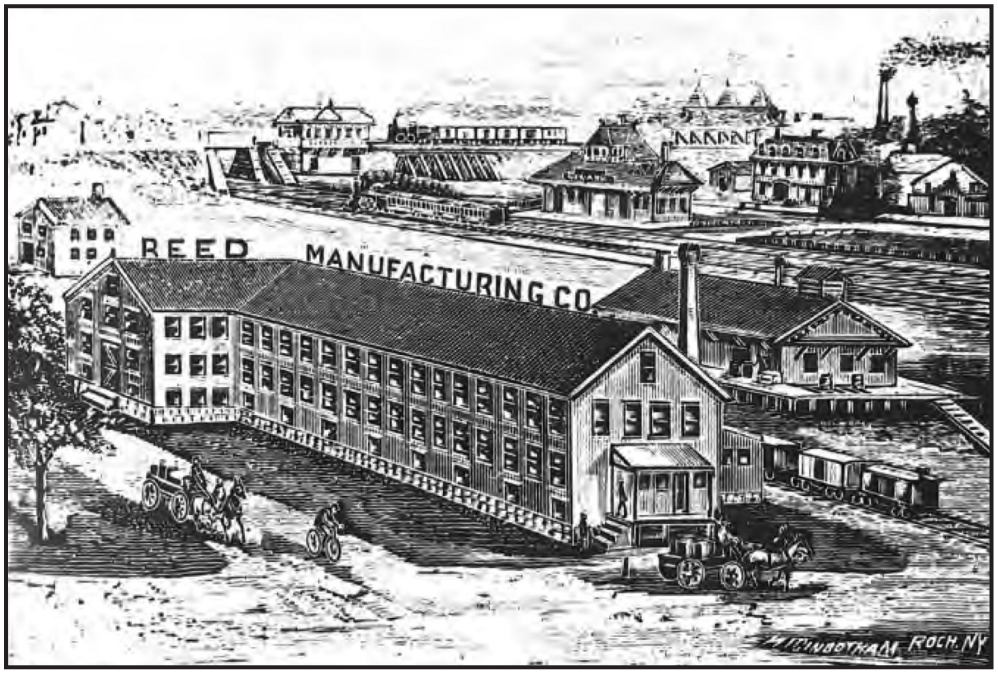

NRHP Registration Form; Wayne County Historical Society

View of Reed Mfg. Co., ca. 1900.

In This Issue:

- Buffalo, N.Y.: 2025 Annual Conference Preview
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to the city of Schenectady.

When G.E. downsized in the mid-1980s much of its Schenectady campus was demolished. GE Buildings 31 and 32 are the only two known early 20th-c. commercial/industrial buildings directly related to GE still standing on Erie Blvd.

The Spencer Kellogg & Sons Elevator (Kellogg Elevator), ca. 1910, is a reinforced-concrete grain elevator on Ganson St. in Buffalo (site of the upcoming 2025 SIA Annual Conference). It housed linseed, which the company used to manufacture oil for paints and other industrial purposes. The cylindrical concrete bins and a towering workhouse are the main elements of the structure; it also features an unusually tall basement that enables train cars to enter the building. The Kellogg Elevator was once a major part of Buffalo's booming grain industry.

The Kingston Barrel Factory is a two-story brick building that was built ca. 1914 as a box manufacturing factory and was converted to barrel manufacturing in 1917. The Kingston Barrel Factory employed as many as 50 to 70 skilled workers, even during the Depression. The barrel plant functioned as a tight cooperage, meaning the barrels manufactured there were designed to hold liquids instead of solids. The plant trained craftsmen in the greater skill required to produce tight cooperage, which needed to be expertly finished to avoid leaks. The factory brought a successful and lucrative business to the city at a time when the U.S. was the top cooperage producer in the world.

The Lowville and Beaver River Railroad (LBRR) Historic District is a privately owned, "short line" historic railroad integrally linked to the economic development of Lewis County in Upstate N.Y. throughout the 20th c. Completed in 1906, the line was capitalized, constructed, and operated by local interests. It ran until Jan. 2007 between Lowville and Croghan. The district remains as one of the few short lines in the state and is notable for representing the transition between canals and railroads, eating rooms and dining cars, ice harvesting and refrigeration, and the development of northern N.Y. communities through locally owned and managed railroads.

The Reed Manufacturing Co. in Newark, Wayne County, grew to national prominence in the production of rust-resistant coated containers, including kitchenware and utensils, pans and roasters, pails, tubs, and large containers, especially the wash boiler. The original H-shaped factory, constructed in 1903, is a brick structure that reflects a transition from traditional heavy-timber mill construction into daylight factory construction. The property also includes the adjacent freestanding administrative headquarters, also of 1903, as well as the ca. 1912 boiler house, the 1912–1924 brick infill structures linking the main factory to the boiler house, and the ca. 1924 tinplating plant. The company closed in 1946.

Sailing Vessel *Gitana* is a 40-ft., historic wooden Bermuda-rigged Yawl yacht built in 1936 for a crew of up to six. She was built using traditional shipbuilding methods and a pioneering design by noted naval architect John Alden. Her original purpose was sailboat racing with a small crew in coastal and ocean conditions. The *Gitana* represents a type of boat that gave rise to leisure and competitive sailing as an

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Jet Lowe [SIA], HAER NY-246, call no. HAER NY,15-BUF,35-.

Kellogg Elevator and south Michigan Ave. lift bridge over the Buffalo River—likely scenes during the upcoming SIA Annual Conference in Buffalo.

The *SIA Newsletter* is published quarterly by the Society for Industrial Archeology. It is sent to SIA members, who also receive the Society's journal, IA, published biannually. The SIA through its publications, conferences, tours, and projects encourages the study, interpretation, and preservation of historically significant industrial sites, structures, artifacts, and technology. By providing a forum for the discussion and exchange of information, the Society advances an awareness and appreciation of the value of preserving our industrial heritage. Annual membership: individual $50; household (joint) $55; full-time student $20; institutional $75; contributing $100; sustaining $150; corporate $500. For members outside of North America, add $10 surface-mailing fee. Send check or money order payable in U.S. funds to the Society for Industrial Archeology to SIA-HQ, Dept. of Social Sciences, Michigan Technological University, 1400 Townsend Drive, Houghton, MI 49931-1295; (906) 487-1889; email: *sia@siahq.org*; website: *www.sia-web.org*.

Mailing date for Vol. 53, No. 4 (Fall 2024), December 2024. ISSN 0160-1067. If you have not received an issue, apply to SIA-HQ (address above) for a replacement copy.

The *SIA Newsletter* welcomes material and correspondence from members, especially in the form of copy already digested and written! The usefulness and timeliness of the newsletter depends on you, the reader, as an important source of information and opinion.

TO CONTACT THE EDITOR: Marni Blake Walter, Editor, *SIA Newsletter*, 11 Esty Rd., Westmoreland, NH 03467; *sianeditor@siahq.org*.

Save the Date: SIA's 53rd Annual Conference
Buffalo, New York, May 29–June 1, 2025

The Society for Industrial Archeology's 53rd Annual Conference will be held in Buffalo, N.Y., May 29 through June 1, 2025. This will be SIA's second visit to Buffalo, the first coming at the 21st Annual Conference in 1992.

The Erie Canal, one of the world's greatest engineering marvels, breathed new life into Buffalo in 1825 (following the town's burning by the British in 1812), setting the stage for the growth of an industrial powerhouse. In the span of about 50 years, the small settlement of fewer than 1,000 residents transformed itself into a city of more than 134,000 people and one of the country's leading business and manufacturing hubs. Grain, steel, aviation, electric power, and even luxury automobiles helped Buffalo become the eighth-largest city in the U.S. by 1900. The City of Light, as Buffalo was dubbed during the 1901 Pan-American Exposition, encapsulated the "American Dream." A place where hard work, innovation, and invention transformed a small trading post into one of the nation's most influential cities.

The Buffalo planning committee is excited to share that process tours on Thursday and Friday will explore these industries, past and present. Some tours will focus on the engineering infrastructure along the Niagara River and ship canals of South Buffalo. The historic industrial landscape features landmark bridges spanning a transshipment network of waterways, and areas where steel factories and grain elevators still stand, such as Silo City. Other tours will visit areas north of the city where hydroelectric plants powered industries at the iconic Niagara Falls and at Lockport along the shipping canal. Buffalo remains an active industrial city, so tours will also visit contemporary places of production, like Hadley Exhibits and Buffalo Pressed Steel.

The conference hotel is the Hyatt Regency in downtown Buffalo. The hotel is housed in the Genesee Building, built in 1922 and designed by Buffalo-based architecture firm Green & Wicks as a steel-framed, Renaissance Revival-style, office building. At the time of its opening, it was the fourth-tallest office building in the city.

