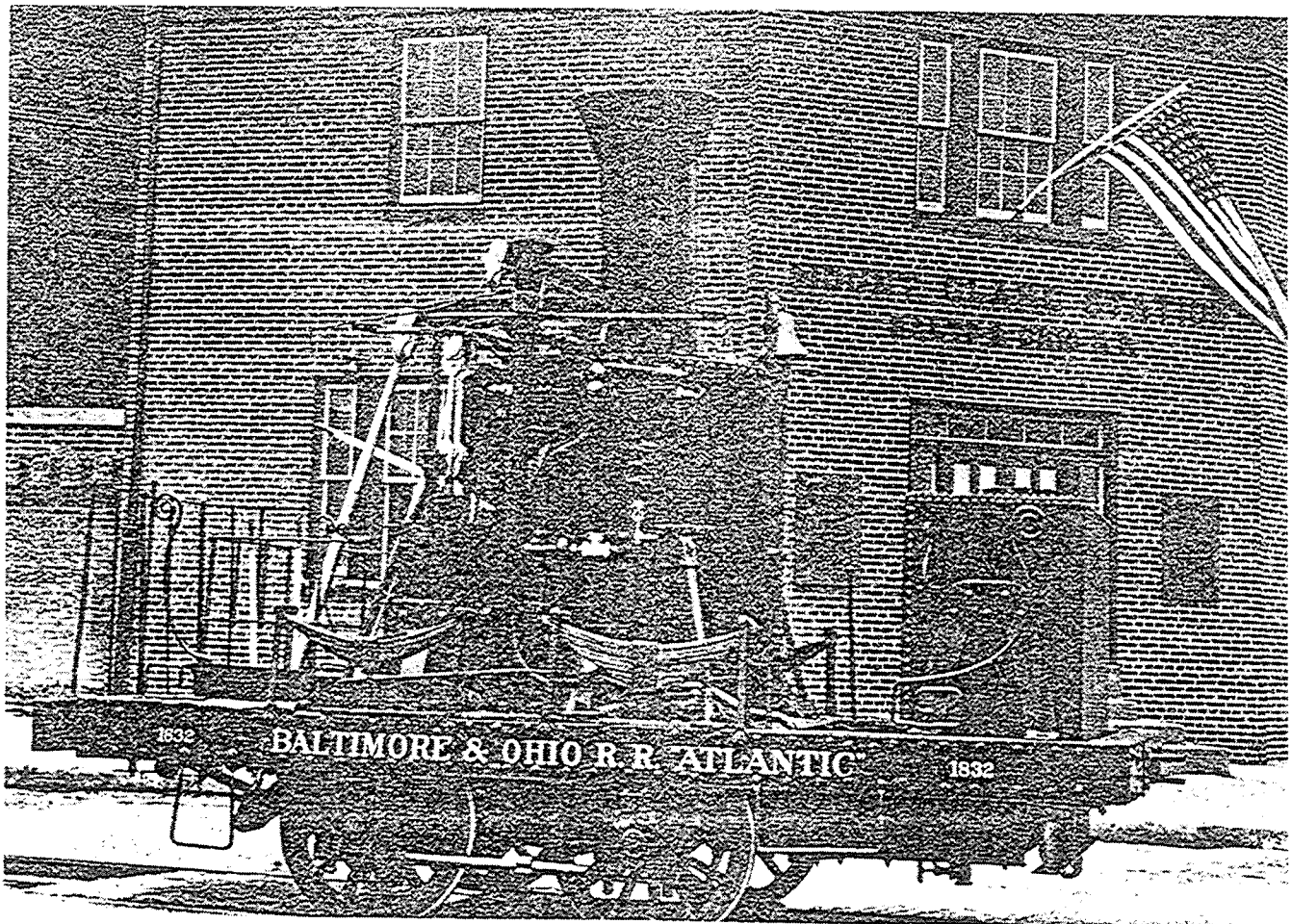


A
NATIONAL HISTORIC
MECHANICAL ENGINEERING LANDMARK

THE BALTIMORE & OHIO RAILROAD

1828

BALTIMORE, MARYLAND



THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

April 27, 1978

PROGRAM
DEDICATION CEREMONY
BALTIMORE & OHIO RAILROAD
BALTIMORE, MD

The ASME National Historic Mechanical Engineering Landmark Program :

Tuesday, April 27, 1978

11:00 A.M.

Master of ceremonies - Bill Arnold

Introduction of honored guests by Bill Arnold

Welcoming talk by Mayor Schaefer

Explanation of National Engineering Landmark
Program by Dr. Donald E. Marlowe

Review of this Landmark Project by Ed Parkison
and John Hankey

Remarks by Congressman Long

Presentation of Plaque by Dr. Kezios to R.S. Henry

Remarks and announcements by Bill Arnold

Tours of Museum

NATIONAL HISTORIC MECHANICAL ENGINEERING LANDMARK

BALTIMORE AND OHIO RAILROAD "OLD MAIN LINE"

by Ed Parkison

INTRODUCTION

Although the Baltimore and Ohio Railroad was not the first railroad chartered or even the first to begin construction in the United States, it was, however, the first to be either chartered, built, or operated as a common carrier. All previous American railroads were private in nature and were created for the purpose of hauling the goods and materials of their owners.

