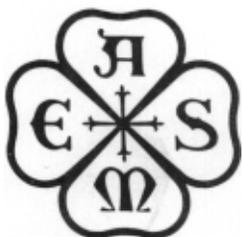


The American Society of Mechanical Engineers
The American Society of Civil Engineers



MOUNT WASHINGTON COG RAILWAY

Constructed 1869



**National Historic
Mechanical and Civil
Engineering Landmark**



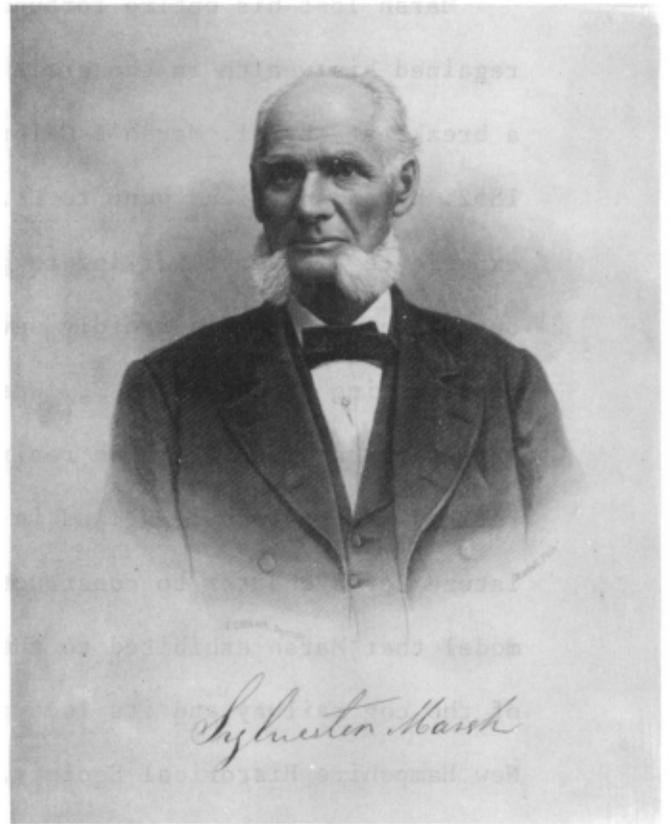
June 26, 1976

MOUNT WASHINGTON COG RAILWAY

Mount Washington, rising 6288 feet above sea level in the mountainous north country of New Hampshire, is the highest peak in the Northeast. The world's first cog railway ascends a western spur of the mountain between Burt and Ammonoosuc Ravines from the Marshfield Base Station which is almost 3600 feet below the summit.

The railway is a tribute to the ingenuity and perseverance of its founder, a civil-mechanical engineer, Sylvester Marsh.

History attributes the conception and the execution of the railway idea directly to Mr. Marsh. Indeed, his very actions personify the exacting requirements of the National Historic Engineering Landmark programs of The American Society of Civil Engineers and The American Society of Mechanical Engineers. The qualities of the Cog Railway are so impressive that, for the first time, two national engineering societies have combined their conclusions in order to designate the train system as a National Historic Mechanical and Civil Engineering Landmark.



Sylvester Marsh was born in Campton, New Hampshire on September 30, 1803. When he was nineteen he walked the 150 miles to Boston in three days to seek a job. There he worked on a farm, returned home for a short time, and then again went to Boston where he entered the provision business. After seven years, he moved to Chicago, then a young town of about 300 settlers. From Chicago, Marsh shipped beef and pork to Boston as he developed into a founder of the meat packing industry in the midwestern city. He invented many of the steam appliances and processes in this industry and was considered a founder of one of America's great cities. Although he did not patent it, he is reputed to have invented the coffee percolator in his time.

Marsh lost his entire fortune in the Business Panic of 1850, but soon regained his wealth in the grain business. During this endeavor he produced a breakfast cereal, Marsh's Caloric Dried Meal. While on a trip East in 1852, he and a friend went to Mt. Washington to climb the peak. The experience of almost failing to get to the summit and shelter because of one of the mountain's rapidly developing storms started Marsh thinking of constructing a railway up Mt. Washington.

