



Western Maryland Shay No. 6, built by the Lima Locomotive Works in 1945, is still in use at the Cass Scenic Railroad State Park in West Virginia. (Photo on this page and track images throughout article courtesy of Walter Scriptunas II.)

Steam & Steel

Ephraim Shay and His Locomotive

By Elizabeth Wemigwase



Railroad enthusiasts no doubt recognize the name “Shay.” The name refers not only to the geared steam locomotive known for its ability to operate on almost any track but also to the man who invented it to help salvage his failing logging business. More than an inventor of an industry-shaking locomotive, Ephraim Shay used the fame and fortune he earned to transform the town of Harbor Springs, Michigan.

Since its founding in 1829, the town of Harbor Springs has been home to many well-known figures. Of those, inventor Ephraim Shay is perhaps the most beloved. A story from 1915 illustrates the admiration the Northern Michigan community felt for him. On a bright December day, a group of children—specially chosen for the honor by their peers—trotted down Main Street to deliver a flower bouquet to “Grandpa Shay.”

The *Petoskey Evening News* reported that nearly all the village's children had chipped in to purchase the flowers to show that they “appreciated all the nice things [Shay] had done for them.” Those “nice things” included having 460 bobsleds constructed as Christmas gifts for local children during the winter of 1914-1915.

Housed within the archives of the Harbor Springs Area Historical Society is a photograph showing Shay standing outside his home holding a bouquet of flowers. The photograph was labeled “Flowers from children, 1915”—leaving no doubt about the origin of the bouquet. Sadly, Shay died shortly after the children presented their gift, passing away in his home on



A portrait of Ephraim Shay. (All photos courtesy of the Harbor Springs Area Historical Society, unless otherwise noted.)

April 20, 1916, after a prolonged illness. His obituary highlighted his many accomplishments, including the invention that made him famous: the Shay geared locomotive.

Early Life

Ephraim Shay was born in Huron County, Ohio, on July 17, 1839. He was sent to his paternal grandparents in Sussex County, New Jersey, to attend a select school. After completing his education, Shay became a teacher, gaining appointments in New Jersey and Ohio.

Shay began keeping a diary in 1861. In March, while in Ohio, Shay wrote that he worked on his father's farm in Norwalk, visited relatives nearby, and finished a three-month teaching appointment in Bellevue.

Later that month, Shay traveled by train to Ionia County, Michigan, where he stayed with his mother's relatives near Muir. Although he did not state the reason for his trip, subsequent diary entries mentioned visiting plots of farmland for sale throughout the region. He might have also been scouting land for his family. Only a month after Shay's arrival, his parents and siblings moved to Ionia County, and his father took up work at a sawmill.

April 1861 was a historic month in U.S. history as the Confederate States of America launched its attack on Fort Sumter and the Civil War erupted. Shay attended a Union recruitment meeting a little over a week after the attack and enlisted for a term of three months. However, his enlistment was cut short—he had just joined his new company in Grand Rapids when he received a telegram on May 8 stating that his father had been fatally wounded in an accident at the mill.

Shay's diary entry the following day described the tragedy and its effects on the family: “Oh such feelings as I experienced standing before my father's corpse. I had but a few days before left him in sorrow, thinking that my return was doubtful. He stayed at home in peace, but how widely different the result....While still looking at him, little Arty and Velma [Shay's siblings] came in. Too young to value their loss, they commenced to tell me how ‘The mill hurt Pa’ but seemed to think he would soon wake up.”

Shay stands with a bouquet of flowers given to him by local children in 1915.





Shay in his Civil War uniform.

Wartime Service

After his father's unexpected death, Shay remained in Ionia County and remodeled a home for his mother and siblings across from his uncle's farm. At the time, the Shay family included 22-year-old Ephraim and his younger siblings, Priscilla (18), Theodore (16), Mary Ann Velma (5), and Arthur (3). Six other children—Loretta, Uzel, Victoria, Chauncy,

Susan Ann, and Florence—had died before 1861.