Nearby IA-related attractions for exploration include:

- Buffalo City Hall (1932), an Art Deco masterpiece, features decorative art that illustrates significant historical themes such as the development of the Erie Canal and the pioneering and industrial spirit of Buffalo's citizens. The lobby and observation deck are open weekdays.
- Louis Sullivan's Guaranty Trust Building (1894–95), an early skyscraper with an exquisite Art Nouveau-style, terracotta façade is highly regarded as one of the famed architect's masterpieces.
- Buffalo & Erie County Naval and Military Park, where visitors can climb aboard a WWII submarine and examine war memorabilia at the museum. Located on the city's waterfront.
- Canalside, in the heart of Buffalo's waterfront district on the Erie Canal Harbor, hosts year-round entertainment including public art, shopping, dining, and bars.

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HAER NY-249, call no. HAER NY,15-BUF,26-.

From left to right: Perot, Marine A, and American elevators. They are now part of Silo City, which boasts "the grandest collection of concrete grain elevators in the world." The massive grain elevators provide a setting for visiting artists, performances, and other events. Silo City is the likely location for the conference banquet.

Jet Lowe [SIA], HAER NY-549-12 (CT)

International Railway Bridge, spanning the Niagara River, Buffalo, N.Y.

CALL FOR PAPERS

SIA 53rd Annual Conference • Buffalo, New York

The Society for Industrial Archeology invites proposals for presentations and poster displays at the 53rd Annual Conference in Buffalo, N.Y., May 29 through June 1, 2025. The presentation sessions will be held at the conference hotel, the Hyatt Regency in downtown Buffalo, on Sat., May 31.

We invite presentations on all topics related to industrial archeology, industrial heritage, history of technology, social change related to industry, and historic industrial structures and bridges. Papers about regional industries and transportation in Buffalo and Western N.Y. are particularly encouraged—including grain, steel, hydropower, and chemical industries. Of note, 2025 is the 200th anniversary of the Erie Canal. We also encourage presentations on challenges facing industrial heritage, and on contributions made to our field by industrial museums. Poster displays are also encouraged and may present works in progress or finished projects. All presentations and poster displays should offer both interpretation and synthesis of data.

The deadline for proposals is Jan. 10, 2025.
https://www.sia-web.org/2025-sia-annual-conference-buffalo-new-york/

Presentation Formats: Proposals may be for individual presentations 20 min. in length, a group of three or four presentations on a common theme filling a 90-min. session, a 90-min. panel discussion with two to five discussants (a formal moderator is encouraged though optional), or a poster presentation. SIA will provide laptop computers, data projectors, screens, and microphones with speakers as needed in each presentation room. Posters will be on display all day Saturday with a dedicated time in the afternoon for poster presenters to be present for discussion.

Proposal Formats: Proposals should be submitted online unless special arrangements have been made. Each proposal must include:

1. The presentation title (you will indicate the type of presentation—single paper, session proposal, or poster—on the submission form);
2. A 300-word abstract that outlines the scope, findings, and conclusions of the presentation;
3. Contact information, including name, affiliation (if appropriate), email address, mailing address, and telephone number for each presenter;
4. A brief biographical statement of 150 words for each presenter;
5. The software (incl. version) used to create your presentation and any additional audio-visual requests beyond the standard equipment listed above.

For 90-min. themed sessions or panel discussions, the organizer should submit a session title and a brief description of the theme, along with all above information, together as a group, as prompted on the online submission form. If any of these items is missing, the proposal cannot be considered. Note that the above word counts apply separately to each presenter in a group. All speakers are expected to pay the registration fee (for either the full conference or one-day rate).

For questions, please contact Marty Johnston, SIA Presentations Committee Chair, *mejohnston@stthomas.edu*.

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American sport and pastime in the late 19th to mid-20th c. Her furnishings, down to the kitchen sink, are original. The vessel is currently docked in the lower harbor of New Rochelle.

The *Seneca Chief* shipwreck is located on the bottomlands of Canandaigua Lake. This steam yacht was built by shipbuilder David Bell and launched by the Canandaigua Lake Steamboat Co. in 1887. It is a rare artifact of a class of watercraft that plied inland waters in the Northeastern U.S., representing late-19th-c. development of maritime transportation, commerce, and tourism, as well as marine architecture and engineering on the Finger Lakes. The *Seneca Chief* ran daily recreational cruises, delivered mail to homes and businesses around the lake, and delivered locally grown produce to lakeside towns and villages.

SAVE THE DATE (continued from page 3)

- Buffalo Theatre District is the destination for Broadway shows, plays, and independent productions.

The Conference Planning Committee looks forward to seeing you in Buffalo!

Paris Roselli

HAER NY-345-31, call no. HAER NY,15-BUF,26-.

Fireboat Edward M. Cotter, moored on the Buffalo River, with grain elevators and lift bridge in background. The Cotter began service to the City of Buffalo Fire Dept. in 1900 and was designated a National Historic Landmark in 1996.

CALL FOR NOMINATIONS 2025

Secretary, Treasurer, Two Directors, and One Nominations Committee Member

Attention SIA Members!

This is your opportunity to help maintain the quality, strength, and diversity of leadership that has kept the SIA growing for more than five decades. We have five important positions to fill in the coming year and you can help choose the next leaders of your organization.

SIA's elected officials work for you to carry out the business of the organization. They represent the SIA to others, recruit new members, and plan the future of your Society.

In 2025, there will be five (5) openings: Secretary, Treasurer, two members of the Board of Directors, and one member of the Nominations Committee. We need candidates willing to give their time, knowledge, and experience to the SIA.

This year's Nominations Committee is asking you to identify candidates—friends, colleagues, or perhaps even yourself—who are qualified and willing to serve. (If modesty precludes self-nomination, please find someone to nominate you.) Each candidate must be an SIA member in good standing and must consent to being considered for nomination.

The deadline for nominations is **Wed., Jan. 15, 2025.** If you have any questions or need additional information, please don't hesitate to contact **Ron Petrie,** Chair, SIA Nominations Committee, 1345 Brockley Ave., Lakewood, Ohio 44107-2440; 216-789-2301, *ron@siahq.org.*

Positions Open in 2025:

Secretary (3-year term). Serves as a member of the Board; takes official minutes at Board meetings and the Annual Business Meeting; and maintains official records.

Treasurer (3-year term). Serves as a member of the Board; is the SIA's accounting officer who records and reports on all financial transactions, and uses this data to evaluate the SIA's financial position.

Directors (3-year term). Two (2) of seven director positions are open this coming year. The Board meets approximately four times per year (both in person and online), including during the Annual Conference. Directors govern official business and affairs of the SIA, and often chair committees that oversee operations such as publications, grants, and local chapters.

Nominations Committee Member (3-year term). One (1) of three elected members who assist with recruiting and evaluating nominees and monitoring annual elections, with the assistance of the immediate past president as an *ex-officio* member. It is expected that members will attend the Annual Conference to count ballots, and that each member will chair the committee during the final year of their term. The Chair announces the results of the election at the Annual Business Meeting during the Conference.

All nominations will be reviewed by the Nominations Committee, which will present a slate of candidates to the membership. Each nomination must include the name, address, telephone number, and email address of the person being nominated, the office for which the nomination is being made, and evidence that the candidate consents to being nominated. Once the slate is selected, the Nominations Committee will request a brief biographical statement and a photograph from each nominee.

For summaries of the nomination process and responsibilities of SIA officials, view the SIA Bylaws at *https://www.sia-web.org/about/bylaws/.* If you're unsure about the process or the obligation, please call or write the Nominations Chair at the address above. Current officeholders and their terms are shown below for your reference.

SIA Officers

Fred Quivik, President (2024–2026)
David Vago, Vice President (2024–2026)
T. Arron Kotlensky, Past President (2024–2026)
James Bouchard, Secretary (2022–2025)
Nanci K. Batchelor, Treasurer (2022–2025)

Board of Directors

Martha Mayer (2022–2025)
Tim Tumberg (2022–2025)
John Mayer (2023–2026)
Mary Starbuck (2023–2026)
Christopher Fennell (2023–2026)
Jacob Kaplan (2024–2027)
Anthony Meadow (2024–2027)

Nominations Committee

Ron Petrie (2022–2025)
William McNiece (2023–2026)
T. Arron Kotlensky, *ex officio* (2024–2026)
Lynn Rakos (2024–2027)

TICCIH Representative

Ron Petrie (2024–2027)

Student Travel Scholarships. The SIA awards travel scholarships to full-time students and professionals with fewer than three years of full-time experience. The scholarship stipends are intended to help attendees offset expenses associated with attending SIA events (e.g., airfare, hotel, registration, etc.). To be eligible for a scholarship, the applicant must become a member in good standing. Student memberships are available for as little as $20/year. Applications should consist of 1) a letter demonstrating a commitment to IA from the applicant, and 2) a letter of reference from a faculty member or an individual active in the SIA. For more information, or to apply for the 2025 Annual Conference in Buffalo, N.Y., May 29 through June 1, 2025, please contact Scott See, Scholarship Committee chair: *sfsee@mtu.edu*. Deadline for applications is Mar. 31, 2025.

CALL FOR NOMINATIONS
2025 SIA General Tools Award

The SIA General Tools Award Committee is seeking nominations for the 2025 General Tools Award. Give this committee some work to do, reviewing nominations for distinguished service to industrial archeology. Any SIA member in good standing may make a nomination.

Remember, the General Tools Award is the highest honor the SIA can bestow. It recognizes individuals who have given sustained, distinguished service to the field of industrial archeology. The award is presented at the SIA's annual business meeting.

