

SOCIETY FOR INDUSTRIAL ARCHEOLOGY

NEWSLETTER

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LAST GASP OF LAST CHICAGO STATION?

Always the country's premier railroad terminal city, Chicago rapidly is coming close to losing its last station. Gradually, the city's onetime six passenger terminals have been demolished (IC's Central, B&O's Grand Central), defiled (Union), or abandoned (Dearborn). A fifth, LaSalle St., lives on borrow time, a shadow of its former self. That leaves the Chicago & North Western's North Western Station (1908-11), a Neoclassic hulk located off the Loop at W. Madison & N. Canal sts., still mostly in original condition.



David Daruszka photograph.

But now, it appears, there may be none. C&NW, still solvent but only marginally so, wants to sell the property to Tishman Midwest Management Corp. Tishman in turn has proposed the usual highrise office building in its place. The 50-story replacement, Tishman says, will include "some type of passenger facility" — presumably a variation of the motel-lobby style now popular for new and rebuilt urban railroad terminals.

Built at a time when C&NW was a major power in the Midwest and a primary transcontinental connection, North Western Station epitomized what architectural historian Carroll Meeks labelled the "Megalomania Period" of terminal design. The four-story two-level granite structure was designed in City Beautiful Italian Renaissance style by Chicago architects C.S. Frost and A.H. Granger—both, incidentally, in-laws of C&NW's then-president Marvin Hughitt. Behind its imposing headhouse, 16 tracks stub-ended underneath a slotted Bush trainshed. With rail traffic then growing exponentially, North Western was designed to handle an awesome 250,000 passengers a day.

John Droege's 1916 classic *Passenger Terminals and Trains*

EDITORIAL ADDRESS

All editorial correspondence should be directed to: Carol Poh Miller, Editor, SIAN, 1260 Granger Ave., Cleveland, O. 44107. (We are using up pre-printed stock.) Questions of membership, address changes, etc. should still be addressed to Rm. 5020, as below.

extolled North Western as one of the most beautiful and efficient urban terminals anywhere. Its architecture later lost critical favor but its efficiency endured. Although the transcontinental and, indeed, *all* intercity trains are gone, North Western was always predominantly a suburban terminal — built to cope with hordes of people and multiple train movements in peak periods. Currently it serves a thriving commuter traffic of over 90,000 passengers a day, still far short of its designed capacity but more than double its 1915 load. Trains may have disappeared elsewhere, but rush hour at North Western is still a sight to behold. In fact, there is tentative talk of adding some Amtrak Milwaukee runs since Union Station (the city's other major station) is becoming overburdened.

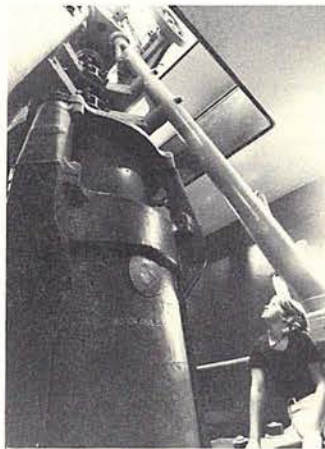
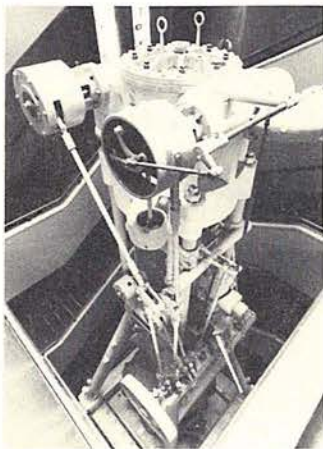
Happily, despite some 1965 interior alterations, North Western has survived in reasonably pristine original form, complete with its Bush trainshed and semaphore interlocking system. It is, in short, an almost perfectly preserved 1910-era metropolitan railroad terminal from its columned facade to its rear approach tracks.

Unhappily, it managed to get overlooked by preservationists perhaps preoccupied with more picturesque structures. The Tishman proposal initially created little local stir. At close to the eleventh hour two Chicago railroaders, David Daruszka and William Francik, formed the Friends of the North Western Station to save it. FNWS hopes to get public support for a compromise solution involving rehabilitation of the station and construction of the office building over the trainshed. The group currently is working for National Register listing and city landmark designation. (As we go to press, we have learned that, at a hearing on Mar. 16, the station was turned down for National Register listing by the Ill. Historic Sites Advisory Council in Springfield. An architect hired by the developer testified that the station interior has been too remodeled to make it worth saving.)

FNWS needs all the help it can get, and quickly. To contribute ideas, advice, moral support, or money, contact Friends of the North Western Station, 7549 N. Oakley, Chicago, Ill. 60645. H.H.H.

NORDBERG STEAM STAMP RESCUED

The world's last surviving steam stamp has narrowly escaped the junkman. The steeple-compound stamp, built by the Nordberg Mfg. Co. in 1900, had stood in Chicago's Museum of Science and Industry since 1938, but the museum planned to scrap it to make room for new exhibits. Peter Molloy [SIA], director of the Western Museum of Mining and Industry in Colorado Springs, Colo., learned of the impending loss last summer from Robert Johnson [SIA], of the Whistles in the Woods museum. The stamp's immense size (90 tons, 40 ft. high) made for expensive rigging and transportation, but the museum was able to raise the necessary funds with the help of Blinderman Construction Co., which initially had been hired to junk the stamp. Blinderman's charge for disassembling and packing the stamp was a fraction of the actual cost. Rexnord Corp., which took over Nordberg a few years ago,



The steeple-compound ore stamp. Left: the low- and high-pressure cylinders. Right: "worm's-eye" view of the stamp. The anvil is reconstructed, from concrete. *Photo Ideas, Inc. photographs.*

generously underwrote transportation costs to Colorado Springs.

Although small Tremain and Reynolds steam stamps were used in many mining districts, the really large stamps manufactured by Ball, Allis, and Nordberg were used only in the copper district of Mich.'s Upper Peninsula. The ores there contained large masses of copper which could not be freed from their rock matrices by

gyrating or gravity stamp crushers; the steam stamp used the shattering effect of its action coupled with massive amounts of water to free the copper and ore nuggets for further concentrating and classifying in the mill.

The steeple compound represents the final evolution of the steam stamp. Earlier models used a single vertical double-acting piston to raise the stamp and drive it onto the ore. Bruno Nordberg began modifying these "simple stamps" with vertical compound cylinders in 1903. The stamp salvaged by WMMI was manufactured in 1900 as a simple stamp for the Calumet and Hecla mine. In 1903-04, it was modified to a steeple-compound type. The Osceola mine was the first to switch to steeple compounds, which rapidly became the most common stamp on the Upper Peninsula. (The Ahmeek mine used eight Nordberg stamps until the depleted ore supply forced its shutdown in the early 1970s.)