At the age of 52, Marsh retired in 1855 and returned East. He refined his railway idea, and in 1858 applied to the New Hampshire Legislature for a charter to construct a steam railway to the summit. The model that Marsh exhibited to the Legislature to demonstrate the workings of the cog railway and its locomotive is now in the possession of the New Hampshire Historical Society. Legend has it that an amendment was offered to the charter adding permission to extend the railway to the moon! That year, Engineer Marsh received a charter to construct mountain

railways to the summits of Mts. Washington and Lafayette.

The site of the proposed railway had been partly surveyed by Marsh and his son. A complete survey was later performed by Colonel Orville Freeman, a well-known civil engineer from Lancaster, New Hampshire. In 1861, Marsh patented the now famous cog mechanism, a device for making the locomotive safe either ascending or descending a grade. Poor business conditions prevented the start of work on the railway until 1866, although Marsh continued on the refinement of project details.

The logistics of transporting equipment to the mountain base was a formidable task. All supplies had to be hauled in small lots from Littleton, 25 miles away. Marsh drove the first oxen in single file from the logging settlement at Twin Rivers to his base at present-day Marshfield (named in joint honor of Sylvester Marsh and Darby Field, first white man to ascend Mt. Washington in 1642). Following Marsh were workmen carrying ox yokes and other equipment on their shoulders. The men logged trees and built a cabin for their headquarters at the construction site. A water-powered sawmill was erected on the Ammonoosuc River and trees of the area provided the timbers for the trestles (Due to the rugged terrain, 3 of the 3½ miles of track are built on trestles.).

The first locomotive was designed by Marsh and constructed by Campbell, Whittier and Co. of Roxbury, Massachusetts. It was disassembled and hauled from Littleton to the Base Station site. A forge was built and Locomotive No. 1, "Hero," was re-assembled. This historic engine, popularly known as Peppersass (front cover photo), has but one pair of cylinders which powered only the front axle through gears. The vertical boiler, rumored to have been previously used by a sawmill, was hung on trunnions so that it

would remain upright as the locomotive overcame steep grades. A victim of a 1929 accident, Peppersass was re-assembled and is now on display at the Base Station.