After his family was settled, Shay again began to travel. While in Illinois, he decided to reenlist after hearing about a Union regiment that was forming. He traveled from Bloomington, Illinois, to St. Louis, Missouri, with his new regiment and mustered into Company D of the 8th Missouri Volunteer Infantry.

Shay's diary chronicles his life during the war, tracing the movements of his company through Missouri, Kentucky, Tennessee, Mississippi, and Arkansas. Likely because of his background in education, Shay was chosen as clerk to the quartermaster's office and later appointed hospital steward under the direction of the head surgeon at hospitals in Mississippi.

In 1864, Shay was honorably discharged from the military, and in July of that year, at the age of 25, he married Jane Henderson. The couple moved back to Ionia County, Michigan, where Shay went on to serve as clerk of Sebewa Township and hold various other jobs in the area. In 1870, Ephraim and

Jane moved to Sunfield, Michigan, in Eaton County and opened a sawmill. It was there that the couple welcomed their first and only child, a son they named Lettie.

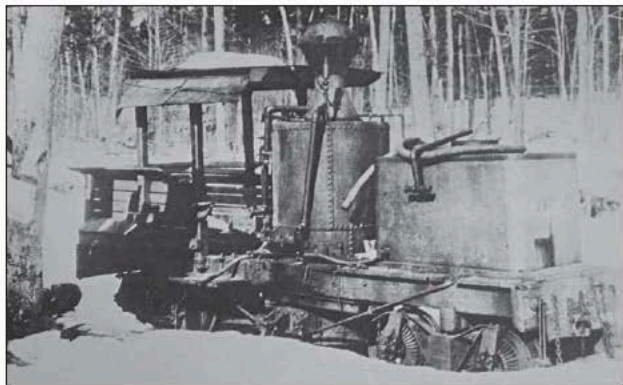
Developing a Locomotive

The Shays left Sunfield in 1873, heading north to Haring, Michigan, located near present-day Cadillac in Wexford County. There, Ephraim set up a sawmill and a general store. He also served as postmaster of the small settlement. In a letter Shay penned later in life, he described his logging business at Haring and revealed that it was in real trouble by 1875: "Business was dull and prices barely paid expenses, I was compelled to reduce costs or quit."

By far, the costliest aspect of logging was transporting felled timber to mills. During the winter, heavy loads of logs were hauled along specially constructed ice roads. Preparing and maintaining those roads was a backbreaking chore, and fickle weather conditions could spell disaster. And, because Shay's stand of timber was not located near a river or stream, transportation by water was impossible.

One solution to the problem was to use a tramway, on which horses or oxen pulled carts along thin rails. Around 1875, Shay decided to try a tramway in Haring. The track he used was basic and inexpensive, meant only to last long enough to log a particular area before being pulled up. Using that method, Shay cut costs by 50 percent. However, tramways had their problems—the biggest of which was that, while going down steep hills, the heavy log carts sometimes ran over the animals pulling them.

According to Shay, brakes on those carts proved ineffective, and he began looking for a solution. With



Milton J. Bond, a friend of Shay's, was another lumberman whose business was on the verge of failure. Shay recommended he try a Lima Machine Works locomotive. The engine that Lima constructed for Bond, pictured here, was likely a duplicate of the engine the company had rebuilt for Shay. (Photo courtesy of the Allen County Museum and Historical Society.)

Shay's locomotive allowed logging companies to transport felled timber more effectively. Pictured here is a Shay used by the lumber company Murphy & Diggins in Cadillac, Michigan. (Photo courtesy of the Claude Thomas Stoner Photographs and Papers, Bentley Historical Library, HS15724.)



the assistance of a local repair shop, he began using a light locomotive in his logging business. Shay wrote, "It worked but destroyed my track, while the cars weighing twice as much did not injure it, I could see if I could convey the power to trucks [axle/wheel assemblies] instead of the customary drivers the track would stand up. I could not use the engine on wood rail while snow was falling so during the winter I rebuilt it conveying the power as best I could to trucks, it worked better and six more winters I did the same rebuilding. All this work was done by myself and my mill blacksmith."