The Baltimore and Ohio Railroad was also the first created in furtherance of the national purpose--the opening of the interior of America and its connection with the eastern seaboard. It was the first railroad to carry paying passengers (January 7, 1830) and it is now the oldest railroad in the United States by any measure or qualification.

THE NATIONAL PURPOSE

After the American Revolution, the vast Northwest Territory (comprising the states of Ohio, Indiana, Illinois, Michigan, Wisconsin, and part of Minnesota) was ceded to the new United States by Britain, who won the area in 1763 in the French and Indian War. American settlers began moving into the new territory soon after the Revolution, but not until 1795 did the flood of immigration begin (by virtue of the forceful dispossession of the Indian inhabitants of the region by General Anthony Wayne).

President Jefferson next secured the purchase of the Louisiana Territory (in 1803), which then gave the United States title to the vast Mississippi River watershed and most of the land east of the Rocky Mountains (excepting Texas, most of Oklahoma, and parts of Kansas, New Mexico, Wyoming and Colorado).

The Ohio River, running nearly a thousand miles to the Mississippi, was navigable all the way, and was the link to settlement to and commerce with, the East. Most of the produce from the central heartland of America found an easy access to the sea down the Ohio and Mississippi Rivers, providing New Orleans with a superiority that threatened the eastern cities on the far side of the Appalachian Mountains.

THE BEGINNING

This pressure stimulated the State of New York into building the Erie Canal, which was completed in 1825, opening the Great Lakes to commerce with the Atlantic coast and giving New York City the financial and commercial leadership of the nation. Only the northern part of the midwestern heartland was affected by this development, however, because the lower Mississippi and Ohio valleys were still virtually closed to the east by the Appalachian Mountains.

To overcome this obstacle, the National Road was developed under the auspices of the Federal Government--the first Interstate Highway system. From Cumberland, Maryland in 1808, it reached the Ohio River at Wheeling, West Virginia (then Virginia) in 1817. Due to the thousands of settlers moving westward over this road, the route soon became inadequate for the traffic.

Two rival companies, one to enhance the commercial advantages of Washington, D.C., and the other those of Baltimore, Maryland (then the nation's third largest city), began construction of their respective projects for replacing the National Road on the same day one hundred and fifty years ago--July 4th, 1828. In Washington, John Quincy Adams, President of the United States, laid the first stone of the Chesapeake and Ohio Canal. In Baltimore, the sole surviving signer of the Declaration



Charles Carroll of Carrollton (with spade) assisting in the laying of the "First Stone" of the Baltimore and Ohio Railroad.

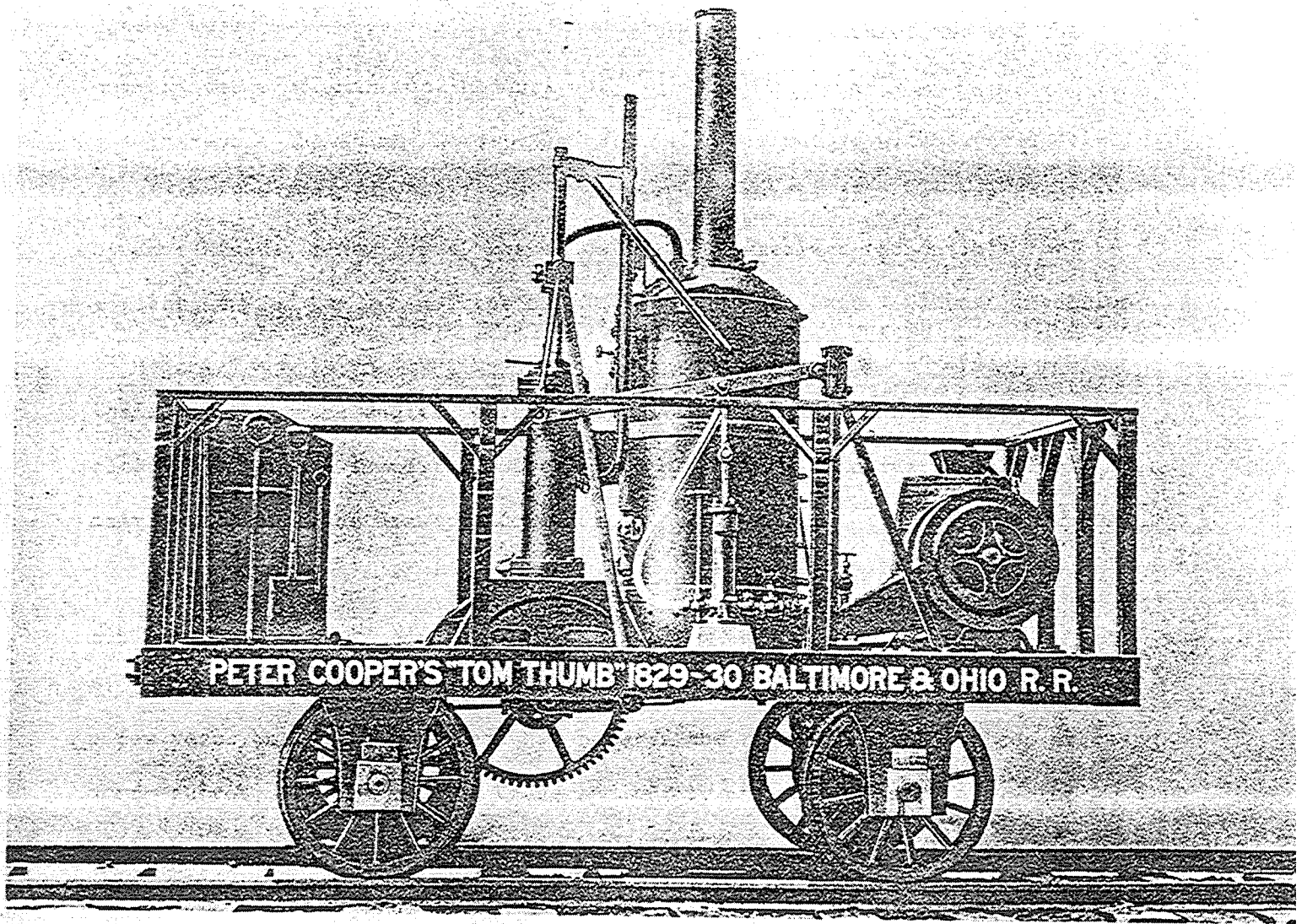
of Independence, 92 year-old Charles Carroll of Carrollton, turned the first spade of earth for the Baltimore and Ohio Railroad. On this occasion, Mr. Carroll was reputed to have remarked that the significance of his act was second only to his signing of the Declaration in its importance.