The WMMI stamp had a capacity of almost 800 tons of ore per day, the equivalent output of about 600 large gravity stamps. It developed about 250 h.p. with steam at 160 p.s.i., exhausting into a low-pressure turbine. The stamp required several tons of water to process a single ton of ore and a foundation of reinforced concrete 25 ft. thick by 16 ft. square. Its anvil block (no longer extant) weighed over 100 tons. The stamp's pistons are 15 and 32 in. in diameter, with a stroke of 2 ft. Because the stamp shoe deteriorated so rapidly (every 3-6 days), the clearance of the pistons was quite large. WMMI plans to assemble the stamp in 1981 and hopes to operate it — at a greatly reduced rate of speed. *P.M.M.*

MORE TRUSS BRIDGE DISCOVERIES . . .

"EGYPTOID" BRIDGE LISTED IN NATIONAL REGISTER

The Reading-Halls Station Bridge, spanning the former Reading RR (now Conrail) tracks near Penna. Rte. 147 in Muncy, Penna., has been listed in the Natl. Register. Fabricated c. 1850, it is a 70-ft.-long Howe pony truss with cast-iron diagonal compression members, wrought-iron vertical tension members and wrought-iron top and bottom chords. The unusual "Egyptoid" form of the compression members places it among the most picturesque iron trusses in the U.S. Even more important, the structure is almost certainly the oldest all-metal truss bridge still in use in America, making it a major IA landmark.



The first all-metal truss bridge used on a U.S. railroad is generally considered to be the West Manayunk, Penna., Howe truss designed by Richard Osbourne in 1845 for the Philadelphia and Reading RR. This bridge was used until 1901, and today portions of it survive in the custody of the Smithsonian's Ntl. Museum of History & Technology. Compared with the Reading-Halls Station Bridge, the West Manayunk Bridge was somewhat cruder and lacked "polish" or refinement.

Although the early history of the Reading-Halls Station Bridge is impossible to document definitively, on the basis of the "Egyptoid" casting motif it is possible to date it to the 1840s or early 1850s. This period marked the end of the short-lived Egyptian Revival style of American architecture, a style also adopted for a number of engineering projects of this era (perhaps the most notable being N.Y.C.'s Croton Aqueduct, completed in 1842). The relatively slender proportions of its structural members also indicate that the bridge dates to c. 1850, because the weight of locomotives and rolling stock at any later time almost certainly would have dictated a "heftier" design. It is highly doubtful that the bridge predates 1845, both because its castings are more refined and sophisticated than the West Manayunk Bridge and because it did not receive the "pioneer" status bestowed on the Manayunk structure. Thus, 1850 is a good estimate of its date of fabrication.

The line the bridge crosses was not built until the early 1870s and did not become a part of the Reading system until the 1880s. The

bridge therefore probably was erected at its present site sometime between 1880 and 1900. At that time, floor beams consisting of railroad rails were placed between the trusses to support the stringers and wooden road deck. The existing span does not have distinctive end posts, indicating that it likely was once part of a larger structure. This conjecture is supported by the fact that, in 1959, bridge historian Richard S. Allen [SIA] located a similar "Egyptoid" Howe truss over the Reading RR near Reading, Penna. (This bridge, unfortunately, was demolished in the early 1960s to make way for a highway interchange.) It may well be that Allen's discovery and the Reading-Halls Station Bridge were both once part of a larger structure on the early Philadelphia and Reading line.



Reading-Halls Station Bridge, looking north. *Tom Richey photographs.*

The Reading-Halls Station Bridge is owned by Conrail and is located in the middle of a privately-owned farm divided by the railroad right of way. While the bridge is in excellent condition, insurance problems may dictate its replacement. The bridge provides the only access to a number of 19th-c. farmhouses and outbuildings, and its 12-ton load limit is not adequate to carry heavy fire trucks, thereby making insurance difficult for the buildings' owners to obtain. Fortunately, solutions to this problem—such as finding another route for the fire trucks, or sensitively strengthening the bridge—are now being explored. There is consensus that *somehow* the bridge must be preserved.

Tom Richey, of the Muncy Historic Survey Project, and Vance Packard [SIA], of the Penna. Historical & Museum Commn., deserve credit for drawing public attention to the historic significance of the bridge. A cautionary note: potential visitors are warned that the bridge is located on private property and is *not* on a public road. D.C.J.

BACKWATER BRIDGES IN WISCONSIN

Six unusual pony truss bridges—five metal bowstring arch trusses and a wooden king-post truss — have been nominated to the National Register by the Historic Preservation Div. of the State Historical Soc. of Wisc. The bridges are all located along McGilvray Bottoms Rd. in northern La Crosse Co. Although the bridges have suffered from years of neglect, the Wisc. Dept. of Natural Resources (DNR) is considering plans to rehabilitate them and maintain the roadway for pedestrian access to the state's Van Loon Wildlife Area.

The Clinton (Iowa) Bridge Co. built seven bowstring arch trusses along McGilvray Bottoms Rd. during the winter of 1891-92. The

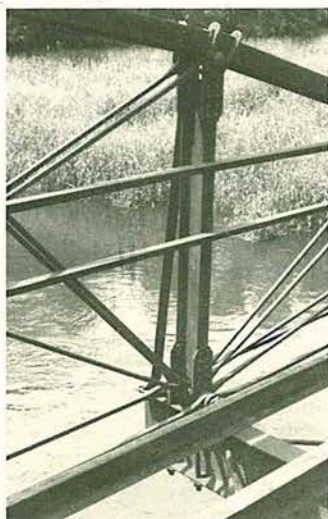


Double-span bowstring arch truss, La Crosse Co., Wisc. Historic Preservation Divn., State Historical Soc. of Wisc. photographs.

structural elements were shipped to the site from Clinton; local laborers then assembled the bridges, which varied in length from 50 to 252 ft., under the direction of two company engineers. One bridge was built to replace a ferry across the Black R., the others to improve the mile-and-a-half country road leading to the ferry through the river's swampy backwaters. The ferry, begun in 1854 by Alex McGilvray, was a profitable business until the late 19th c., when growth of the area's lumber industry made continued operation impossible since logs jammed the river for part of each year. Area residents, with help from the Black River Log Driving Assn. and the Black River Improvement Co., eventually raised sufficient funds to construct the needed bridges.