The lumberman described his locomotive as being "crude in the extreme but it drew my logs from anywhere...saving much labor from teams and was extremely profitable."

Partnering With Lima

After six winters working on his invention, Shay reached a point at which he needed additional help. George Disman, an employee of Lima

Machine Works—formerly Carnes, Agerter & Co.—went to Haring to take measurements and formulate a plan to overhaul Shay's locomotive. The engine was shipped to Lima, rebuilt, and sent back to Shay. Shortly after returning the engine, Lima began producing locomotives for other area lumbermen.

Although Shay initially tried to keep his revolutionary design quiet, people took notice. Cummer & Son, a rival company, bought a stand of timber right next to his and ordered a Shay-style locomotive to log it. Shay commented, "[N]aturally I resented the intrusion and finding I could patent the engine, did so." On June 14, 1881, Shay was issued Patent No. 242,992 for his geared locomotive engine. He then licensed the design to Lima Machine Works.

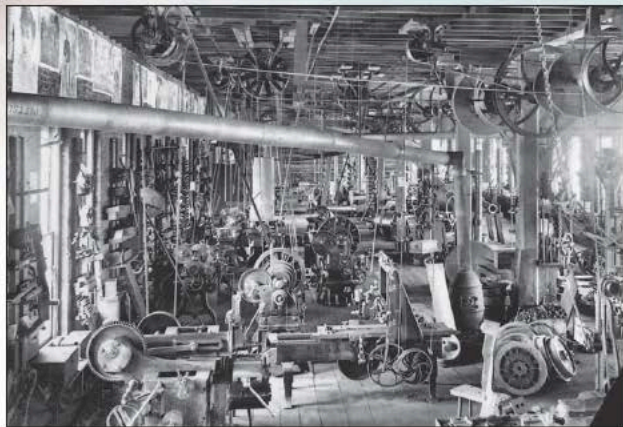
By 1883, Lima offered seven models of Shay locomotives in its catalog. The company sold 37 of the engines to logging operations across the country that year. During the company's most profitable years—the period of 1903-1907—it sold 756 Shay locomotives. Around the same time, the machine began making

its way to international markets. The Shay locomotive could be found in mining and logging camps in Mexico, Canada, Tasmania, Japan, Peru, Brazil, Uruguay, the Philippines, and Australia by 1905.

Lima built Shay locomotives until 1945, producing more than 2,700. There were four classes of Shay, varying in weight from 6 to 160 tons.

The 1971 centennial edition of the *Cadillac Evening News* gave an excellent description of the locomotive and how it differed from traditional rod-driven designs: "Shay's invention included a vertical boiler from which power was conveyed to many wheels by means of universal joints and expansion couplings....Through a series of gears, power from the boiler was carried to all of the wheels of the locomotive including those under the tender." The article further described how the locomotive—with its "tremendous power and traction"—could operate "over most any kind of track."

With the success of his invention, Ephraim Shay became a household name, famous across the country



and the world for his contributions to the logging industry. With royalties gained from licensing his design to Lima, Shay retired from his business in Haring and moved north with his family to Harbor Springs in 1888.

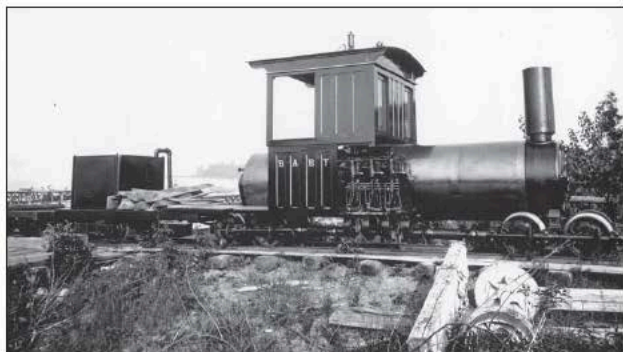
Retirement in Harbor Springs

Shay was a wealthy man when he arrived in Harbor Springs. While he could have lived comfortably for the rest of his days, he was not a man to sit idle. Between 1888 and his death in 1916, Shay built a stamped-steel home, a renowned machine shop, three locomotives, a steel yacht named the *Aha*, a logging railroad, and the town's first waterworks. The 1892 edition of the trade magazine *Northwestern Lumberman* noted Shay's impact on Harbor Springs: "[H]e stopped lumbering a few years ago, and settled down in the little village of Harbor Springs, Mich., to which sleepy municipality his coming was in the nature of a boom."