THE CONSTRUCTION

The actual implementation of Baltimore's design required engineering talent. At that time, there were no engineering schools in the United States except the United States Military Academy at West Point. From the Army came Col. Stephen H. Long (who had previously led one of the first western expeditions for the United States, and for whom Long's Peak, highest in Rocky Mountain National Park, is named) who was in charge of determining the route and the building of the bridges. The army also furnished Major George Whistler (father of the famous artist, James McNiell Whistler, and husband of the artist's most famous subject).

The railroad also drew heavily on those who had been involved in the construction of the National Road, such as Jonathan Knight, Chief Engineer of the Baltimore and Ohio Railroad for many years, and who was responsible for most of the actual construction and many of the innovations on the road. He was joined by Casper Wever as Superintendent of Construction. One of the fathers of truss design, Wendel Bollman, began as a carpenter laying track between Baltimore and Ellicott City; and Albert Fink, another truss designer, also worked on this road.

By the end of 1829 the rails were down a few miles outside of Baltimore-- enough so that the first railroad passengers in America paid for the privilege of riding on the cars, which were then horse drawn. At this time, there was no form of motive power on the Baltimore and Ohio other than animal-drawn



One of three current representations of the "Tom Thumb" -- one of America's most famous locomotives.

trains because of the inadequacy of the English made locomotives and the non-existence of American locomotives.

To reduce the animal loads, the railroad experimented with several designs for cars and undercarriages. The most successful of these was developed by Ross Winans, a New Jersey horse dealer, who later was responsible for a great many of the locomotives on the Baltimore and Ohio. Winans' invention, involving an integral wheel and axle combination, with the flanges on the inside of the track and the entire assembly mounted in journal bearings outside, became an immediate success (and still in use today)--requiring only a few pounds of draw per ton of load.