In 1911, a flood substantially weakened and partially washed away one of the smaller bridges. Due to a disagreement between the town of Holland, in which the road and the bridges are located, and La Crosse Co., repairs were delayed for nearly nine years. Finally, in 1920, the county agreed to pay the Clinton Bridge Co. to replace the damaged bowstring with the present king-post truss. The fate of the bridge over the main channel of the Black R. is not known for certain, but the bridge probably was destroyed during the 1930s. McGilvray Bottoms Rd. was rendered useless and was forgotten. In 1957, the Wisc. DNR acquired the roadway, the bridges, and the surrounding land for inclusion in the Van Loon Wildlife Area. The road has since been used primarily by sportsmen for access to the preserve.

Aside from the Van Loon bridges, only one other bowstring arch truss is known to exist in Wisc. It was "discovered" by George



Danko [SIA] in Lake Side Park in Fond du Lac during a bridge survey of selected Wisc. counties in 1977 [SIAN, Sept. 1977]. K.M.P.

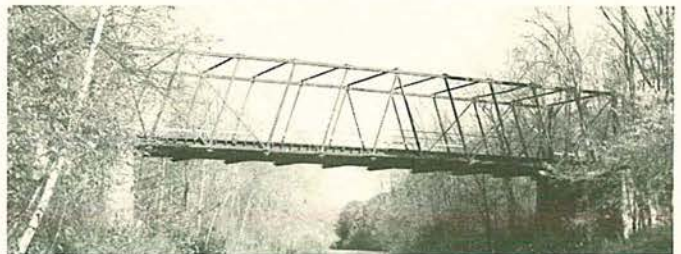
... and in the Bay State

One S.S. Post-designed truss bridge and one hybrid companion, both in the town of Lancaster, Mass., have been placed in the National Register through the efforts of Phyllis and Lee Farnsworth and the Lancaster Historical Comm.

The Ponakin Road Bridge, spanning the north branch of the Nashua R., was erected in 1871 by the Watson Mfg. Co. of Paterson, N.J. It is the only Post-patent truss HAER has identified anywhere in the U.S. The iron through truss is 100 ft. long and 20 ft. wide. It is on a country lane, bypassed by a major highway.

The Post truss, distinguished by compression members inclined toward the center of the bridge, was designed by Simeon S. Post (1805-1872), a N.H.-born civil engineer. Post originally was a house joiner and architect. He later studied engineering with John Johnson, Vt.'s Surveyor General. Post was assistant engineer on the Auburn & Syracuse RR beginning in 1836. He later served as engineer for other roads. Beginning in 1858, he devoted his energies to bridge design, publishing a treatise on the subject in *Railway Journal*. Post was actively involved in the promotion of his truss pattern, for which he received patents in 1863 and 1868. He was a founding member of the A.S.C.E.

The second Lancaster span to receive recognition is the Atherton Bridge, a pony truss of no specific patent but employing Phoenix-column compression members in a hybrid of the Post and Warren forms. The structure, which has been closed to traffic for several years, crosses the South branch of the Nashua R. Erected c. 1870, it is 72 ft. long and 18 ft., 5 in. wide. B.A.D.



Ponakin Road Bridge, Lancaster, Mass., a Post through truss. Herbert H. Harwood photograph, 1977.



Atherton Bridge, Lancaster, Mass., a Post pony truss. Carol Dubie photograph.

A Steam Revival

The following item is extracted from *Smoke and Cinder*, the monthly newsletter of the Tennessee Valley Railroad Museum. It was reported by Dale G. Kraus.

From Switzerland comes news that Winterthur Locomotive Works, in cooperation with the Sulzer Corp., is building a new STEAM LOCOMOTIVE for the Indonesian Rys. This is not a research project, but a firm order for a 42-inch gauge, rack and adhesion locomotive, to replace the diesels currently in use.

To accomplish this feat, the Sulzer and Winterthur engineers have re-invented the steam locomotive, using high-technology metallurgy, solid-state electronics, and a new understanding of the thermodynamics of high-pressure steam. Although the principal companies will not release the details of the locomotive until after

delivery, the rudimentary specifications are available, and are quite impressive.

It will be a cab-forward, lignite-fired 2-8-4 or 4-8-4. It will use a Sulzer marine boiler, operating at 800 to 1000 p.s.i., specially braced to take the pounding of rack operation on poor track. High-strength aluminum alloys will be used wherever possible, as will carbon-epoxy composites developed by the aircraft industry. The locomotive will be a four-cylinder compound, capable of 80km/h (50 mph) on adhesion, and 30km/h (19 mph) on the triple-Abt-system rack.

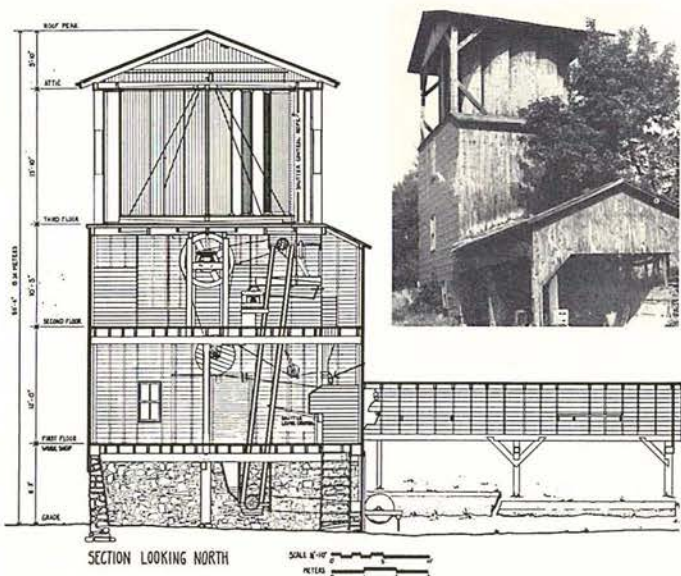
The most notable feature will be the valve gear and throttle system. The valve gear is of a radical design, using an electronic feedback sensing system to admit exactly the right amount of steam into the cylinder, to assure maximum efficiency. The throttle will use a computer to monitor the load, track adhesion conditions, and steam supply, to assure maximum tractive effort or motive power while running either on or off the rack.

The boiler will use distilled water, which will be reclaimed by the condensing tender. The condensing mechanism is a space program spinoff, capable of reclaiming in excess of 99% of the steam.

WIND TURBINE IN JEOPARDY

In 1883, George Gladden observed a vertical wind turbine in operation on a Nebraska farm. Gladden acquired the rights to build one himself on his farm in western New York state. Gladden's Mill, completed in 1890, is believed to be a variation of one patented by Bernard Koeppe in 1888. (In the Koeppe design, the shutters are flat and the vanes are V-shaped, whereas in Gladden's the opposite is true.)

The Gladden turbine was originally equipped with machinery for elevating and grinding grain, an apple grater and cider press, wood lathe, and shop for general repair work. The vertical wind turbine operated for nearly 40 years, until the thrust bearing at the bottom of the wheel shaft cracked and mill operations ceased.