After moving to Harbor Springs, Shay and his family first lived in a modest home on Main Street. Around 1892, son Lette married a local named Katherine Roe, and Shay decided to build a new home. He and his wife moved across the street to the unique, newly constructed "Hexagon House," while Lette took over the old home with Katherine and, eventually, the couple's three daughters.

Stepping out of the lower-level entrance of his splendid new home, the elder Shay could walk across the street to his machine shop. Described as being the "finest north of Grand Rapids," Shay's shop was used as a home base for many of his projects.

In 1902, Shay chartered a rail line known locally as the Hemlock Central. Officially named the Harbor Springs Railway, the narrow-gauge



Above, top to bottom: The interior of Shay's Harbor Springs machine shop. His beloved Locomotive #1, which he called "Baby." One of Shay's Hemlock Central excursion trains, c. 1906. (Photo courtesy of the Library of Congress, Prints & Photographs Division, LC-D4-19005.)

track ran from Shay's property to lumber mills north of Harbor Springs. After an expansion in 1904, the line measured eight miles in length and carried logs, freight, and passengers. Three locomotives, all made at Shay's machine shop, ran on the track. They were named simply Locomotives #1, #2, and #3, though the first was affectionately nicknamed "Baby."

Beyond the railway's uses in the lumber industry, the Hemlock Central also served as a tourist attraction. Residents and visitors could ride the train into the countryside for a modest fee until the line closed in 1912.

In addition to bringing his locomotive and notoriety to the town, Shay was involved in the local yacht club, was a doting grandparent, belonged to the local Grand Army of the Republic chapter, and was on the board of directors of the local bank. Perhaps his most important project in Harbor Springs was the creation of the first waterworks. He designed and built the waterworks shortly after he arrived, recognizing the growing need for running water and tapping the artesian wells prevalent in the area and on his own property. Twelve miles of water mains, reservoirs, a pump house, and other

parts of the system were sold to the city for \$22,000 in 1911.

Shay's contributions to both the logging industry and Harbor Springs were extensive. Each year, the town celebrates "Shay Days"—paying tribute to the man who so influenced the town's history. 📖

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The Hexagon House

The September 5, 1894, edition of the *Daily Resorter* has one of the few contemporary descriptions of the one-of-a-kind home Shay constructed: "It is built entirely of steel, the outside walls being pressed into an imitation of brick, while the inside walls and ceiling are all pressed in attractive designs and artistically decorated."

Although the central portion of the home was octagonal, the upper level was hexagonal, and the wings jutting from the center section on the main level numbered six—giving rise to the nickname "Hexagon House." The *Daily Resorter* article further described how the "space below in the octagon center is used as a sitting room while the upper portion is used as an observatory. The basement is fitted up as an office, billiard room and den."

Sadly, little is known about what the home looked like when Shay lived there. No blueprints, floor plans, or interior photographs have been discovered. After Ephraim and Jane Shay died, Lette moved to Ann Arbor with his family and sold the remaining Shay properties, including the Hexagon House. Records are scarce for that time in the home's history, but



Shay's "Hexagon House" in Harbor Springs.

one newspaper article mentioned the home being used as a base for the Red Cross in 1918. The dwelling was later converted into small shops, with a variety of businesses appearing and disappearing within its walls through the decades.

In the late 1980s, Mary Cay Bartush Jones purchased the property and began to revive it. The badly neglected exterior stamped steel was replaced, and several other repairs were completed. In December 2016, Jones donated the home to the Harbor Springs Area Historical Society. The society is currently restoring the historic structure.