THE IRON HORSE

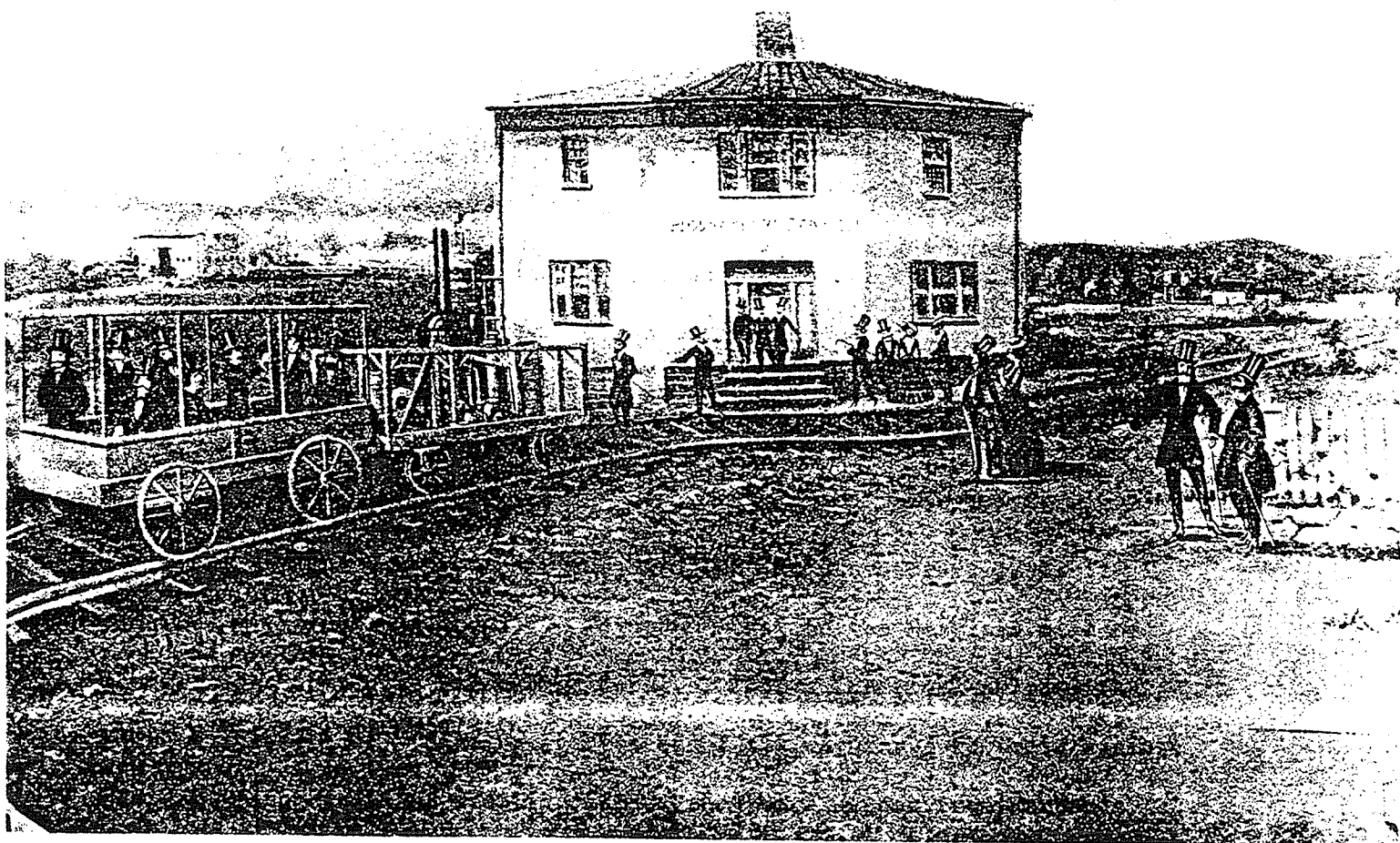
Although the development of the railroads in England had been accomplished a few years before, those roads had none of the requirements for steep grades, sharp curves, nor the need to traverse largely unexplored territory. The English locomotives could not pull the grades that were being located by the surveying crews on their way over the Appalachians on their way to the Ohio River.

The first locomotive to be tested on the new line was Peter Cooper's "Tom Thumb", which was able to make the run from Baltimore to Ellicott City at an unprecedented speed of 13 miles per hour (subsequent to an ignominious defeat by a horse as a result of mechanical failure).

Because this little engine, famous as it has become, had insurmountable limitations, a contest was held in 1831 to select a locomotive more suitable for the intended service. The contest rules stipulated a coal or coke burning boiler which consumed its own smoke, a maximum working pressure of 100 psi, the ability to withstand a hydrostatic test of 300 psi, a weight limitation of 3½ tons, and a drawbar pull of 15 tons at 15 miles per hour, to name a few of the conditions



The "Andrew Jackson", rebuilt to represent "The Atlantic", the first
"Granite" B&O. ↳ 1832



An artist's conception of an early representation of Mt. Clare Station. Probably not factually accurate.

Only the "York", built by Phineas Davis of York, Pennsylvania, met the test. From this prototype came the "Atlantic", then in quick succession, the "Traveller", and the "Arabian" (which became the first to cross the high ridge between Baltimore and Federick, and which received the Baltimore and Ohio's "No. 1" locomotive when the numbering system was adopted several years later). Although each of these engines had some degree of mechanical improvement over its predecessor, they all carried upright boilers, and all were built by Phineas Davis, who was later killed on the line when he was thrown from his own engine.

TO HARPER'S FERRY

60 miles

When the road reached Federick, Maryland, in December of 1831, it had become the world's longest. Point of Rocks, on the Maryland side of the Potomac River, was reached in April of 1832. The track skirted the edge of these rocks, fighting every step of the way for a foothold against the competing canal and finally reached the shore across from Harper's Ferry in 1834. It then required two years to cross the river and gain access into Virginia, which had not originally chartered the railroad.