Locomotive #2 - The George Stevenson

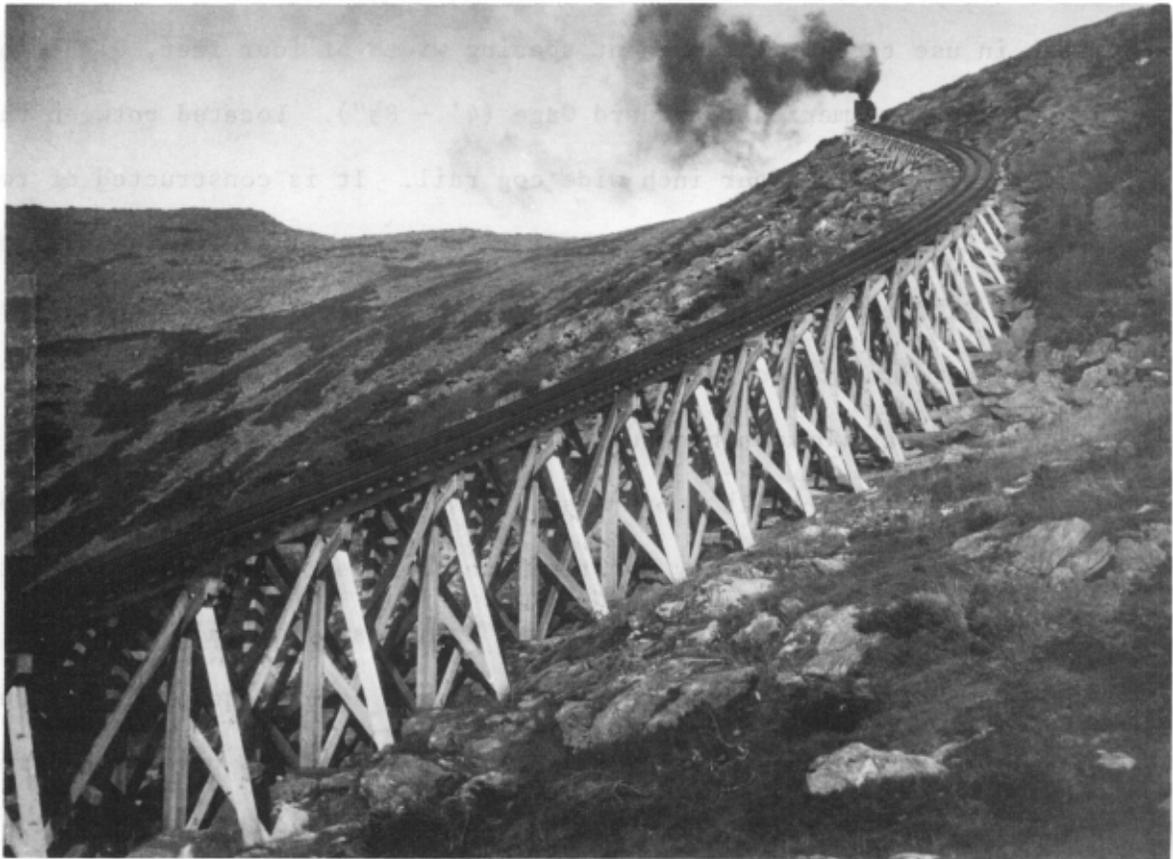
Then, as now, steam powered the mountain ascent. Marsh developed several special devices for the locomotives, including friction brakes and a ratchet, used on the upward trip, which could hold the locomotive at any grade. This first locomotive was controlled in descending the mountain by admitting air to the driving cylinders. The piston movement compressed the air, although live steam could be admitted if necessary. Also, the passenger cars had individual braking systems to control their descent.

The first rails were flat iron strips two inches wide and one-half inch thick. They were bolted to timbers fastened to the cross-ties. By 1870, these rails were replaced by more conventional rails similar to those in use today. The present spacing width of four feet, eight inches is practically American Standard Gage (4' - 8½"). Located between the two travel rails is the four inch wide cog rail. It is constructed of two angle irons 3/8th inch thick by 1½ inch diameter bolts placed four inches on center. These cog rails were -- even then -- comparatively expensive: two dollars per linear foot delivered to Marshfield.

As soon as workmen has built a length of experimental track and tested their newly-built Peppersass, it was decided to present a demonstration run on the railway to stimulate confidence in the project, thereby generating greater investor interest. The first trip on the railway was made on August 29, 1866. The driving and safety equipment was fully exhibited and the successful trial run well served its purpose: investors now believed that Marsh could accomplish his dream.

Of course, there remained much expensive construction to complete, but progress continued at a steady pace. On July 3, 1869, the first train reached the summit of Mt. Washington and the Cog Railway became the first mountain climbing railway in the world -- and with an average grade of 25%;

the steepest portion is the 37.4% grade at Jacob's Ladder! It has been in continuous operation since its 1869 opening except for one year during World War I and three years during World War II. It is interesting to note that New Hampshire manufacturers furnished several of the locomotives used in the early operations of the railway. Walter Aiken's shop in Franklin furnished some of the earliest models, followed by others from the Manchester Locomotive Works. When the Cog Railway first opened for operation, it was considered by many to be "the greatest engineering feat of the century."



Before the storm - Jacob's Ladder and cog train, climbing on Long Trestle. This is how the railway trestle looked during the 70 years that it stood up under terrific winter winds.

Engineer Marsh made little monetary gain from the railway. He invested much of his personal fortune, as well as a great deal of energy and time. He obviously enjoyed intangible rewards as he claimed the railway project cured his "dyspepsia." In 1877, the railway paid its first dividend -- nine percent. In eight years, investors received a return of 88% on their original investment.