Here's what we're looking for: (1) the recipient must have given noteworthy, beyond-the-call-of-duty service, over an extended period, to the cause of industrial archeology; (2) the type of service for which the recipient is recognized is unspecified, but must be for other than academic publication; (3) it is desirable but not required that the recipient be, or previously have been, a member of the SIA; (4) the award may be made only to living individuals. Teams, groups, agencies, firms, or any other collective entities are not eligible.

Think of a name, then start a nomination. The committee can help you finish. You can write a statement of 2–3 pages identifying the qualifying accomplishments. Or, write a partial nomination describing one sector of the person's work you know best, with suggestions of others who might know more about the candidate's career. Nominations also may be collaborative efforts submitted by two or three members.

Supplementary material (the candidate's resume, for example) may be added. Nominations must also include the name, address, phone, and email of the nominator.

Information on the award and examples of successful nominations appear on the SIA website for many of the members who have received the award to date: *www.sia-web.org/activities/awards/general-tools-award*.

Previous recipients are Emory Kemp (1993), Robert Vogel (1994), Edward Rutsch (1995), Patrick Malone (1996), Margot Gayle (1997), Helena Wright (1998), Vance Packard (1999), Eric DeLony (2000), Robert Merriam (2001), Charles Parrott (2002), Alex Barbour (2003), Charles K. Hyde (2004), Lance Metz (2005), [no award given in 2006], Patrick Martin (2007), Chris Andreae (2008), Carol Poh (2009), Robert Gordon (2010), Richard Anderson (2011), Jane Mork Gibson (2012), Bob Frame (2013), Jet Lowe (2014), [no award given in 2015], Duncan Hay (2016), Patrick Harshbarger (2017), Fred Quivik (2018), David Simmons (2019), Brian Shovers (2020), Vern Mesler (2021), Louise Trottier (2022), [no award given in 2023], and Michael Raber (2024).

The General Tools Award was established in 1992 through the generosity of Gerald Weinstein [SIA], then chairman of the board of General Tools & Instruments Co. LLC. High Road Capital Partners acquired General Tools & Instruments in Feb. 2014 and have been pleased for the SIA to continue using the company's name on the award. The award is funded by the Abraham and Lillian Rosenberg Foundation. The Rosenbergs founded General Hardware, the predecessor to General Tools. The award consists of a citation, a commissioned sculpture ("The Plumb Bob"), and a cash award.

Please email or call Timothy Tumberg (*Timothy.A.Tumberg@usace.army.mil*, 651-468-7726) if you are interested in making a nomination for 2025. Nominations are due on Mar. 31, 2025.

SIA Implements New Online Membership Management System

SIA members who have already renewed their memberships online for 2025 (thank you for renewing!) likely noticed a change in the way online renewal looks and functions. The new online membership registration and renewal page, with its prominently displayed photograph of the Troy Gasholder House (HAER NY-2) is the most outwardly visible aspect of a new membership management system, NeonOne, which the Society has implemented.

From headquarters' perspective, the major benefit of this system is its effective automation of a wide range of tasks. Processing membership renewals and conference registrations were prominent among these, and there will now be more time at headquarters for work that is more interesting than data entry.

The system also has benefits for SIA governance, giving the SIA leadership ready access to information about membership, finances, and other aspects of organizational operations.

For members, the new system offers improved features like an automatically updated member directory, easier access to

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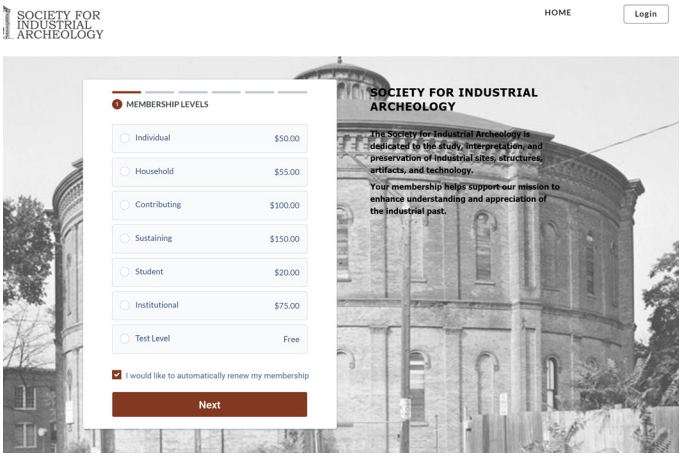

Screen capture of NeonOne membership registration/renewal page with background image of the Troy Gasholder House (HAER NY-2).

SOCIETY FOR INDUSTRIAL ARCHEOLOGY
NEWSLETTER

PUBLICATIONS OF INTEREST

Vol. 53, No. 4 Fall 2024

COMPILED BY
Mary Habstritt, New York, N.Y.; Patrick Harshbarger, Wilmington, Del.;
Daniel Schneider, Lake Linden, Mich.; and Marni Blake Walter, SIAN *editor, Westmoreland, N.H.*

GENERAL INTEREST

- **IA Review**, Vol. 46, No. 1 (2024) includes Ian West, *Editorial*; Rhys Morgan, Libby Langlands, Tom Henderson, and Richard Lewis, *Rediscovering Copperopolis: The Hafod Plate Rolling Mill, Swansea*; Ian Miller, *Salford Twist Mill: Uncovering an Iconic Textile Factory*; David Barker and Richard A. Gregory, *Resolving an Enigma: The Discovery of a Continuous Annular Tunnel Kiln at the Royal Doulton Potteries, Burslem, Stoke-on-Trent*; Róbert Antal, František Kolář, Michaela Ryšková, and Hynek Zbranek, *Archaeological Traces of Pre-Industrial and Industrial Dyeing Workshops in the Czech Republic*; Robert Carr, review of *Bricks of Victorian London: A Social and Economic History*, by Peter Hounsell; and Michael Messenger, review of *The Coming of the Railway: A New Global History, 1750–1850*, by David Gwyn (see listing herein under Railroads).
- **Revista de Historia Industrial—Industrial History Review (RHI–IHR)** often includes articles of IA interest (*revistes.ub.edu/index.php/HistoriaIndustrial*). The current issue, Vol. 34, No. 91 (July 2024), explores guilds, collective action, and social capital through a case study in the 18th-c. Northern Iberian region of Navarre; recycling and reusing during wartime, focusing on the Spanish Civil War; and business strategies for internationalization, wages, and the labor market under dictatorships, specifically during the Franco regime in Spain.
- **TICCIH Bulletin No. 104A and 104B** (2nd Quarter, 2024, published in two parts). **No. 104A** includes Miles Oglethorpe, *Entering a New Era*; Mirhan Damir, Pakinam Zeid, and Heike Oevermann, *Documenting Industrial Legacies in Egypt through the Vantage Point of 'Sharing Heritage'*; Paulo Oliveira Ramos, Azulejo *Facades and Industrial Heritage*; Jan Zikmund, *A New Project of the Research Centre for Industrial Heritage at the Faculty of Architecture of the Czech Technical University in Prague*; Leonor Medeiros and Conceição Serôdio, *Where to Next? Big Machinery's New Life after the Factory*; Sandra Pichlak-Czop, *Industrial Heritage as an Urban Connector: Example of Pokój Coal Mine in Ruda Śląska*; Christelle El Hage and Yara Rizk, *Tripoli Station: A Reflection of the Enduring Community Strength of Tripolitans*; Kristina Pandža, *Rijeka and Its Industrial Heritage*; Derek Latham, *Belper Mills: A Historic Industrial Complex 'at Risk'*; book reviews: *The Architecture of Steam—Waterworks and the Victorian Sanitary Crisis*, by James Douet, reviewed by Norbert Tempel; and *Guillermo Kahlo: Fotógrafo de Fundidora*, by Alberto Casillas Hernández. **No. 104B** includes Miles Oglethorpe, *A Window into the Past*; Roine Viklund, *TICCIH World Congress in Kiruna, Sweden, 2025*; Hubert Schnedl, *The Virtual Rotunde: Bringing Industrial Heritage Back to Life*; Alfredo Cruz, *The Detroit Industry Murals (1932–1933) in the Dawning of the Automation Dream: 90 Years*; Nadine Berthelier, *Water Towers of France*; Lou Renwick, *Armstrong's Silo Illuminates Its Cragside Heritage in Northumberland England*; Robin Debo and Bart Vanacker, *Toppled Statue from John Cockerill Monument*; Mostafa Abo Shamia, *The Remains of Carver's Ginning Mill Stand Witness to the History of Cotton in Al-Mahallah Al-Hubrah*; a book review: *The Willington Waggonway, A Rival to the Stockton and Darlington*, by Les Turnbull, reviewed by Rick Smith; and upcoming events listings.

IRON & STEEL

- Youngstown Steel Heritage / J&L Narrow Gauge Railroad. **Where We Have Been and Where We Are Going**. *YouTube* (Oct. 20, 2024). *www.youtube.com*. A discussion at the McDonald 14 mill about Youngstown Steel Heritage, their past preservation efforts, and future plans.