From the time the road left Baltimore, the system underwent constant development and improvement. Each few miles brought some necessary change in the roadbed dictated by unforeseen conditions. The track itself saw a profound change, and evolved from wood stringers and stone sills to the "T" section that is very similar to that used today. Constant improvement in the motive power was dictated by the increasing grades and need for efficiency. By the time Harper's Ferry was reached, the Baltimore and Ohio was ready to purchase locomotives with horizontal boilers. It is important to note that the development of the road and the development of the motive power, along with the development of other rolling stock and the system itself,

** 1 Dec 1834*

went hand-in-hand, each dependent on the limitations of the other. Also, about this time, the profession of Engineering, which began as a military enterprise, became divided into its disciplines of Civil and Mechanical. The early development of the railroad was in no small way responsible for this change. The Baltimore and Ohio Railroad can take pride in its vanguard position in the development of America's and the world's railroad systems. It truly deserves its reputation as "The Railroad University".

Ed H. Parkison
Project Historian

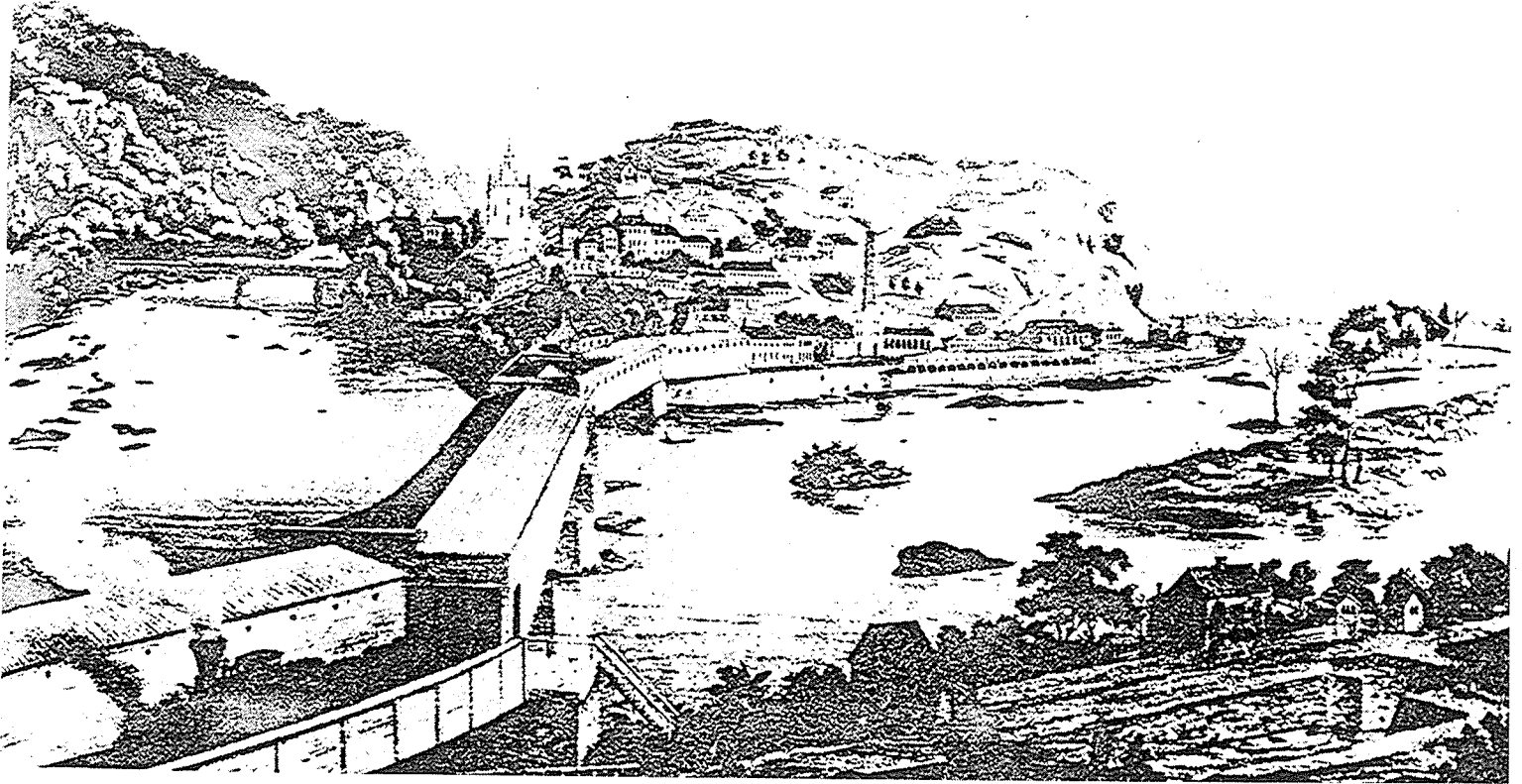
ILLUSTRATION CREDITS: All Illustrations are from the Baltimore and Ohio Transportation Museum and Archives, The Chessie System