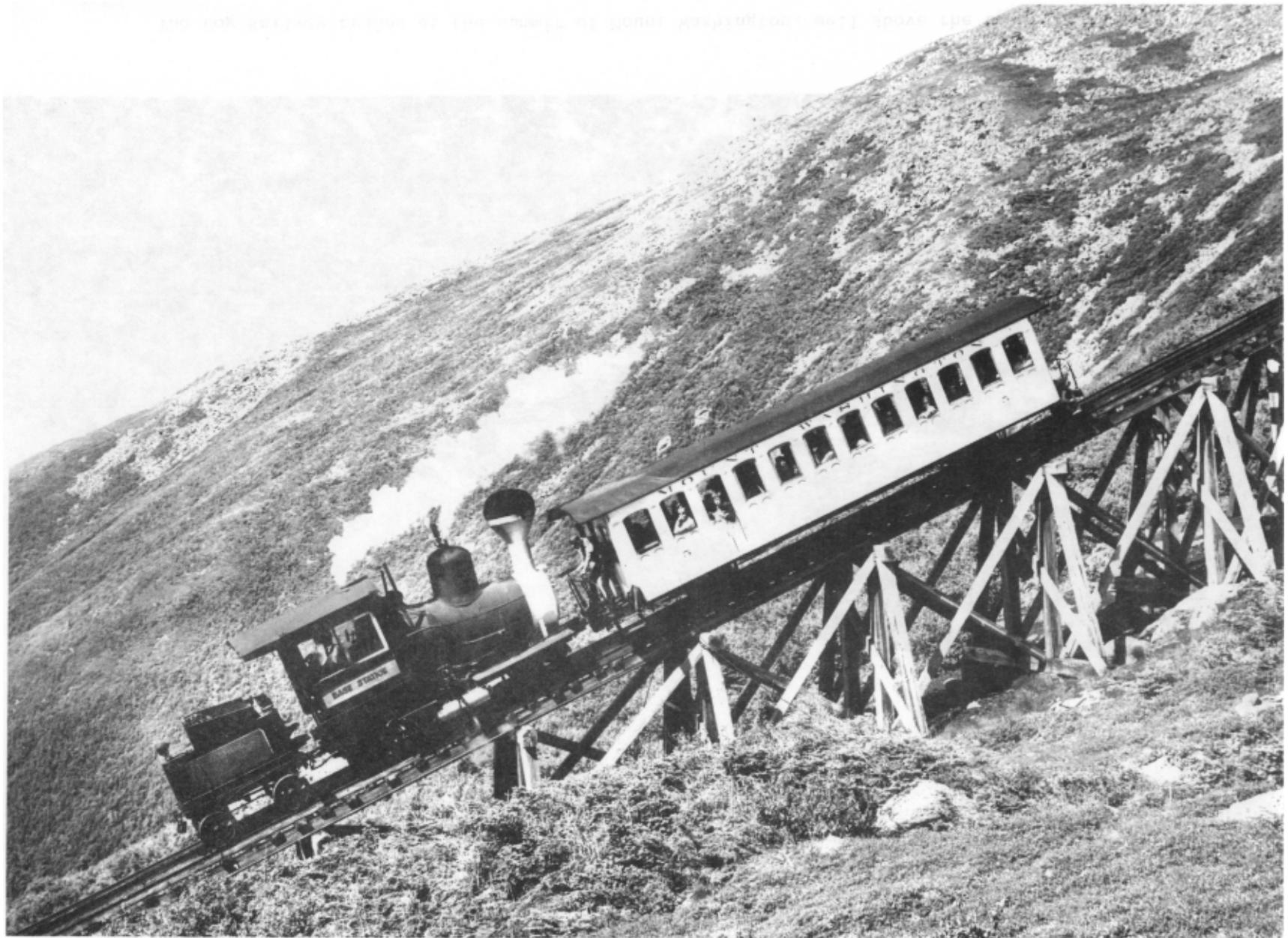
During the past century the Cog Railway had several owners. However, the name "Teague" stands out in the railway's long and successful history. In the early 1930's the Boston and Maine Railroad owned the railway, but negotiated favorable terms for purchase by Henry N. Teague, who successfully operated the railway. Upon his death, Henry Teague deeded his mountain property to Dartmouth College. In 1962, the railway was purchased by Colonel Arthur S. Teague, an energetic and capable former employee of Henry Teague. It was Arthur Teague who co-designed the side switches, installed in the 1940's, which allow trains to pass each other on the mountain. Colonel Teague, with his devoted wife and family, inspired loyal workers and accomplished a great deal with the railway. The Colonel had a Master's degree in engineering, and he put his knowledge to productive use in upgrading the railway equipment and facilities. When the affable Colonel died suddenly in 1967, his wife and most qualified associate, Ellen Teague, was elected President and Treasurer of the railway. Surely few others could have sustained the operation of the railway better than Mrs. Teague. Her enthusiasm and devotion, coupled with a very dedicated General Manager, Edward Clark, are assuring that the Mt. Washington Cog Railway remains at the top of the list of the major tourist attractions in America today.