MINES & MINING

- Ron Pearson, Ric Case, and Vagel Keller. **Four Days In the Archives Part 3: Proposed Robertsdale Mine Trestles**. *TT* Vol. 35, No. 4 (Winter 2023), 5–12. An update on the continuing archival search for the lost Robertsdale (Pa.) coal mines and coal cleaning plant. Recent research shows facilities of the Rockhill Iron and Coal Co., both existing at the time and proposed. Includes historic maps and photos, and a timeline for early Rockhill coal mines.

WATER TRANSPORT

- Anthony F. Hall. **The Lives of Cannalers: Lake Champlain's Sailing Canal Boat Families**. *New York Almanack* (Oct. 6. 2024). *www.newyorkalmanack.com/2024/10/lake-champlain-canal-boats/*. The Champlain Canal, completed in 1823, connected Lake Champlain with the Hudson River and the Erie Canal and opened the Champlain Valley to the national and international marketplace. Recent research adds to the history of the family-owned and operated sailing canal boats—vessels with collapsible masts unique to this

transportation corridor. Describes discoveries from several underwater excavations of shipwrecks by archeologists at the Lake Champlain Maritime Museum in Vergennes, Vt., shedding light on the people who lived and worked on the canal boats and the communities that prospered from the canal trade.

Railroads

- David Gwyn. **The Coming of the Railway: A New Global History, 1750–1850**. Yale Univ. Pr., 2023. 416 pp., illus. $35, hardcover or ebook. Tells the story of the early iron railway from a global perspective. From the 1750s onward the introduction of iron rails led to a dramatic technological evolution. Documents the combination of ruthless enterprise, brilliant experimenters, and international cooperation with which railway construction rapidly expanded across the world, and its resulting outsize social, political, and economic impact.

Bridges

- Kimberly Coleman. **New Mexico**. *ASPIRE* (Spring 2024), pp. 44–45. Overview of the activities of NMDOT's Bridge Bureau, which manages an inventory of 2,980 state-owned bridges. Roughly a third are concrete or prestressed-concrete girder bridges. Topics include the history of concrete bridges, the use of ultra-high-performance concrete, accelerated bridge construction, and emergency repairs. The state's oldest concrete bridge is an historic arch bridge, Bridge Street over Gallinas River in Las Vegas, built in 1909.
- Lucas Day. **Ithaca Seeking New Owner of North Cayuga Street Bridge**. *Finger Lakes Daily News* (Sept. 29, 2024). *www.fingerlakesdailynews.com*. The City of Ithaca and the N.Y. State Dept. of Transportation are seeking parties interested in taking ownership of the North Cayuga Street Bridge, a single-span, Warren Pony Truss structure that is currently located across Fall Creek. The bridge, built in 1934, is eligible for listing in the National Register of Historic Places (NRHP), but is structurally deficient, with advanced deterioration to critical components of the structure.
- Gregg Freeby. **The American Segmental Bridge Institute: 35 Years of Continuous Improvement.** *ASPIRE* (Spring 2024), pp. 36–37. The first post-tensioned, concrete, segmental, box-girder bridge built in the U.S. was the JFK Causeway (1973) in Corpus Christi, Tex. The ASBI, formed in 1988, has been influential in developing the bridge type through seminars, training, and an annual convention.
- Colleen Gardina. **Truss: Bird or Bridge?** *Inside Adams: Science, Technology & Business Blog* (Sept. 20, 2024). *blogs.loc.gov/inside_adams/2024/09/truss-bridge*. A summary of truss bridge design and development, beginning in the 13th c., with descriptions and illustrations of several types and a list of further reading.
- Monica Schultes. **Simpson Gumpertz & Heger Thrives on Challenging Projects.** *ASPIRE* (Spring 2024), pp. 6–9. Overview of the engineering firm's past and recent work. Howard Simpson, Werner Gumpertz, and Frank Heger, three MIT professors, founded SGH in 1956. Considered experts on the causes of structural failures, the firm has investigated such tragedies as the World Trade Center collapse in 2001 and Boston's MBTA Haymarket Station tunnel collapse in 2022. Among SGH's assets is the Applied Science and Research Center, a 13,500-sq.-ft. lab, at its headquarters in Waltham, Mass.

Agriculture & Food Processing

- Susan Landis. **"Ketchup" with Pittsburgh's H.J. Heinz**. *Pennsylvania Historic Preservation Blog* (Apr. 18, 2018). *pahistoricpreservation.com/ketchup-pittsburghs-heinz*. A brief history of Henry J. Heinz and H.J. Heinz Co., the condiment manufacturing company he started in Pittsburgh in the late 19th c. Discusses the architecture of the factory complex and the amenable labor conditions created for employees' well-being; includes images from the Pa. State Archives.
- Joseph Webb. **William H. Luden–Luden's Candy**. *GoReadingBerks* (n.d.). *goreadingberks.com/william-h-luden-ludens-candy*. William H. Luden, developer of the Luden cough drop, launched a candy business in 1879 in the rear of his father's jewelry shop in Reading, Pa. In 1936, he created the 5th Avenue candy bar, now manufactured by the Hershey Co. A thorough history of the company and its industrial buildings, with numerous photos. Also includes a link to a video showing candy production for Luden's 100th anniversary: *www.youtube.com*.

Abbreviations:

IA Review = Journal of the Association for Industrial Archaeology (U.K.), *www.industrial-archaeology.org*.
NYT = *New York Times*
SCA = Society for Commercial Archeology
TICCIH = The International Committee for the Conservation of the Industrial Heritage, *https://ticcih.org*.
TT = *Timber Transfer*. Published by Friends of the East Broad Top. Avail. with membership. $30/yr. *www.febt.org*.
WSJ = *Wall Street Journal*

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With Thanks.

Publications of Interest *are compiled from books, articles, and digital media brought to our attention by you, the reader. SIA members are encouraged to send citations of new and recent books, articles, CDs, DVDs, etc., especially those in their own areas of interest and those obscure titles that may not be known to other SIA members. Publications of Interest, c/o* Marni Blake Walter, Editor, *SIA Newsletter*, 11 Esty Rd., Westmoreland, NH 03467; *sianeditor@siahq.org*. ■

Eric DeLony Industrial Heritage Preservation Grant Fund
Application Deadline: Mar. 1, 2025

The SIA offers grants from the Eric DeLony Industrial Heritage Preservation Grant Fund from $1,000 to $3,000 for the study, documentation, recordation, or preservation of significant historic industrial sites, structures, and objects. Funds may be used for a range of projects including, but not limited to: increasing public awareness of preservation efforts, photography, videography, preparing inventories, and developing measured drawings of extant significant industrial sites, structures, maritime facilities, and industrial artifacts. Grant recipients must agree to prepare a written summary of their project suitable for publication in either the *SIAN* or for *IA*, the Society's scholarly journal.

Grants are open to qualified individuals, independent scholars, nonprofit organizations, and academic institutions. Organizations are preferred over individuals. Substantial participation from state, county, or local history organizations is encouraged, although such groups do not necessarily need to be a sponsoring agency.

For info on how to apply: *www.sia-web.org/activities/preservation-grants*

CHAPTER NEWS

On July 27, **Northern Ohio** (NOCSIA) enjoyed a daylong outing in Seville, Ohio, a town of some 2,000 residents, 40 mi. south of Cleveland. The group met for breakfast at the Well Cafe, located in the Seville Inn, which traces its origin to a tavern opened in 1823, though the current structure was not built until 1895. After breakfast, everyone carpooled to the Northern Ohio Railway Museum, just outside of town, to see Ohio's finest collection of restored interurban cars. From the 1890s until the 1930s, a light-rail network connected the major cities of Ohio and adjacent states. After lunch, Jonathan Hacker of the Seville Preservation Project led a guided tour of downtown Seville, with emphasis on past industrial activity and current building restoration projects. Many of us were surprised to learn Seville once had a thriving tobacco industry. The walking tour ended at the Seville Historical Museum, where we learned more details about Seville's past, including the true story of Captain Martin Bates and his wife Anna—two giants nearly eight ft. tall who lived in Seville in the 19th c.

Ron Petrie

Steve Titchenal

NOCSIA member about to board a restored interurban car for a demonstration ride at the Northern Ohio Railway Museum in Seville, Ohio.

Northern New England will offer a "virtual tour" for this year's fall/winter tour. The subject will be the construction and operation of the Cog Railway that climbs the west side of Mt. Washington. The tour will feature an illustrated report in the SIA's journal *IA*, Vol. 20, 1994. Chapter members should watch their email and the chapter newsletter for further information.

On June 29, **Southern New England** visited Saugus Iron Works National Historic Site near Boston, Ma., the site of the first successful, integrated iron works in Colonial America. It operated from 1646 to 1670, producing pig iron, cast iron, and wrought iron by refining bog ore from nearby ponds, swamps, riverbeds, and bogs. A National Park Service guide led a tour of the site, and Betsey Dyer gave a talk about the microbiology of bog iron. ■

ONLINE MEMBERSHIP *(continued from page 6)*

member benefits such as free downloads of *IA* journal articles via JSTOR, and the ability to self-edit your member profile. Current members can access these features by logging into their membership account at *https://sia.app.neoncrm.com/log-in* using the email address associated with their membership.