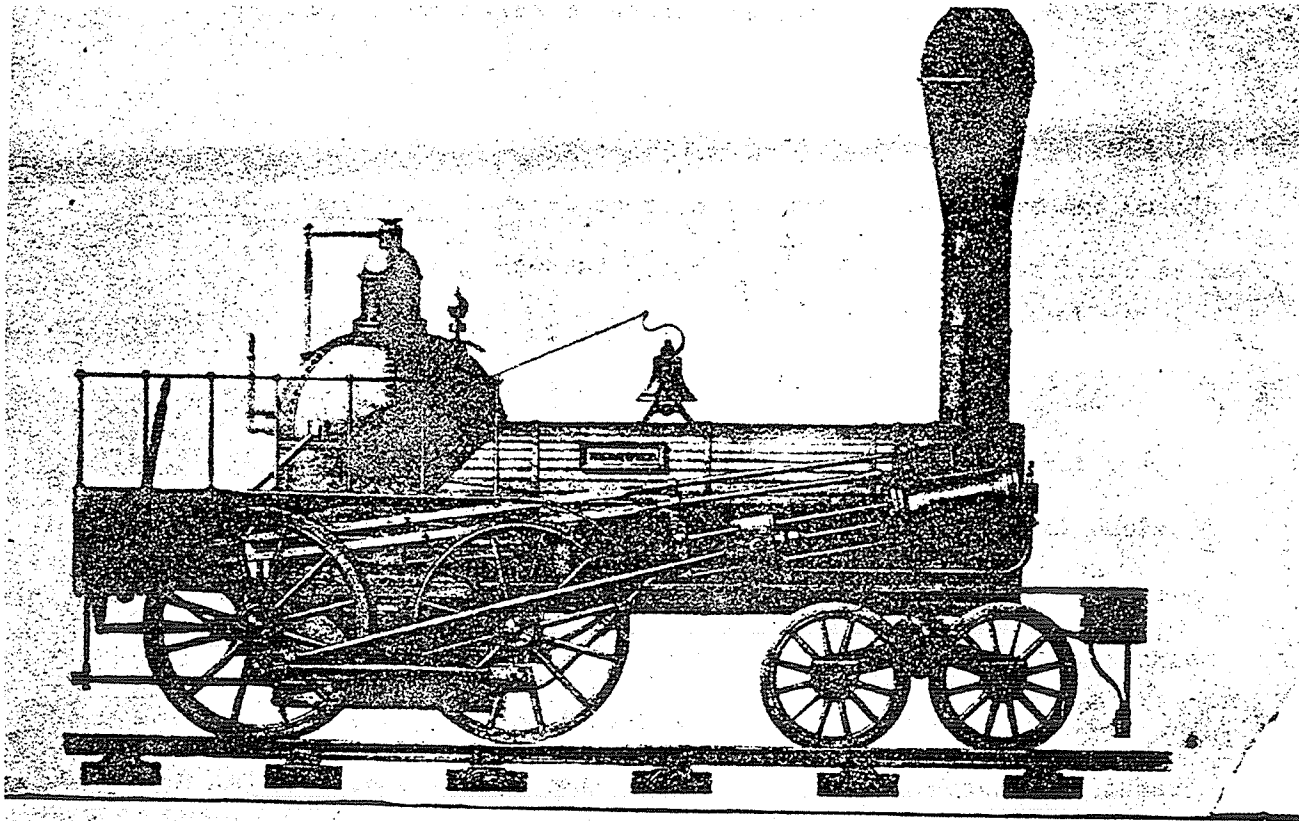
DEDICATION PLAQUE

"THE DEVELOPMENT AND APPLICATION OF THE RAILROAD ENGINEERING CONCEPTS AND EQUIPMENT WHICH OPENED THE AMERICAN WEST BEGAN HERE IN 1828. THIS ROUTE, BETWEEN MT. CLARE AND HARPER'S FERRY, PRESERVES ITS ORIGINAL ALIGNMENT AS AMERICA'S OLDEST RAILROAD."

BIBLIOGRAPHY

- Bell, J. Snowden, The Early Motive Power of the Baltimore and Ohio Railroad, New York, 1912 (Republished by Glenwood Publishers, Felton, Calif.)
- Hungerford, Edward, The Story of the Baltimore and Ohio Railroad, 1827-1927, New York, 1928
- Sagle, Lawrence W., B & O Steam Power, Baltimore, 1964
- Scott, Elsie, The Catalogue of the Centenary Exhibition of the Baltimore and Ohio Railroad, 1927
- White, John H., Jr., American Locomotives, An Engineering History, 1830-1880, Baltimore, 1968





LOCOMOTIVE "MERCURY"
AFTERWARDS NO. 30
BUILT BY EASTWICK & HARRISON FOR B & O. R. R. 1842.

The "Mercury", one of the early Horizontal Boiler Locomotives used on the Baltimore and Ohio Railroad.

EARLY LOCOMOTIVES OF THE BALTIMORE AND OHIO RAILROAD

1829-1830 Tom Thumb Peter Cooper, Builder--The Baltimore and Ohio's first steam-powered locomotive. Displaced the horse as the primary means of motive power.