Gladden wind turbine. Drawings by Allen Lubow, 1975.

The Gladden Mill, believed to be the only remaining vertical-axis windmill in the Northeastern U.S., is now threatened. Its owner cares nothing about it and, for a price, wants it moved from his property. Fortunately, the nearby Glover's Mill Energy Center, a conservation and alternative-energy information center headquartered in an 1833 gristmill, has adopted preservation of the Gladden turbine as its cause. The group hopes to buy the turbine and move it to safety. Its owner wants \$3,000 for it, and even more money will be needed to move it. General Mills already has generously donated \$1000 to the campaign. Additional donations to help save the mill, which was recorded by an emergency team from HAER in 1975, are urgently needed. Contact: Merle Sheffield, Executive Director, Glover's Mill Energy Center, R.D. 2, Box 22, Randolph, N.Y. 14772.

IA IN THE NATIONAL REGISTER

Compiled by Carol Dubie

National Register listings, Jan. 10 - Feb. 15, 1980:

GEORGIA

Rome Clock Tower, Rome. 1871 Romanesque-style brick tower enclosing wrought-iron standpipe 26 ft. in diameter, 60-ft. high.

Lee & Gordon Mill, Chickamauga. 1867 gristmill with millstones, later 19th-c. turbine, dusters, and sifters; log dam and raceway.

IDAHO

Proctor Mt. Ski Lift, Ketchum. 2,300-ft. mono-cable chairlift. Earliest known chairlift in the world (1936), invented by James Curran of the Union Pacific RR engineering dept.

MAINE

Schooner Bowdoin, Camden. 60-ton, 88-ft. two-mastered schooner, designed and built in 1921 for Arctic exploration.

MARYLAND

Canton Historic District, Baltimore. Riverfront industrial and residential district including 19th-c. warehouses and wharves.

NEW MEXICO

Acequia System of El Rancho de las Golondrinas, Santa Fe vic. 3.4-mile portion of 18th-c. irrigation ditch, example of early irrigation technology.

NEW YORK

Brandreth Pill Factory, Ossining. 1836-1907 industrial complex with principal structure dating to 1870s and 80s. Associated with Dr. Benjamin Brandreth, important figure in the development of patent medicines in 19th c.

NORTH CAROLINA

Biltmore Industries, Asheville. 1917-20s complex of cottage industry buildings associated with Vanderbilt's sponsorship of arts and crafts movement in Asheville. Some 1917 interior features remain, including Davis & Furber carding machines.

Mount Shepherd Pottery Site, Asheboro. Late 18th-c. kiln site with potential to yield information about the development of early industry in the region.

Rocky Mount Mills, Rocky Mount. Late 19th-c. textile mill complex associated with the industrialization of N.C. before and after Civil War.

Yoder's Mill Historic District, Catawba Co. Typical rural complex of farm residences and outbuildings; remains of wood and masonry dams, millrace, gristmill, sawmill, and hydroelectric plant.



Kinta Cotton Storage House. Michael W. Everman photograph.

OKLAHOMA

Cotton Storage House, Kinta. 1904 octagonal storage house built during heyday of Okla. cotton production. A rare survivor. NR listing hopefully will induce would-be vandals to keep their "cotton pickin'" hands off it!

PENNSYLVANIA

Covered Bridges Thematic Resources, Union Co. Includes four bridges (two Burrs, two multiple king-posts). Part of continuing effort to nominate all historic covered bridges in state.

Reading-Halls Station Bridge, Muncy vic. Superb c. 1850 iron Howe pony truss [see article this issue].

Ashley Planes, Ashley and vic. Site of important inclined planes used in transporting vast amounts of anthracite out of the Wyoming field. Operational 1837-1948 [SIA 1979 Fall Tour].

TEXAS

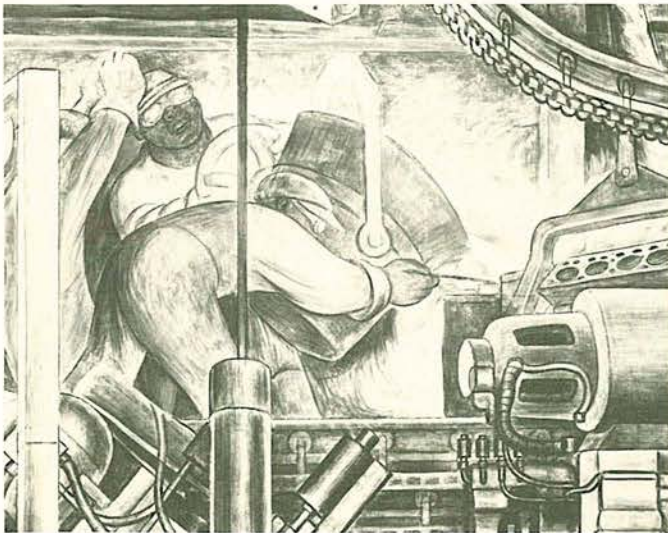
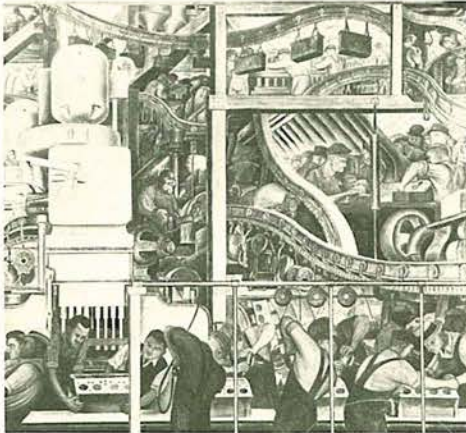
Ada Belle Oil Well, Batson vic. Dug 1903, the only remaining shallow oil well of its kind in operation in the East Texas oil fields. Complex includes seven buildings, wells, separating tanks, roundhouse, blacksmith shops, company office, and low-level mud storage pit.

UTAH

General Engineering Co. Building, Salt Lake City. 1906 brick and stucco two-story office building associated with John Michael Callow, investor and internationally recognized mining engineer.