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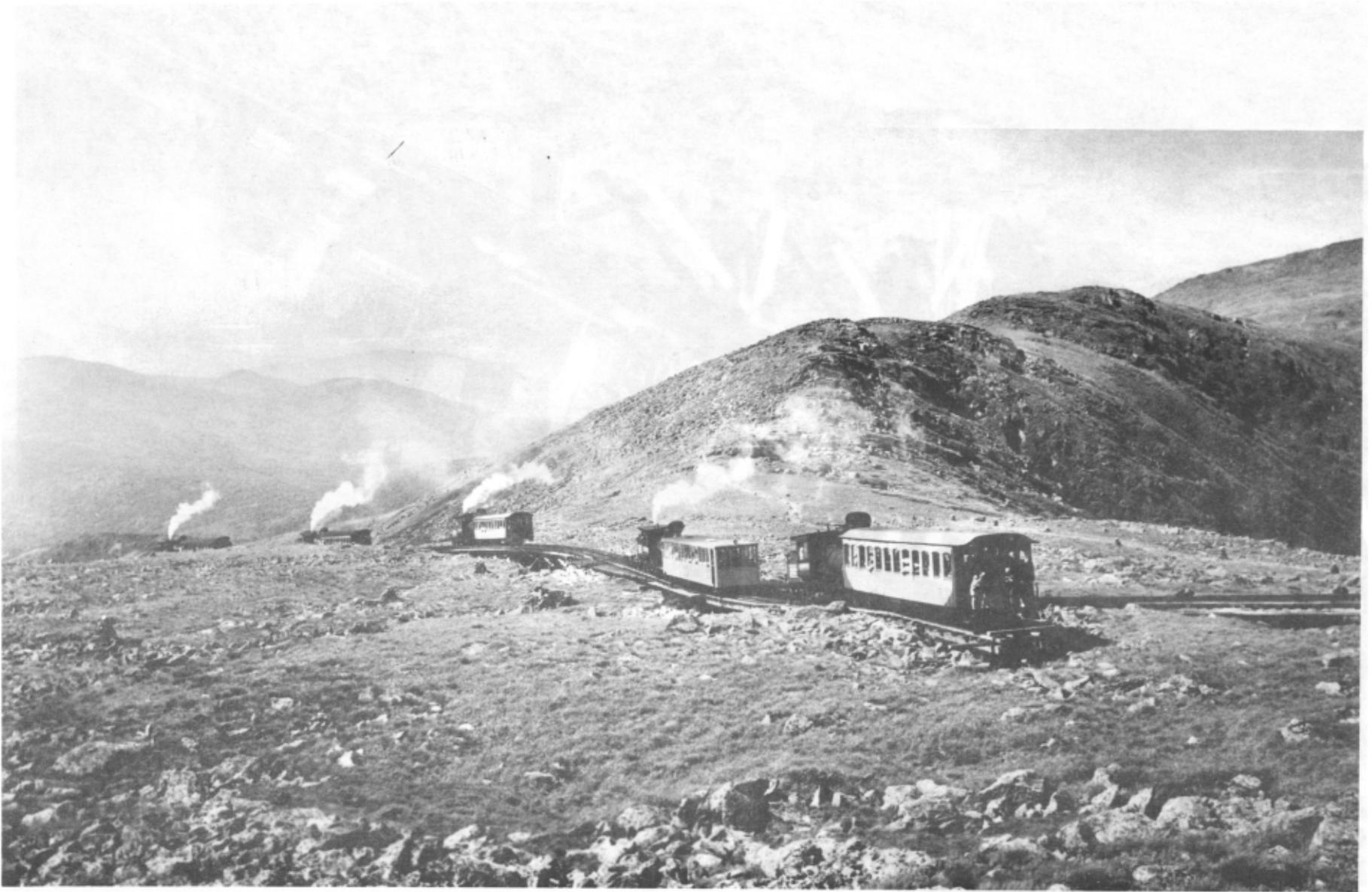
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One of the Cog Railway trains on the Jacob's Ladder, with a grade of 37.4%.