1831 York Phineas Davis, Builder--winner of the first prize in the Baltimore and Ohio competition. Vertical boiler, no tubes, with center flue extending down from the crown to cylindrical drum firebox, carried on a frame supported on two pairs of drivers with outside cranks, vertical cylinders. 3½ tons. Remodelled by relocating cylinders to the back of the boiler and driving through spur gears on one pair of drivers.

1832 Atlantic Phineas Davis, Builder--four-wheeled, vertical boiler, vertical cylinders, single driver, walking beam, Grasshopper type.

1833 Traveller Phineas Davis, Builder--four-wheeled, vertical boiler, vertical cylinders, walking beam, Grasshopper type. First "booster" drivers. Iron plated frame.

1834 Arabian Davis and Gartner, Builders--four-wheeled, vertical boiler, vertical cylinders (12" x 22"). First locomotive over the ridge between Baltimore and Frederick.

A BRIEF CHRONOLOGY OF THE B&O

- 1827 - The B&O Railroad was founded by a group of Baltimore businessmen to link the Atlantic Seaboard with the Ohio River.
- 1830 - The B&O began operation as the first American railroad in public service. The first horse-drawn trains soon were succeeded by American-built locomotives.
- 1834 - The B&O main line was opened to Harpers Ferry, Va. (now W.VA.). Freight trains began to bring to Baltimore the agricultural and mineral products of the Shenandoah and Potomac River Valleys.
- 1835 - The B&O completed its line and inaugurated service between the cities of Baltimore and Washington.
- 1844 - Samuel F.B. Morse set up his first telegraph line along the B&O's right-of-way between Baltimore and Washington. The famous first telegram, "What Hath God Wrought" , was sent between these cities on May 24.
- 1850 - The first electric locomotive, constructed by a Dr. Charles Grafton Page, was tested on the Washington Branch of the B&O.
- 1852 - On December 24, the tracks of the B&O were laid through to the Ohio River at Wheeling, the original objective.
- 1857 - With the completion of the Northwestern Virginia, the Marietta and Cincinnati, and the Ohio and Mississippi Railroads—all of which are included in the B&O system—a direct rail route was opened all the way from Baltimore to St. Louis, in the heart of the Mississippi River Valley. Great celebrations marked the event.
- 1861 to 1865 - The B&O served as the lifeline of the North during the Civil War. John W. Garrett, Southern-born B&O president, dedicated his own services and those of the railroad to the Union cause.
- 1863 - The B&O helped handle the greatest mass military movement by rail in history (until that time). This comprised 20,000 troops with horses, mules and other equipment, including material for pontoon bridges. The force was moved from Washington D.C. via Indianapolis and Louisville to Chattanooga in 11 days.
- 1874 - The B&O Railroad gained its first entrance into Chicago and many other midwestern cities.
- 1886 - The eastern terminus of the B&O was extended to Philadelphia. From there, B&O trains operated (and still do) over the tracks of the Reading Co. and the Central Railroad of New Jersey into Jersey City, with ferry connections to New York.
- 1917 to 1918 - The B&O played an important role in World War I in the Transportation of troops and war material.
- 1927 - The B&O celebrated its 100th anniversary with the famous *Fair of the Iron Horse* , a mammoth pageant and exhibit depicting the

history of transportation in America.

1941 to 1945 - The B&O served the Nation in World War II, as army training camps and war production plants sprang up along its lines. Serving three major East Coast ports - New York, Philadelphia and Baltimore - the B&O helped to carry many of the men and much of the material destined for overseas theatres of operations.

1951 - The B&O had grown to be one of the nation's great rail systems, with 6,000 miles of line, 2,000 locomotives and 100,000 cars.

SOME B&O FIRSTS

- First railroad to be chartered and built in America--February 28, 1827.
- First to use a "wagon", father of today's freight car, invented by Ross Winans--December 1828.
- First to operate a locomotive built in America, the "Tom Thumb", -- September 1829.
- First stone-arch railroad bridge in America, the "Carrollton Viaduct"-- completed November 7, 1829.
- First to earn passenger revenue--December 1829.
- 2 First to use car wheels that revolved with axles (invented by Ross Winans)-- 1829.
- First to build a railroad passenger and freight station, "Mount Clare"-- 1829 (Rebuilt 1830).
- First to publish a timetable--May 23, 1830.
- First to complete a double-track line, Baltimore to Ellicott's Mills-- February 1831.
- First to operate an 8-wheel passenger coach, the "Columbus" (designed by Ross Winans)--July 4, 1831.
- First to use iron wheels on passenger cars--1832.
- First to operate a railroad shop, Mount Clare, Baltimore (through contact with Phineas Davis)--1833.
- First to use a baggage car--1834.
- First to enter Washington--August 24, 1835
- First to have a government contract for carrying mail--effective January, 1, 1838.
- First to use dining or "Refectory" cars--1843.
- First telegraph line, Baltimore to Washington, constructed along B&O lines--1844. (First message transmitted May 24, 1844.)
- First to use iron box cars, forerunner of present all-steel cars--1844.
- First to test an electrically-operated locomotive (invented by Charles Grafton Page)--April 29, 1851.
- First rail line to reach the Ohio River from Eastern seaboard--December 24, 1852. *Wheeling*
- First to operate through service from Atlantic Coast to Mississippi River-- June 21, 1857.