DETROIT PREVIEW: IA IN ART

Between July 1932 and March 1933, Mexican muralist Diego Rivera (1886-1957) completed a series of frescoes in an enclosed court at the Detroit Institute of Arts. Rivera chose Detroit's industry as the theme of the project and in his two major panels portrayed contemporary automobile

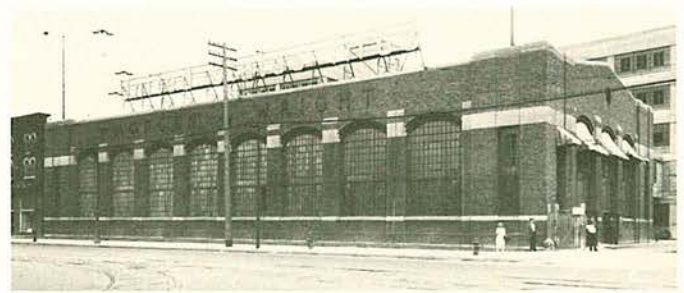


Detroit Industry: North wall, details. *Detroit Institute of Arts photographs.*

manufacturing methods and equipment. He spent over a month at the Ford Motor Co.'s River Rouge complex, observing and sketching the operations there before beginning the automotive panels. The panels show the major phases of automobile manufacture, from the production of pig iron to final assembly. Rivera's *tour de force* will be a *stop de tour* at this spring's Annual Conference. *C.K.H.*

UNIROYAL PLANT RETIRED

Uniroyal, Inc., has announced that, after July, the company will ply its trade in tires without its venerable Detroit plant and its 1,700 employees. The plant, located on Detroit's riverfront, was built in 1905-06 by the Morgan & Wright Bicycle Tire Co., then the largest manufacturer of bicycle tires in the world. The complex originally had about 900,000 sq. ft. of floorspace; after numerous additions, there are now twenty buildings with over 3 million sq. ft. The complex consists mostly of reinforced concrete buildings, five to eight stories high. Albert Kahn designed most of the earlier sections.



Morgan & Wright Bicycle Tire Co. Building (1906), Albert Kahn, architect. *Albert Kahn Associates photograph.*



Uniroyal's Detroit plant. *Uniroyal, Inc. photograph.*

The plant began with a workforce of 750 and a daily output of 300 tires when it opened in 1906. The United States Rubber Co. ("Uniroyal" since 1967) bought the complex in 1914 and began concentrating its tire production there. By the early 1940s, 10,000 workers were producing 60,000 tires a day. In recent years, the workforce has declined to under 2,000, production to less than one-third its war-time high. Among other things, this plant housed several Detroit auto shows during its early years. Its tire testing facilities are believed to be the largest in the world.

In their news release of January 22, Uniroyal described the Detroit plant as their least productive tire facility: "Detroit is an old, multi-storied plant that has been in operation since 1906. The basic structure of the facility imposes inherent high costs and makes modernization, efficient layout and future expansion highly impractical." You can see for yourself during the conference. *C.K.H.*

Follow-Up on the News

A **Bessemer converter**, donated by developers Gerald Peckich and Art Silverman after they purchased the A.M. Byers Co. plant in Ambridge, Pa., was erected last fall on Pittsburgh's Artifact Square, on the city's South Side, as part of the Pittsburgh History & Landmarks Foundation's Station Square project. The Assn. of Iron & Steel Engineers donated \$25,000 for the converter's dismantling, shipping, and reassembly [SIAN May 77:3, July 77:5, Sept. 79:8]. As previously reported, the rescued converter was bottomless; but the Pa. Engineering Corp., which built the converter in 1929, generously donated a replica to complete the assembly. Two cranes, acting in concert, and about a dozen workmen pieced together the converter in a day and a half. Bessemer converters used to light up the skies on America's steel cities; Pittsburgh's new monument is that city's only survivor (and, we suspect, the only one left in the U.S.). *Pittsburgher*, October 1979.

We reported, seven years ago, that the unloved **Liberty ships** of World War II were rapidly going the way of the dinosaur [SIAN 73:5], with only some 100 surviving from an original fleet of 2,742 (and most of these in foreign cargo service).

By 1978 only two were left in the U.S. The National Liberty Ship Memorial in San Francisco hoped to restore one, the *Jeremiah O'Brien*, as a public museum. The second ship, the *John W. Brown*, was being used as a maritime trade school but was destined to be replaced.

The *O'Brien* is now well on its way to a new life. Its exterior has

been sandblasted and painted; internal restoration will follow. Plans are to sail her under her own power on May 21. After a memorial service at sea, the ship will be berthed at Fort Mason in San Francisco Harbor.

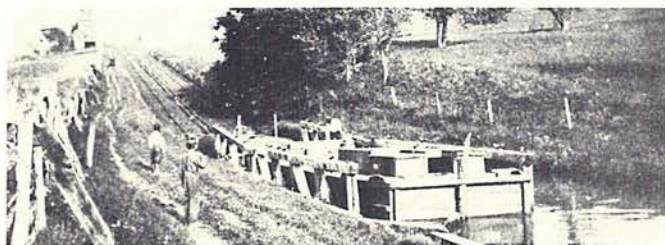
In New York, the *Brown* has won a temporary reprieve. A replacement vessel cannot be used immediately because of flaking asbestos. The *Brown* will remain a schoolhouse for at least another year. *NY Times*, 17 February 1980.

ASCE LANDMARKS

Two sites recently were designated Natl. Historic Civil Engineering Landmarks by the American Society of Civil Engineers:

MORRIS CANAL BOAT HOIST SYSTEM. A system of 23 water-powered inclined planes, in combination with locks, enabled boats in northern N.J.'s Morris Canal to "climb" more than 900 feet from tidewater at Newark Bay to the summit level at Lake Hopatcong. From there, the boats were gradually lowered 760 feet to the Delaware River at Phillipsburg, opposite Easton, Penna.

Each inclined plane consisted of a track between two canal levels. A boat approaching the plane entered a cradle which rode the track and was pulled up or let down the incline by a chain



Morris Canal, Plane No. 9 West, Port Warren, Stewartville, N.J., c. 1900.

wound on a drum. The drum was turned by a Scotch turbine powered by canal water falling between the two levels. The planes varied from 500 to 1,600 feet in length. James Renwick, professor of Natural and Experimental Philosophy at Columbia Univ. and a civil engineer, is credited with developing the system, which was based on planes in use on English waterways.

The Morris Canal and its inclined planes served from 1831 until 1924, when the canal was drained. It was originally built to carry coal from Penna. and iron goods from N.J. forges and furnaces to the markets of Paterson and Newark.

GOODYEAR AIRDOCK. Built in 1929 to house two U.S. Army zeppelins, the Goodyear Airdock, at Akron, O., is still among the largest buildings ever built in terms of uninterrupted interior space (more than 55,000,000 cu. ft.). ASCE cited the "pioneering studies in the aerodynamics of buildings" needed to build such a structure. Dr. Karl Arnstein, director of engineering for Goodyear-Zeppelin, conducted extensive wind tunnel tests on a scale model of the structure. Arnstein designed the airdock in the form of a semi-paraboloid (resembling a huge quonset hut with rounded ends),



with two pairs of "orange-peel" doors at each end. The airdock is 1,175 ft. long, 325 ft. wide, and 211 ft. high.

The Goodyear Airdock was built to house the USS Akron and USS Macon, two 785-ft.-long twin zeppelins, during construction. The last dirigible constructed here was built in 1960. The building is largely unused today.