State of New Hampshire Photo



The Cog Railway trains at the summit of Mount Washington, well above the timberline.

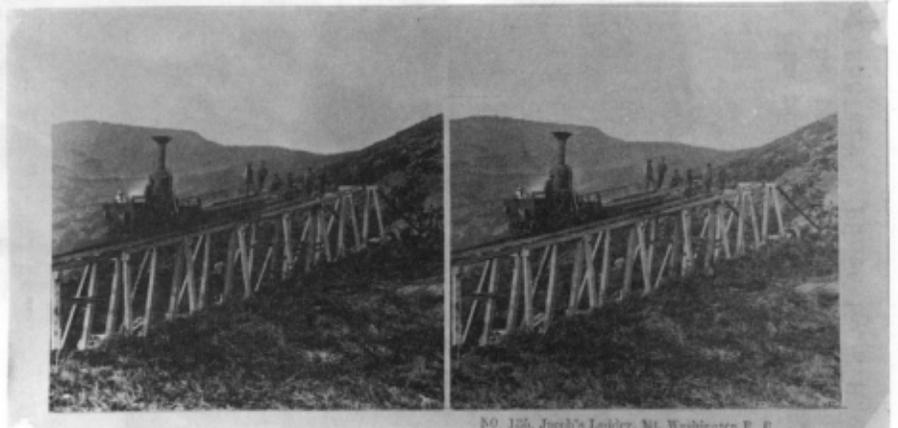
State of New Hampshire Photo



23. Sliding down Mt. Washington Railway.



No. 160. Rail Road on to Mt. Washington.