- First to operate a railway express company--August 1, 1877.
- First to place an electric locomotive in regular service--June 27, 1895.
- First to operate a streamlined passenger train, Baltimore to Washington--
May to August, 1900.
- First to operate an air-conditioned car, the "Martha Washington" diner--
April 1930.
- First to operate a completely air-conditioned train, the "Columbian"--
May 1931.
- First to operate Diesel-electric locomotives in long distance passenger
service--August 22, 1935.
- First to provide scheduled door-to-door carload freight service (Sentinel
Service)--1947.
- First to provide high-speed, scheduled door-to-door less-carload freight
service (Time-Saver Service)--1950.
- First in the Eastern U.S. to install strata-dome coaches and sleepers
on its passenger trains--1949 and 1951.

ACKNOWLEDGEMENTS

Our History and Heritage Committee wishes to acknowledge the efforts of those who were active in the pursuit of this National Mechanical (and Civil) Engineering Landmark. These people would include Henry Naylor, the originator of the idea, Ed Parkison, our research historian who put much time into both research and writing, our past chairman, Francis Macaluso, Jodee Sacco and John Hankey at the B&O Museum who extended us many courtesies and much assistance, and George Kotnick, Earl Madison, Carron Donahue and others at A.S.M.E National who gave us much encouragement and help.

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NATIONAL HISTORIC MECHANICAL ENGINEERING LANDMARK PROGRAM

In September 1971 the ASME Council reactivated the Society's History and Heritage program with the formation of a National History and Heritage Committee. The overall objective of the Committee is to promote a general awareness of our technological heritage among both engineers and the general public. A charge given the Committee is to gather data on all works and artifacts with a mechanical engineering connection which are historically significant to the profession. An ambitious goal, and one achieved largely through the volunteer efforts of the Section History and Heritage Committees, Technical Divisions and interested ASME members.

Accordingly, several programs are carried out under the direction of the National Committee. The National Landmarks program is a demarcation of local sites which are of national significance, honoring people or events which have contributed to the general development of mankind. A complete description of activities appears in MS-72, the H&H Manual. A copy is available from the ASME Public Relations Department.

The Baltimore & Ohio Railroad is the thirtieth landmark to be designated since the program began in 1973. The others are:

- Ferries and Cliff House Cable Railway Power House, San Francisco, CA - 1973
- Leavitt Pumping Engine, Chestnut Hill Pumping Station, Brookline, MA - 1973
- A.B. Wood Low-Head High-Volume Screw Pump, New Orleans, LA - 1974
- Portsmouth-Kittery Naval Shipbuilding Activity, Portsmouth, NH - 1975
- 102-inch Boyden Hydraulic Turbines, Cohoes, NY - 1975
- 5000 KW Vertical Curtis Steam Turbine-Generator, Schenectady, NY - 1975
- Saugus Iron Works, Saugus, MA - 1975
- Pioneer Oil Refinery, Newhall, CA - 1975
- Chesapeake & Delaware Canal, Scoop Wheel and Engines, Chesapeake City, MD - 1975
- U.S.S. Texas, Reciprocating Steam Engines, Houston, TX - 1975
- Childs-Irving Hydro Plant, Irving, AZ - 1976
- Hanford B-Nuclear Reactor, Hanford, WA - 1976
- First Air Conditioning, Magma Copper Mine, Superior, AZ - 1976
- Manitou and Pike's Peak Cog Railway, Colorado Springs, CO - 1976
- Edgar Steam-Electric Station, Weymouth, ~~NH~~ - 1976 *Mass*
- Mt. Washington Cog Railway, Mt. Washington, NH - 1976
- Folsom Power House #1, Folsom, CA - 1976
- Crawler Transporters of Launch Complex 39, J.F.K. Space Center, FL - 1977
- Fairmount Water Works, Philadelphia, PA - 1977
- U.S.S. Olympia, Vertical Reciprocating Steam Engines, Philadelphia, PA - 1977
- 5 Ton "Pit-Cast" Jib Crane, Birmingham, AL - 1977
- State Line Generating Unit #1, Hammond, IN - 1977
- Pratt Institute Power Generating Plant, Brooklyn, NY - 1977
- Monongahela Incline, Pittsburgh, PA - 1977
- Duquesne Incline, Pittsburgh, PA - 1977
- Great Falls Raceway and Power System, Patterson, NJ - 1977
- Vulcan Street Power Plant, Appleton, WI - 1977
- Wilkinson Mill, Pawtucket, RI - 1977
- New York City Subway System, New York, NY - 1978