The new system has some operational tradeoffs. For example, donating to more than one of the SIA's special funds (Eric Delony Industrial Heritage Preservation Grant, Student Travel Scholarship, Vogel Prize, General Fund) is a more cumbersome process. We're working with NeonOne to improve this. In the meantime, please contact me at SIA headquarters (906-487-1889; *sia@siahq.org*) if you need help allocating a donation. Thank you for your patience and generosity!

And please contact headquarters if you have questions about NeonOne, or need help renewing your membership or logging into your online profile. I'll be glad to use some of my time that's been spared through automation to help you out. I also plan to host an online orientation session for the new system on Zoom in January, details forthcoming via email.

Daniel Schneider, SIA Headquarters

"The Year Without a Christmas": Saltville, Virginia, Muck Dam Disaster Anniversary

Christmas Eve 2024 marks the 100th anniversary of the Saltville Muck Dam Disaster, the deadly—but relatively unknown—collapse of an industrial waste impoundment at the Mathieson Alkali Works at Saltville, Va.

A previous SIA *Newsletter* article, "IA in Art: Panoramic Industrial Photographs" (*SIAN* Vol. 41, No. 2, Spring 2012, pp. 4–5), by this author featured the accompanying historic image showing that impoundment, discussed in the context of historic industrial landscape photography and panoramic cameras. The location was unidentified at that time, and no readers responded to a location query. In the article I commented that "the closest dwellings are situated almost under the toe of the tailings dam, a juxtaposition that suggests an imminent Johnstown Flood–like disaster." Unfortunately, that observation proved correct. I enlisted the help of a geospatial analyst who does things like locate North Korean nuclear weapons, and they quickly determined the location in question was Saltville, Va.

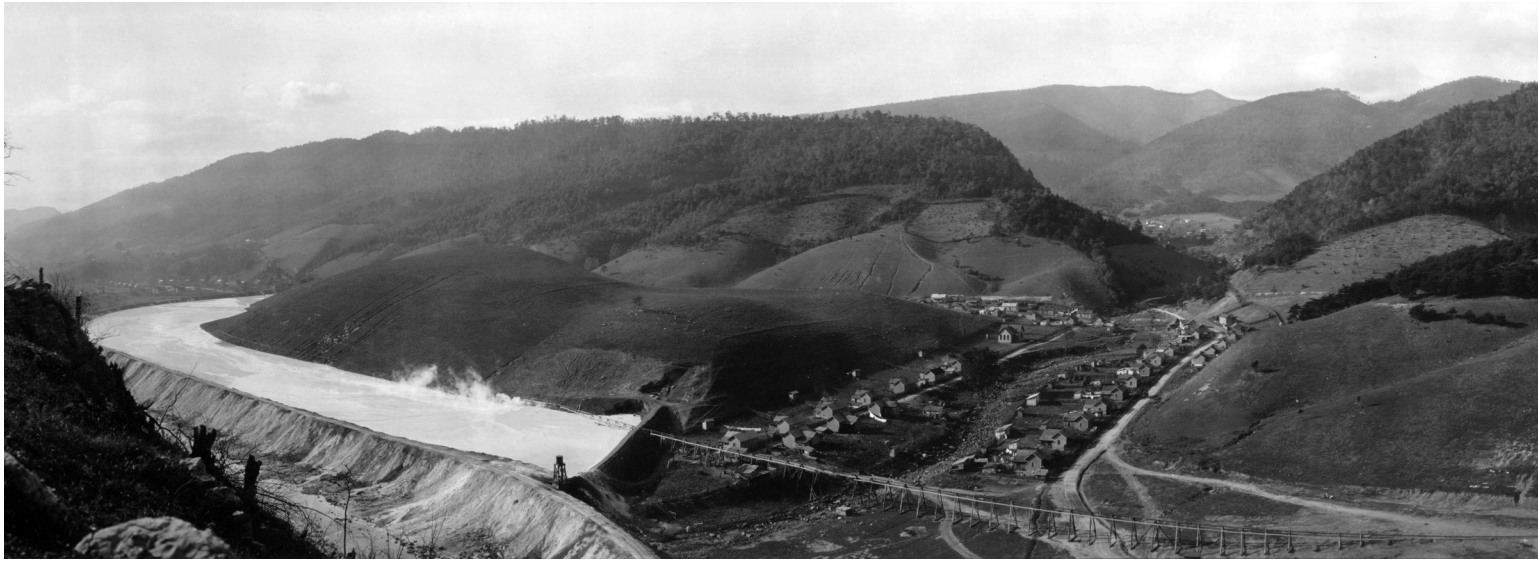
Saltville is located in Smyth County in southwestern Virginia in the Clinch Mountains, which include folded limestone layers hosting gypsum and salt deposits that supported regional industries beginning in the late 18th c. The Saltville area was a major antebellum salt and plaster production center. During the Civil War, the heavily fortified Saltville saltworks was a critical salt source for the Confederate army.

In 1892, Mathieson Alkali Works purchased Saltville's Holston Salt and Plaster Co., and with American capital and imported British workers built a new salt plant. Mathieson established a paternalistic company town that quickly expanded around the works. In 1908, Mathieson expanded the works and their product line, using salt and limestone to produce a variety of alkali chemicals including baking, bicarbonate, and caustic soda. By 1924, 16 years of alkali chemical production had left a massive impoundment of waste tailings, locally called "muck," extending along one side of the North Fork of the Holston River. Mathieson pumped the tailings in a water slurry through a launder pipe from the plant to the impoundment, forming a "muck dam" that followed and eventually formed the bank along one side of the river.

Directly across from the long white tailings bank was Palmertown, a small worker suburb of Saltville proper. On Christmas Eve 1924, heavy rains saturated the tailings, and just after 8:00 p.m. the dam collapsed, sending a 30-acre wall of alkali tailings across, up, and down the river in the darkness, sweeping away houses and killing 19 Palmertown residents, 12 of them children. The tailings surged a quarter of a mile upstream, destroying much of the settlement of Chinch Row, which had to be abandoned. In addition to the dead, many were injured, and many of those suffered alkali skin burns. Unfortunately, Mathieson's many Saltville company town amenities did not include a hospital. Alkali waters killed fish 40 miles downstream in Kingsport.

According to an account of events that night, "All were unconscious, as were their forebears, of the huge black wall that faced the town across the river and held in leash the ferocious monster that was so soon to destroy them. With demonic fury, at a few minutes past eight o'clock, it suddenly broke and a wave of muck nearly a hundred feet high and over three hundred feet wide swept into the river and over a hill and through the village, sweeping houses, barns, trees, and everything in its path, or else burying them to a great depth under its white slime."

The next day, "the whole landscape was covered with



Author's collection.

Circa 1920 Haines Photo Co. panoramic photograph of Saltville, Va., showing, from right to left, the Mathieson Alkali Works plant, the tailings launder sweeping in a curve across the center, the muck dam built along the bed of the North

a thick coat of muck which gave an appearance not very unlike that of a great snow field. Houses stood halfway up in the white alkali; debris strewed the surface, while drowned animals were lying on every hand of what had once been a fine apple orchard; nothing remained except a few trees which were completely white-washed by the flying muck spray to their topmost branches. Others could be seen farther down the bottom, dragged out by the roots as one might pull weeds from a garden. Huge masses of the wall of the dam, as large as a barn and as tall as a church spire, stood where once had been the homes of men, while the great yawning gap of the dam itself, beyond the river, gave awe inspiring evidence of the death-dealing monster it had held in leash."

The Saltville Muck Dam Disaster was largely considered a natural event caused by heavy rains. Mathieson constructed a new and improved tailings impoundment. Saltville's population peaked at 2,964 in 1930. The motto of the intertwined company and town was "Serving America with the Salt of the Earth." Mathieson Alkali Works changed its name to the Mathieson Chemical Co. in the 1930s. In 1954 Mathieson merged with the Olin Corp. to form the Olin-Mathieson Chemical Corp. In 1961 Olin-Mathieson built a hydrazine plant at Saltville that produced chemical propellants that fueled NASA's Apollo Program moon rocket engines. In 1964, the company was renamed the Olin Corp. In 1970, Olin announced it was ending Saltville operations, and the plant—and much of Saltville's economy—shut down by 1973.

The land occupied by the Saltville Muck Dam has been reclaimed, but the dam's length and legacy are still visible today in the landscape along the North Fork of the Holston River. The Museum of the Middle Appalachians in Saltville is mounting a Muck Dam Disaster exhibit and plans an event and monument installation commemorating the event's centennial this December.