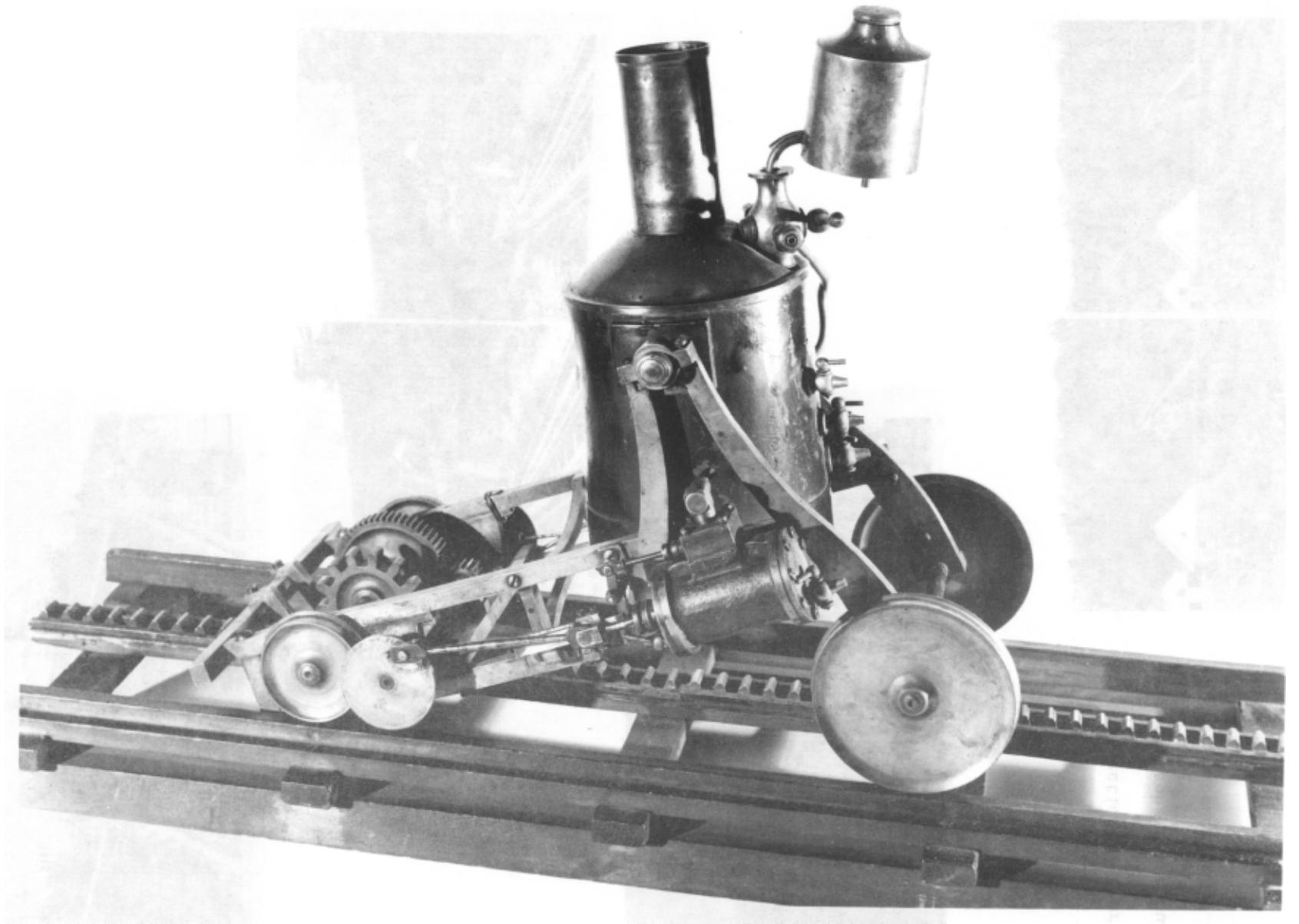


No. 125. Jacob's Ladder, Mt. Washington E. R.



No. 188 Mt. Washington E. R. Depot

A collection of stereoscope
 photographs taken during
 the construction of the
 Cog Railway



Sylvester Marsh used this model to help him persuade the New Hampshire State Legislature to grant him a charter for a railway to the top of Mt. Washington. The model is now the property of the New Hampshire Historical Society. Photo by N.H. Historical Society.

ABOUT THE ASCE AND ASME HISTORY AND HERITAGE PROGRAMS

Both The American Society of Civil Engineers and The American Society of Mechanical Engineers conduct programs whose purposes are to point out, both to engineers and the public, the technological heritage of the United States and the constant, important presence of engineers in the development of the nation. One of the ways in which this goal is achieved is through the designation and dedication of Civil and Mechanical Engineering "Landmarks:" machines, plants, bridges, viaducts, etc., that were "firsts" of their kind, the products of considerable engineering achievement, and "landmark" applications of technology.

The ASCE program is administered by the ASCE Committee on the History and Heritage of American Civil Engineering, and has been in force since 1966. At present, 57 landmarks have been designated. The ASME program is administered by the ASME National History and Heritage Committee, and the program has been in force since 1973. Presently, 17 National Landmarks have been designated, and 10 more have been approved through 1977.

Both Societies' History and Heritage programs are similar in scope, including such activities as historical publications, cooperation with The Smithsonian Institution, celebration of the American Bicentennial, and National and Local Landmark designation and dedication.

The dedication of the Mt. Washington Cog Railway is the first joint landmark dedication by the two Societies; the railway meets the standards set up by both for qualification as a National Engineering Landmark in both the areas of Civil and Mechanical Engineering. The future will undoubtedly see more such joint dedications.