CONTRIBUTORS TO THIS ISSUE

Bernard A. Drew, Great Barrington, Mass.; Herbert H. Harwood, Jr., Baltimore; Charles K. Hyde, Wayne State Univ.; Donald C. Jackson, HAER; Peter M. Molloy, WMMI; Kim Mark Peters, State Historical Soc. of Wisc.

MISC. NOTES

HISTORIAN'S OFFICE, U.S. DEPT. OF ENERGY, seeks applications for the 1980-81 Visiting Scholar Program. Program sponsors curriculum development and research in the history of energy systems, policies, and technologies. Inquiries to: Dr. Richard C. Hewlett, Rm. 7G-033 Forrestal, U.S. Dept. of Energy, Wash., D.C. 20585.

ROBERT C. POST [SIA] is the new editor of *Railroad History*. He will be pleased to consider for publication manuscripts that deal with railroads and their associated supply-trade industry from the standpoint of business history, economic history, history of technology, biography, or industrial archeology. Address inquiries to 3118 Cheverly Ave., Cheverly, Md. 20785.

FRIENDS OF CAST IRON ARCHITECTURE will hold their spring walking tours of Manhattan's cast-iron architecture on Sunday afternoons May 4, 11, and 18 at 2 P.M. On June 8, FCIA will sponsor a special walking tour in Central Park, to focus on five iron bridges there. Meet at Maine Monument, Columbus Circle, at 2 P.M. Cost is \$2.50. FCIA now offers a cast-iron apron. Actually it is a cloth apron, butcher-type, featuring the spectacular roof of Manhattan's Gilsey Hotel (1869). The words "Friends of Cast Iron Architecture" appear in an arc over the design. Cost is \$6. Mail check payable to FCIA to: T. Bernardin, 56 Seventh Ave., Apt. 17L, N.Y., N.Y. 10011.

COUNCIL FOR NORTHEAST HISTORICAL ARCHAEOLOGY (CNEHA) has established a permanent mailing address and now offers several categories of membership. As the only regional organization concerned with the archaeology of the historic Northeast (New England, Mid-Atlantic States, and Eastern Canada), CNEHA supports the development of all aspects of historical archaeology through conferences and publication of *Northeast Historical Archaeology*. *NHA* reports research on the entire historic period (ca. 1600-20th c.), including both underwater and terrestrial investigations. Membership categories: Individual \$10.00; Student \$7.50; Institution \$10.00; Joint (receives one copy of publications) \$12.50; Fellow \$25.00; Life \$200. Send check to: CNEHA, University Museum, Univ. of Pa., 33rd & Spruce sts., Philadelphia, Pa. 19104.

LOWELL CONFERENCE ON INDUSTRIAL HISTORY: "The Social Impacts of Industrialization" will be held at the Univ. of Lowell, May 8 and 9. Sponsored by the Univ. of Lowell, Lowell Natl. Historical Park, and the Lowell Historic Preservation Commn. Information and registration forms: Prof. Oliver Ford, L.C.I.H. Chairman, Univ. of Lowell, One University Ave., Lowell, Mass. 01854.

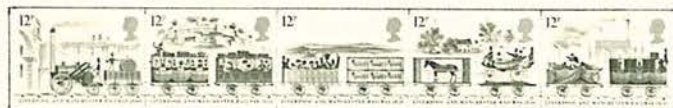
BUFFALO, New York's 19th-c. gateway to the West, will be the site of the 7th annual conference of the Preservation League of New York, May 16-18. Conference theme will be "Preservation in the Post-Industrial City: The Value of Neighborhood Preservation." One session will focus on "Buffalo Masterpieces: Architecture and Industrial Archaeology." Registration deadline is May 5. Conference program and registration forms: Preservation League, 13 Northern Blvd., Albany, N.Y. 12210.

WORKING AMERICANS. A traveling exhibition of paintings of work in a remarkable variety of settings, from c. 1840s to 1940s: printers, miners, laborers, dockhands, mill workers, loggers, whalers, strikers, et al., and many of the symbols of work. A stunning, moving collection of paintings assembled by Smithsonian Institution Traveling Exhibition Service. To be in Detroit, Rochester, Chicago, Birmingham, Trenton, and Lexington, Mass. Schedule: SITES, SI, Wash., D.C. 20560. [See *Publications* for catalog note.]

AVAILABLE - TINIUS-OLSEN Universal Testing Machine, c.1910. Approx. 6 ft. x 3.5 ft. x 7 ft. high; 1.5 tons +. Motorized. A basic machine of fundamental importance. Free to appropriate taker, as-is, where-is. Prof. W.M. Hagist, Dept. of M.E., Univ. of R.I., Kingston 02881. (401) 792-2535/24.



AMERICAN WINDMILLS are featured on a new \$3 stamp booklet, made up of two panes of 10 "diminutive" (15c) stamps. The stamps illustrate five windmills over the period 1720-1890. Depicted are the Robertson Windmill (1720) at Williamsburg, Va., a post type reconstructed by Colonial Williamsburg; the Old Windmill at Portsmouth, R.I., a replica of an octagonal smock gristmill, three stories high with 60-ft. sails, built on the same site by the English in 1790; the Cape Cod Windmill at Eastham, Mass. (c. 1793), like those traditionally found in the Netherlands and Cape Cod's oldest windmill; the Dutch Mill in Fabyan Park Forest Preserve near Batavia, Ill. (1860), another example of the smock mill; and a Southwestern windmill, built in Texas c. 1890, a type designed to pump water and manufactured in quantity at the turn of the century — still visible in many parts of the country. Re the last type, historian Walter Prescott Webb has said that, on the Great Plains, three inventions were essential to a settler's survival: the Colt revolver, barbed wire, and the cheap windmill. There were about 80 factories producing these in 1890; Sears, Roebuck offered "the most complete line," all bearing Sear's Kenwood brand.



GREAT BRITAIN has issued a strip of five 12-pence commemorative stamps in honor of the 150th anniversary of the Liverpool & Manchester Ry., the world's first regular passenger-carrying railroad, opened in Sept. 1830. The five stamps together illustrate a complete train of 1830, with each stamp showing a different item of rolling stock. Depicted are the "Rocket," the locomotive that won in competitive trials in 1829; an open third-class carriage; a two-story livestock car; and two flat cars. The backgrounds depict landmarks found along the line.