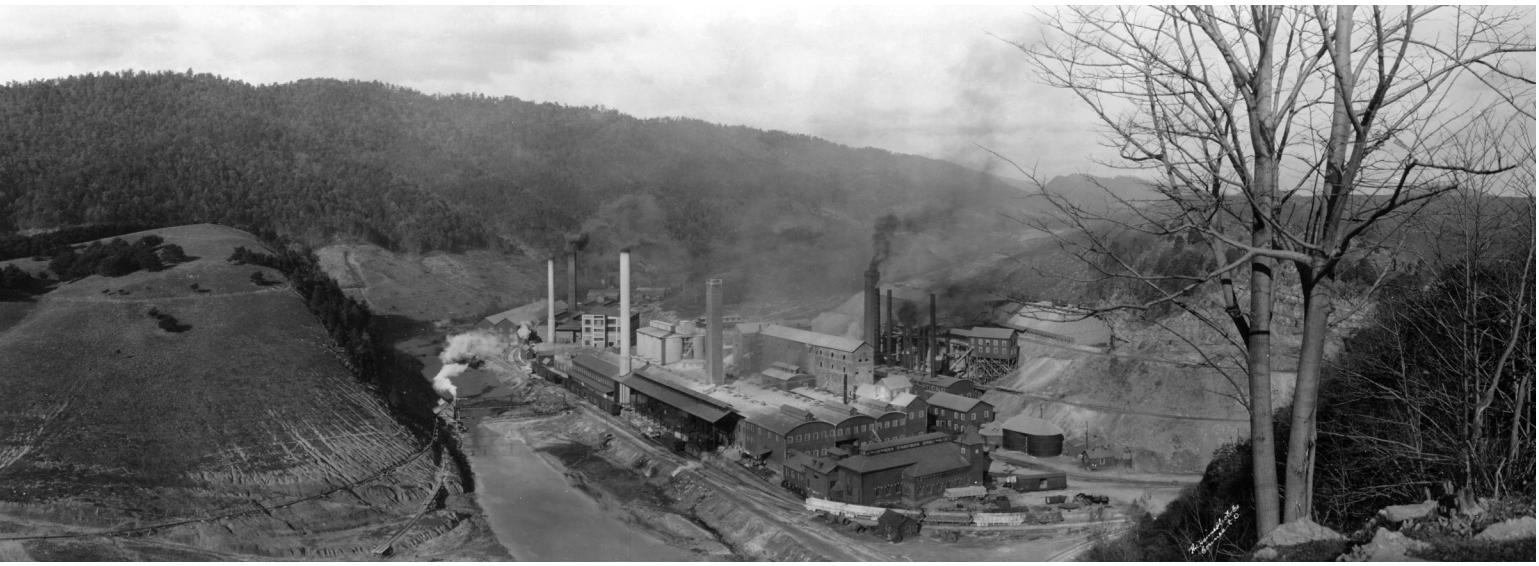
Matthew Kierstead

IA ON THE WEB

Two podcasts about railroads: **American Railroad** (*www.silkroad.org/american-railroad-podcast*). Weaves music, storytelling, and historical analysis from railroad communities across the U.S. Episodes feature the Chinese laborers' crucial role in Calif.'s railroads, the tragic tale of Black railroad workers in N.C., the intersection of music and labor history in N.Y. and Boston, as well as the musical traditions of the Lakota community in Standing Rock Reservation. Musician Rhiannon Giddens hosts the five-episode series. **American Railroading Podcast** (*www.americanrailroading.net*). Host Don Walsh, an industry professional with over 25 years of experience, explores a wide range of topics, from regulatory items and the challenges the industry faces to passenger rail excursions and recognizing U.S. Armed Forces Veterans in railroading. Twenty podcast episodes and videos are available.

National Center for Wood Transportation Structures (*www.woodcenter.org*) offers a wealth of information and resources about covered bridges and other wood transportation structures. Includes a video library, world guide to covered bridges, links to demonstration projects, and a library of presentations and publications dating back to 1905.

IA on the Web *is compiled from sites brought to the editor's attention by members, who are encouraged to submit their IA Web finds:* sianeditor@siahq.org ■



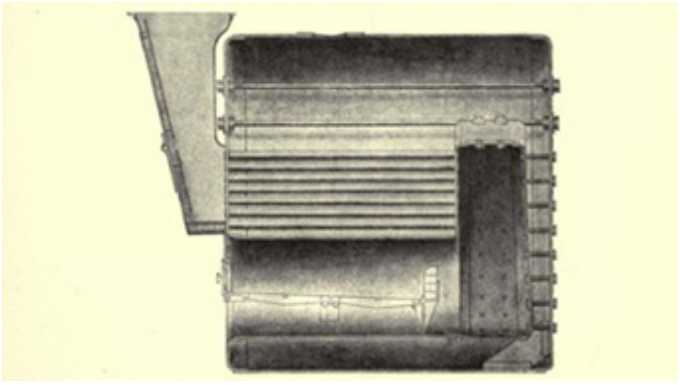
Fork of the Holston River, and, just visible in the distance at far left, the hamlet of Palmertown that was obliterated in the Christmas Eve 1924 Muck Dam Disaster.

Advances in Marine Boiler Design, 1890–1940

The following is a preview of a research article to appear in a forthcoming issue of IA: The Journal of the Society for Industrial Archeology. *Watch for that article for an expanded discussion and many illustrations.*

S.H. Leonard, Marine Engineer, wrote in 1890 that, "One of the most important questions arising in connection with marine machinery at the present time is that concerning the improvement of the steam generator." That same year, U.S. Navy Assistant Engineer F.C. Bieg published extracts from a paper by Imperial German Navy Engineer Carl Busley in the *Journal of the American Society of Naval Engineers (JASNE)* titled, "T`he Development of the Marine Engine in the Last Decades." Busley wrote that two types of developments were made: improvements in the manner of using steam and in generating steam. Busley's steam generator improvements consisted of forced draft, by exhaust and by pressure; heating the air used for combustion; thorough heating of the feed water; the use of distilled water to supply the waste in feed water; and water-tube boilers.

Simultaneously understated and prescient, these two engineers together articulated one of the most important required developments in adapting steam power to marine use: boiler design. Busley's list of "improvements in the manner of generating the steam" was as rich an area of exploration in 1940 as it was in 1890. Arguably more important than the engines (as the steam must first be created before it is to be used), boilers represented the heart of the ship. Without boilers, ships could not propel themselves, generate electricity or hot water, or cook food. Warships could not operate turrets or ammunition hoists, and critical range-keeping and fire-control systems all relied on power generated by the ship's service turbo generators. A WWII-era U.S. Navy Damage Control manual lists the first responsibility of the Engineering Officer of the Watch in General Quarters as "[meeting] all speed demands of the Commanding Officer," followed shortly thereafter by "[routing] live steam in the main and auxiliary steam lines to the main engines and all of their auxiliaries, and the auxiliary exhaust." From the outset, reliable and durable boiler design was crucial to bringing the technology into widespread use.



From Kennedy, Modern Engines, *47.*

Scotch-type marine boiler.

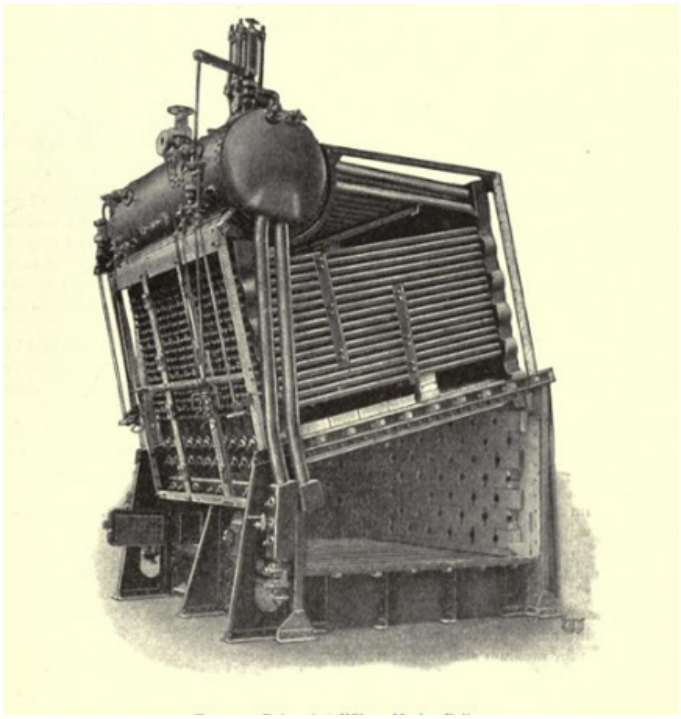
The marine industry was one of the last to widely rely on steam power; marine boiler design accordingly reached much higher levels of refinement than other areas of use. Due in large part to the poor efficiency of reciprocating engines of the time, steam was the only way to attain high speeds with a modicum of fuel economy.

Periods of Development

Developments occurred in two distinct time periods: 1890–1910 and 1910–1940. An examination of the *JASNE* from 1890–1910 revealed an extraordinary array of operating mechanisms and designs, but engineers generally focused on developing workable designs and comparing the relative merits of fire-tube and water-tube boilers at increased power outputs. Research also centered on mechanical plant packaging and fuel efficiency. By 1910, boiler design had crystallized into several distinct forms, each with their own advantages and disadvantages. Boiler design was therefore simply a matter of selecting the correct design for a vessel's intended use and displacement. After 1910, research centered around developing engineering plants with greater power levels and thermal efficiency. Together, these periods provide a fascinating window through which to view the rapidly advancing technology of the late 19th and early 20th centuries.

1890–1910: Foundations

From 1890–1910, researchers worked on foundational principles. Boilers can be divided into two types: fire-tube boilers and water-tube boilers. Both types consist of boiler



From Kennedy, Modern Engines, *47.*

Babcock & Wilcox cross-drum marine-type boiler. Notice the steam drum and water tubes at right angles to each other, from which the boiler type derives its name.

tubes, steam drum, feedwater drum, feed water inlet valve, steam outlet valve, and shell plating. In the case of oil-fired boilers, burner tubes are located beneath the tubes to allow heat to rise and radiantly heat the tubes; coal-fired boilers have a simple furnace beneath, into which the stokers shovel coal around the clock. Fire-tube boilers essentially consist of a large tank of water that has tubes passing through it which contain fire. Water-tube boilers are the opposite: they have a "tank" (furnace) filled with fire, and the tubes that pass through contain the water. Both systems have distinct advantages and disadvantages.

Fire-Tube vs. Water-Tube Boilers

Fire-tube boilers are simpler to construct and maintain, and they operate at lower pressures. Typically, these found use in merchant vessels or those that did not require high speeds. Water-tube boilers were used in large, high displacement vessels such as warships, ocean liners, or other vessels that required high speeds and immense amounts of steam. Fire-tube boilers for both terrestrial and marine use were of the "Scotch" type, which consisted of a large-diameter water drum crisscrossed by the fire tubes. A variant of this type called the "return flue" boiler divided the water drum into two parts with a serpentine flue to direct the combustion gases towards the rear, allowing greater heating surface area without the need for a double-ended furnace. Some variants of this type made up to three passes with the combustion gases for even greater efficiency.

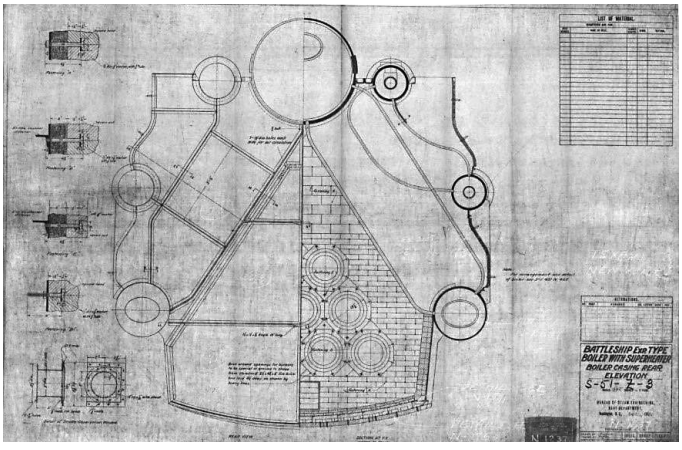
By contrast, water-tube boilers demonstrate an incredible variety of designs and operating mechanisms. Three types of water-tube boilers are discussed here: three-drum A-type express boilers, cross-drum water-tube boilers, and cross-drum separately fired superheater boilers. Although the paths of combustion gases and water in these boiler types vary, their general operating principles remain the same. When in operation the intense heat inside the furnace heats the water which rises into the steam drum and vaporizes into steam. From there it exits the steam drum where it passes to the engines, then to a condenser, then a feedwater deaeration tank, and is then pumped under pressure back into the water drum. Later ships with more advanced propulsion plants added additional components to the loop.

The system is a closed loop but since ships relied on steam for all functions, any time a check valve was opened or the ship's whistle operated, some steam and therefore feedwater was lost and needed to be replenished. Accordingly, ships also had vacuum distillation equipment installed to create purified boiler feedwater that was free of mineral impurities which may deposit themselves on the inside of boiler tubes and cause hot spots and dangerous ruptures. Essential to the boiler's safe operation is the formation of a natural convection current that carries hot water up to the surface and cooler water down to the bottom of the tubes. Anything that impacted this delicate balance had the possibility to cause hot spots and tube ruptures.

Marine boiler design up until 1910 was dictated by physical dimensions, mass and displacement, ease of maintenance, throttle response, and overall steam capacity required by the ship. Water-tube boilers used space much more efficiently than fire-tube boilers; although the overall physical size of two examples of each type may be comparable, the individual parts of a water-tube boiler are significantly lighter while retaining the same level of safety. Leonard writes that "the water in a tubulous boiler averages from 5–15% of the weight of the empty boiler, while in the Scotch type the average is from 60–65%." This meant that a smaller reservoir was needed, greatly simplifying mechanical plant packaging and freeing up valuable displacement that could be put towards other, more strategic, uses. Fire-tube boiler design remained relatively static with small degrees of modification generally centered on increasing tube heating surface by increasing the number of water tubes.

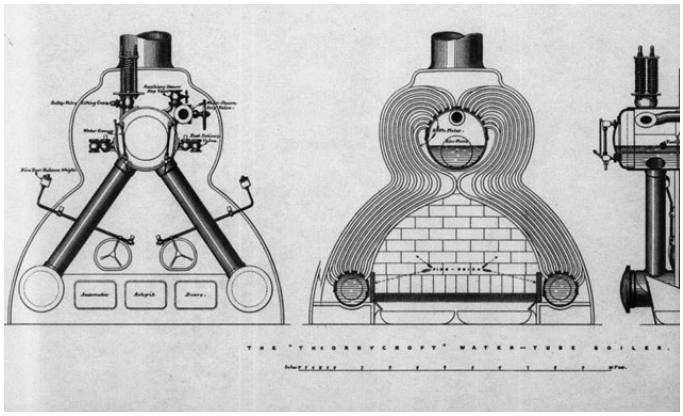
Prior to 1910, engineers experimented with the most efficient and easy-to-service tube configurations. These occurred in two types: drum-type boilers and A-type boilers.

(continued on page 14)



Courtesy Univ. of North Texas Libraries

Diagram of the Dyson A-type express boiler as designed for the battleship USS* South Dakota. *As designed, these boilers contained oil-fired superheaters which were later removed after that class of battleships was cancelled. They were later fitted to USS* Texas *during its mid-1920s refit and conversion to fuel oil.



From Leonard, "Tubulous Boilers," 63.

Diagram of the Thornycroft water-tube boiler. The uppermost center circle is the steam drum, the two circles on the bottom are the feedwater drums, the steam and exhaust valves are at the top of the A, and the downcomers and feedwater inlet valves are at the bottom of the A. Notice that the downcomers are located outside the shell plating to avoid reheating the feedwater.

Marine Boiler (continued from page 13)

Drum-type water-tube boilers such as the Belleville type, developed around 1890, stacked several rows of boiler tubes atop one another and inclined them slightly to vertical to encourage convection current formation. First entering use with the French navy, USN Chief Engineer Benjamin Isherwood wrote that "The boiler is Mr. Belleville's latest design. The ash pit, the furnace, the tubes containing the heating surface, the uptake, the chimney, etc., are placed immediately above one another, and lie within the same horizontal rectangular area of the furnace and its walls." A second type of water-tube boiler called the A-type was developed as well. True to form, the A-type boiler consists of two water drums located at the legs of the A, with a large, combined steam drum in the middle of the A. The furnace and burners were located between the legs of the A, and the whole apparatus enclosed with shell plating.

Post-WWI Developments

By the late 1920s and early 1930s, steam power had been rendered obsolete, except in the marine industry where boiler design had been standardized. The internal combustion engine was still in its infancy, with large engines almost entirely relegated to stationary power generation, pumping, or other forms of heavy machinery. Part of the issue lies in the relative efficiencies of diesel and steam propulsion. At the time, steam propulsion was significantly more powerful on a horsepower-per-pound basis than diesel power. Revolutions in warship design also required advances in marine engineering which then filtered down to the merchant shipping industry.

An examination of the *JASNE* from 1910–1940 revealed that marine engineers increasingly focused on improving designs of auxiliary boiler equipment such as air heaters and economizers, superheaters, boiler tube configurations, and types of fuel oil, while the designs of boilers themselves heavily depended on the type of ship they would be installed on. Marine boiler technology had reached a high level of refinement by the mid-1930s; its heyday was only to last another 30 years or so, when the technology was rendered obsolete by cheaper and more efficient reciprocating engine technology.

By the late 1920s, marine boiler design had crystallized with the industry settling on four general forms: Scotch boilers, cross-drum water-tube boilers, three-drum express type boilers, and three-drum separately fired superheater boilers. All came with their own benefits and drawbacks and were specified for different types of ships. Whereas a moderately sized merchant ship would require only moderate steam pressure, volume, and speed and would be well served by a Scotch boiler, a modern warship such as USS *Colorado* (BB-45, commissioned in 1923) needed to steam at 21 knots and power her entire complement of life support and fire control systems—making the greater steam generating capacity of a three-drum express-type boiler necessary. The choice of boiler was highly dependent on the purpose for which the ship was built and the requirements placed on its steam generating capacity.