THE WORK OF IA

The (fourth) Industrial Archeology Institute will be held at the University of Vermont, July 7-11. The 2-cr. course will be conducted by Eric DeLony [SIA], Project Architect of the Savannah Landmark Rehabilitation Project, Inc., and formerly principal architect of HAER. The IA Institute is designed to instruct preservation professionals, historians, and others in recognizing and evaluating historic American industrial and engineering sites and structures. Drawing on Vermont's technological heritage, participants will learn the techniques of documentation and recording. Site visits, field recording, lectures, and discussions will constitute an intensive, week-long experience. The institute is limited to 25 students; cost is \$48 per cr. for Vt. residents, \$66 per cr. for non-residents; a \$10 registration fee is non-refundable. Information and application: IA Institute, Continuing Education, Grasse Mount, Univ. of Vt., Burlington 05405.



1979 IA Institute participants measuring a water-turbine-powered pumping engine of 1874. Vergennes, Vt. Jennifer A. Wilson photograph.

SIA AFFAIRS

ROEBLING CHAPTER. On Jan. 15, about 35 members and friends met at the ITT Avionics Lab auditorium in Nutley, N.J. for an IA "show and tell" session and election of new officers. This was

the culmination of a busy year of tours, including trips to the West Point Foundry, the Thomas Edison laboratories in West Orange, the Energex light bulb factory, John Federowicz's steam-powered peach basket factory in Califon, the Wharton plant of Thatcher Glass, and the Homasote plant in Trenton. New officers are as follows: Thorwald Torgersen, pres.; Marjorie Ingle, secy.; Bob Holton continues as treas. At a subsequent executive meeting, plans were begun for this year's chapter activities. The first, on March 6, was joint sponsorship, with the Friends of Cast Iron Architecture, of a lecture by Mario Campioli, Assistant Architect of the U.S. Capitol, who spoke on the construction and restoration of the Capitol's cast-iron dome. The chapter's major project for 1980 will be the initiation of a photographic inventory of significant IA sites and artifacts in the Roebbling Chapter area, to serve as a teaching tool and as a means of introducing the ideas of IA to interested groups. SIA members in the N.Y.-N.J.-Philadelphia area not already members of the Roebbling Chapter are urged to join. Contact: T. Torgersen, P.O. Box 429, Hackettstown, N.J. 07840. Dues are \$2. per year, still one of the best bargains around!

LETTERS

Editor: In response to your request to jump into the Vogel/Comp to-do . . . Last summer a HAER rehabilitation team worked in Lockport, Ill. I worked with them as a part-time historian [and] found that there was little enthusiasm from the HAER Washington representative for recording the many historic industrial structures in Lockport. In the beginning the architects were enthusiastically taking measured drawings of structures, but they were told to drop this activity and instead focus on rehabilitation studies. The end result was a lot of wasted motion.

The new HAER approach is mostly interested in appealing to the public, and as a result feels it must shortchange the job it can do more effectively [i.e.] recording industrial structures. The public, however, is not bought off so easily, if Lockport is any gauge of public reaction. The result of the HAER team visit is generally disappointment, disappointment that many things that were seemingly promised by the rehabilitation project are not forthcoming. Rehabilitation requires capital, and studies are secondary to that. The unstated promise was that, following the HAER rehabilitation study, a cornucopia of government largesse would tumble upon the town—not so, of course . . .

From our experience, it seems that the cost-effectiveness of recording, photographing, and taking measured drawings is much greater for HAER than doing rehabilitation studies. Rehabilitation studies require retail study, [as well as] tax and legal experts, [as well as] several other areas of expertise that cannot be put together for a summer. Why can't HAER continue to do what it has effectively done in the past? *John M. Lamb, Lockport, Ill.*

Editor: Re [Robert Vogel's] editorial swan song in Vol. 8 No. 6: [He is] RIGHT . . . The reason [he is] right is simple. The government is destroying the intellectual fiber of our historical agencies. All of us (mostly) dedicated professionals rued the day when the HCRS was formed and divested us of those agencies that provided us with leadership and morale. Now they are gone. "The essential crippling of a pair of the most cost-effective and valuable historical programs ever mounted by the U.S. Government" has been precipitated by an endemic situation in our bureaucracy, spawned by fear of professionals and advanced by individuals who are not in the least bit sensitive to the perils facing our material heritage. I fear that you may not appreciate the depth of that bleak prognosis. Why can't the government recognize HAER for what it was/is, and realize that its call was to record and that its major imperative was to survey? What is bad about preserving (albeit two-dimensionally) our industrial artifactual legacy? Why do we dilute a good thing by publishing a "Danville re-hab" and a "Fairmount Park re-hab," when both need full inventory and survey publication? As [Vogel has] so eloquently argued, HAER does not have any business being in the rehab pool. Why can't success be trumpeted?

At any rate, I, too, feel that his move has essentially ripped the guts out of our finest national recording project and changed its leadership so dramatically that, although hope springs eternal, I'm not so sure . . . *D. Orr, Delaware City, Del.*

PUBLICATIONS OF INTEREST

Compiled by Robert M. Frame III, Minnesota Historical Society,
and Robert M. Vogel

Walton Bean, **Building the Central Pacific RR.** In *Walton Bean's California: An Interpretive History*, pp. 171-81. N.Y.: McGraw-Hill, 1978.

Charles Bias, **The Completion of the Chesapeake & Ohio RR to the Ohio River, 1869-73.** In *W. Va. History*, Summer 1979, pp. 393-403. (W. Va. Hist. Soc., Science & Culture Center, Charlestown 25305.)

John R. Bockstoe, **Steam Whaling in the Western Arctic.** Seattle: Univ. of Washington Press, 1977. 127 pp. \$15. Rev.: *Business Hist. Rev.*, Autumn 1979.

Margaret F. Byington, **Homestead: The Households of a Mill Town.** (1910 Reprint). Pittsburgh: Univ. Center for International Studies, Univ. of Pittsburgh, 1974. 292 pp. \$6. Penetrating social study of 90 families in their interaction with U.S. Steel's Homestead Works. New intro. by Samuel P. Hays. Might well be contrasted with the 1911 classical, similar study of a textile mill town: *The Lawrence Survey*.

Louis P. Cain, **Sanitation Strategy for a Lakefront Metropolis: The Case of Chicago.** De Kalb: Northern Ill. Univ. Press, 1978. 173 pp., illus., maps. \$15. Mixed rev. by Carl W. Condit [SIA] in *Tech. & Culture*, Oct. 1979.

Carl W. Condit [SIA], **The Port of New York — A History of the Rail and Terminal System from the Beginnings to Pennsylvania Station.** Chicago: Univ. of Chicago Press, 1980. 456 pp. \$29.95. The ultimate account of the complex railmarine transportation systems that evolved between 1830 and 1910.

Brian J. Cudahy, **Under the Sidewalks of N.Y.: The Story of the Greatest Subway System in the World.** Brattleboro, Vt.: Stephen Green Press (Box 100, 05301), 1979. 176 pp. \$16.95.