Scotch Boilers

The single most common type of boiler in service in the late 1920s was the Scotch boiler, which was a variant of the fire-tube boiler that included large diameter tubes for efficient heating as well as return piping to admit the condensed steam back to the system to be reboiled and recycled. One of the drawbacks of the Scotch boiler was its large weight. As early as the 1890s, marine engineers knew that operating pressures could not be raised much above 150 PSI without seriously increasing the weight of the shell plating and losing a concomitant amount of available displacement. Increasing operating pressure was the primary means of raising power levels; for this reason, power ratings for ships did not increase significantly until the development of high-pressure water-tube boilers. Another issue was their large water capacity. Although Scotch boilers reduced the need for the installation of vacuum distillation equipment to provide purified feedwater, their large water capacity resulted in long lag times from when the boiler was lit to raising an adequate head of steam. When underway they also demonstrated poor throttle response, as the greater thermal mass of the water took longer to respond to increased heat as more burners were lit. Scotch boilers were still useful in stationary power generation applications, as well as locomotive use.

Cross-Drum Water-Tube Boilers

Design revisions in the years leading up to WWI led to the widespread adoption of the cross-drum water-tube boiler. Cross-drum water-tube boilers were one of the first variants of the water-tube boiler that saw widespread marine use. They could be easily adapted to turbine use with the addition of a superheater but were also commonly used in non-superheated, reciprocating engine applications due to their rapid throttle response and prolific steam generating capacity. The name "cross-drum" refers to the configuration of the steam drum and water tubes: they are perpendicular to one another with the additional benefit of the same steam drum headroom requirements as the Scotch boiler because the drum is perpendicular to the tubes instead of parallel.

Heating surface area could also be greatly increased as the surface area did not depend on the size of the water drum. If more heating surface was required more water tubes could be added without much added weight. The vertical inclination of the water tubes created a natural convection current which could be assisted by steam or electric driven pumps. The straight tubes also lent themselves to easy maintenance and repair; few replacement tubes needed to be carried and any ruptured tubes could simply be capped. Their efficiency was generally greater than 80% which led to reduced fuel costs and more economical operation. They were large and heavy for their steam generating capacity, however, which led to the development of the three-drum express-type boiler.

Three-Drum Boilers

Three-drum express-type boilers had been in production for many years prior to their refinement in the early 20th c. Their development depended on the creation of seamless tubing and the adoption of straight tubes after experiments by British shipbuilder Alfred Yarrow. The high pressures encountered in the typical water-tube boiler required a high degree of refinement in tube design and made them

one of the most important and expensive components of the boiler. Labberton writes of the three-drum express-type boiler that it reached its most common form around 1910. Seamless tube production had advanced to the point where "there is no limit to the pressure that can be generated when strength is considered. However, after a pressure of about 800 PSI or thereabouts is reached, trouble starts due to lack of circulation unless more headroom is incorporated than is ordinarily available. The efficiency at full load is approximately 85%." Three-drum express-type boilers were favored where rapid throttle response and low weight were needed with little regard for cost, as they were significantly more expensive to design and manufacture than a Scotch boiler. For these reasons they found use in warships, ocean liners, and other vessels that required extraordinary speeds and amounts of steam.

Straight-tube three-drum express-type boilers evolved out of their earlier incarnations which used curved tubes, such as the Thornycroft design first introduced in the late 1880s. Curved tubes created issues with joining tubes to the manifold and were expensive and difficult to maintain. The answer to the Thornycroft's problems was found in a similar design by British shipbuilder Alfred Yarrow. Yarrow conducted experiments to find the most efficient water tube layout: one that would establish adequate convection currents while also reducing manufacturing and maintenance costs. Yarrow found that, contrary to popular belief, applying heat to a tube in which water descends actually increases the rate of convection via the thermosiphon effect, thus establishing flow characteristics superior to boilers that had their downcomers located outside the shell plating, eliminating external downcomers and allowing the use of straight water tubes. Yarrow realized that these tubes would always remain full of water, completely eliminating the potential for hot spots and solving one of the main issues that the Thornycroft's curved tubes were designed to fix. This constant flow also eliminated the need for additional downcomers, thus freeing up room for more water tubes. Yarrow built his boilers with straight water tubes, which greatly simplified manufacturing and maintenance and developed a means of joining these tubes to the manifold such that thermal expansion was effectively negated. Yarrow boilers developed into one of the most important classes of high-pressure water-tube boilers, with many of them being fitted to ships through the end of the 1930s.

Three-drum separately fired superheater boilers were the last type of boiler developed and consequently the most refined of all the above designs, finding widespread adoption in U.S. vessels constructed prior to and during WWII. Their efficient use of space enabled widespread use of these boilers. Although they occupied a footprint similar to a standard three-drum boiler, they were able to create significantly higher volumes of steam through a radiant superheater that was in direct contact with the flame, leading to significantly higher efficiencies than would have otherwise been found. The degree of superheating was controlled by means of extinguishing burners in the superheater area or using an air damper.

Conclusion

Boiler design was a productive area of research in the early years of the 20th c. Developing reliable and functional boilers was crucial to global commerce and necessitated significant investment on the part of marine engineers and shipyards. Whereas research to 1910 focused on discovering the most efficient tube layouts, research after 1910 shifted to refining aspects of the engineering plant of a modern seagoing vessel. Marine boiler design reached a high level of refinement prior to its demise and provides a fascinating view of the intersection of engineering and commerce.

William Gansle

For additional information:

Carl Busley, "The Development of the Marine Engine in the Last Decades," excerpted by F.C. Bieg, USN, in *JASNE*, Vol. 1, No. 2 (1890): 151–152. The *JASNE* is a particularly invaluable resource by which to analyze the development of marine boiler technology from its early stages in the late 1880s to its eventual demise after WWII.

Benjamin Isherwood, "Ericsson Compound Engine and Belleville Boiler," *JASNE*, Vol. 2, No. 4 (1890): 445.

Rankin Kennedy, *Modern Engines and Power Generators: A Practical Work on Prime Movers and the Transmission of Power, Steam, Electric, Water, and Hot Air* (New York, N.Y.: D. Van Nostrand & Co., 1905), 29.

S.H. Leonard, "Tubulous Boilers," *JASNE*, Vol. 2, No. 2 (1890): 163.

Naval Damage Control Training Center, Handbook of Damage Control, NAVPERS 16191, (Philadelphia, Pa.: 1945), 322.

CONFERENCES & WORKSHOPS

Call for Papers: The Textile History Forum is seeking papers, presentations, and works-in-progress on any aspect of textile research. The Textile History Forum will be held at the Weaver's Croft and Eaton Hill Textiles, 334 Jake Martin Rd., Marshfield, Vt., Aug. 1–3, 2025. The forum is an informal but intense weekend of papers, demonstrations, and works-in-progress open to anyone interested and enthusiastic about textiles, textile tools, the traditional textile process, fabric history, and material culture. Presenters from all areas of textile interests are encouraged to share their research; no formal academic credentials are necessary. Deadline for proposals: **Jan. 15, 2025**. Send abstracts for consideration to S. Rabbit Goody, Thistle Hill Weavers, 101 Chestnut Ridge Rd., Cherry Valley N.Y. 13320, or email to *rabbitgoodythw@gmail.com*. ■

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CALENDAR

2025

***Mar. 26–29:* National Council on Public History (NCPH) 2025 Annual Meeting, Montréal, Québec, Canada**. Info: *https://ncph.org/conference/2025-annual-meeting/*.

***Apr. 30–May 4:* Society of Architectural Historians Annual International Conference, Atlanta, Ga.** Info: *www.sah.org*.

***May 15–18:* Vernacular Architecture Forum Annual Conference, Wilmington, Del**. Info: *www.vafweb.org*.

***May 29–June 1:* SIA ANNUAL CONFERENCE, BUFFALO, N.Y.** See preview article in this issue. Info: *www.sia-web.org*.

***June 11–15:* Mining History Assn. Conference, Gunnison, Colo**. Info: *www.mininghistoryassociation.org*.

***June 12–14:* Construction History Society of America 9th Meeting, Univ. of Va., Charlottesville, Va**. Info: *www.constructionhistorysociety.org*.

***Aug. 1–3:* 2025 Textile History Forum, the Weaver's Croft and Eaton Hill Textiles, Marshfield Vt**. See Call for Papers in this issue. Info: contact S. Rabbit Goody, *rabbitgoodythw@gmail.com*.

***Aug. 25–30:* TICCIH (The International Committee for the Conservation of the Industrial Heritage) 19th Congress: Heritage In Action: Legacies of Industry In Future Making, Kiruna, Sweden**. Info: *https://ticcih2025-kiruna.se*.

***Sept. 10–13:* American Association for State and Local History (AASLH) Annual Conference: The American Experiment, Cincinnati, Ohio**. Info: *www.aaslh.org*.

***Sept. 23–26:* Early Railways 8: International Conference on Early Railways, Darlington, U.K.** Info: *rchs.org.uk/early-railways-conference-combined/*.

***Oct. 9–11:* Society for the History of Technology (SHOT) Annual Meeting, Esch-sur-Alzette, Luxembourg**. Info: *www.historyoftechnology.org*.

***Oct. 14–17:* Big Stuff 2025: Skills and Machines—A Living Partnership, Ghent, Belgium**. Info: *https://bigstuff2025.info*.

2026

***April 15–19:* Society of Architectural Historians Annual International Conference, Mexico City, Mexico.** Info: *www.sah.org*.