Neal FitzSimons [SIA] (Ed.), **Engineering Classics of James Kip Finch.** Kensington, Md.: Cedar Press, 1978. 189 pp. \$10. Collection of Finch's articles in *Consulting Engineer*, 1959-1968. Great engineering books of antiquity; great engineers; important articles. Rev.: *Tech. & Culture*, Oct. 1979.

W.K.V. Gale, **Iron & Steel.** Buxton, Derbyshire: Moorland Publ. Co., 1977. 112 pp., illus. \$12. Rev.: *Tech. & Culture*, Oct. 1979.

H. Roger Grant & Charles W. Bohi, **The Country Railroad Station in America.** Boulder, Colo.: Pruett Publ. Co. (3235 Prairie Ave., 80301), 1978. 192 pp., illus. \$22.50. Architectural overview of the combination freight and passenger station and the importance of the country depot as a community hub.

Herbert H. Harwood, Jr. [SIA], **Impossible Challenge, The Baltimore & Ohio RR in Maryland.** Balto.: Barnard, Roberts & Co., 1979. 497 pp., heavily illus. \$40. Thorough, vital account of the most important American RR venture: the B&O's initial segment from Baltimore to Harpers Ferry, and all other B&O lines in the Free State. Full description of operations and structures. To be reviewed in *IA*.

Patricia Hills & Abigail Booth Gerds, **The Working American.** Washington: Smithsonian Institution Traveling Exhibition Service, 1979. (SITES, SI, 20560). 68 pp., 50 illus. \$6. The catalog of a show sponsored by District 1199, Natl. Union of Hospital & Health Care Employees, and SITES. 42 paintings by a wide variety of Amer. painters of work in all its aspects: mill & factory; street & forest; field & mine. Splendid illus. essay by Hills; catalog annotation by Gerds. Wonderful.

John H. Lienhard, **The Rate of Technological Improvement Before & After the 1830s.** In *Tech. & Culture*, July 1979, pp. 515-30.

George S. May, R.E. Olds, **Auto Industry Pioneer.** Grand Rapids, Mich.: Wm. B. Eerdmans Publ. Co., 1977. 458 pp. \$13.95. Rev.: *Business Hist. Rev.*, Autumn 1979.

A.E. Musson, **The Growth of British Industry.** NY: Holmes & Meier, 1978. 396 pp. \$29.50. Rev.: *Tech. & Culture*, Oct. 1979.

Richard H. Peterson, **The Bonanza Kings: The Social Origins and Business Behavior of Western Mining Entrepreneurs, 1870-1900.**

Nebr.: Univ. of Nebr. Press, 1977. 191 pp. \$9.95. Rev.: *Business Hist. Rev.*, Autumn 1978.

William W. Ray, **Crusade or Civil War?: The Pullman Strike in California.** In *Calif. History*, Spring 1979, pp. 20-37., illus.

Mark H. Rose, **Interstate: Express Highway Politics, 1941-56.** Lawrence: Regents Press of Kans., 1980. 169 pp. \$14.

Ralph Samuel (Ed.), **Miners, Quarrymen & Slateworkers.** London: Routledge & Kegan Paul, 1977. 363 pp., illus. \$20. Favorable rev. by R.P. Multhauf [SIA] in *Tech. & Culture*, Oct. 1979.

Robert L. Schuyler (Ed.) [SIA], **North American Archaeologist.** Farmingdale, N.Y.: Baywood Publ. Co., Inc. (P.O. Box 609, 11735). 1979-80. \$15./yr. An important new journal.

Paula A. C. Spero, **Metal Truss Bridges in Virginia: 1865-1932 (No. 6—The Lynchburg Construction District).** Charlottesville: Va. Highway & Transportation Research Council, 1979. 68 pp. Gratis. Continuation of Va's. truss inventorying project, unique in the U.S. Good general discussion and listing of all trusses with any metal principles. Photos of more interesting examples. Incls. the Lynchburg Fink deck truss of 1870 [SIAN Jan/Mar 79].

P. J. Stoddart, **The Development of the Southern Ontario Steam Ry. Network Under Competitive Conditions—1830-1914.** M.A. thesis, Univ. of Guelph (Guelph, Ont.), 1976.

John F. Stover, **Iron Road to the West: American Railroads in the 1850s.** N.Y.: Columbia Univ. Press, 1978. 266 pp. \$14.95. Favorable rev.: *RR History* 140, 1979.

Michael D. Thompson, **The Iron Industry in Western Maryland.** Wash. Co. Tourism Office (Court House Annex, Hagerstown, Md. 21740), 1978. 157 pp. \$4. A synthesis showing interrelationships among the western Maryland furnaces.

Robert A. Weinstein, **The Tall Ships on Puget Sound: The Marine Photographs of Wilhelm Hester.** Univ. of Washington Press, 1978.

David Weitzman [SIA], **A Conversation with Bridge 3.** In *Historic Preservation*, Nov/Dec 1979, pp. 10-17. General commentary on preservation of iron truss bridges, illus.

Elizabeth Willmot, **Faces & Places Along the Railway.** Toronto: Gage Publishing, Ltd., 1979. 126 pp., \$17.95 Canadian. Lushly illus. account of, mostly, stations, but other structures and their inhabitants along Ontario's Rys. Wonderful.

Alfred Wislicki, **The Development of Excavating Machinery From a Historical Perspective.** Warsaw: Institute of the Mechanization of Building, 1976. 150 pp. z150. Thoroughly analytical, describing kinematics, drives, power systems, from 15th c. to early 20th c. In Polish but useful nonetheless. Rev.: *Tech. & Culture*, July 1979.

Helena Wright [SIA], **New City on the Merrimack: Prints of Lawrence, 1845-1876.** N. Andover, Mass.: Merrimack Valley Textile Museum, 1974. (800 Mass. Ave. 01845) 32 pp. \$3.50. Outstanding grouping of lithographs and engravings of the mills, workers, houses, canals, and the dam, that formed the first textile "new" city following Lowell, during its first 30 years. Good introduction and annotations. Really tip-top.

The Best From American Canals. The American Canal Soc., 809 Rathton Rd., York, Pa. 17403, 1980. 92 pp., 150 illus., \$6. Compilation of feature articles in past issues of ACS's *American Canals*. Swell.

A HISTORY OF THE AMERICAN LOCOMOTIVE

Dover Publications (180 Varick St., N.Y.C. 10014) has reprinted John H. White, Jr.'s engineering study of early American locomotives, originally published in 1968 by Johns Hopkins Press. The book has been out of print for many years. The reprint is paper bound and somewhat reduced in size from the original, but the line drawings are much clearer and the price is only \$10. for 528 pp. The book contains text and illustrations on locomotive builders, materials, performance, representative machines, sample specifications, and biographical sketches of important personages. It is fully documented and indexed.