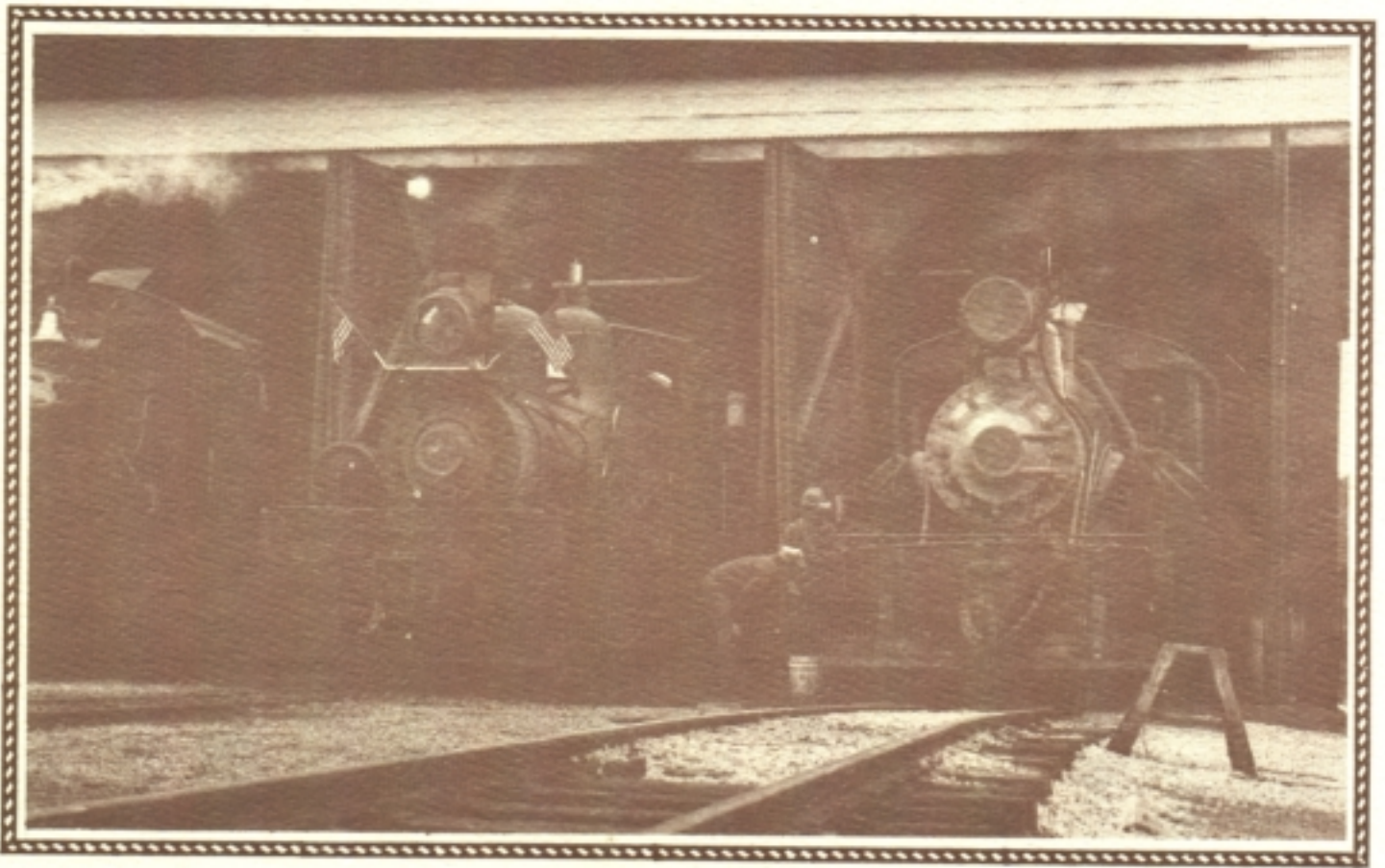


The Geared Locomotive Collection of
**ROARING CAMP AND BIG TREES
NARROW GAUGE RAILROAD**

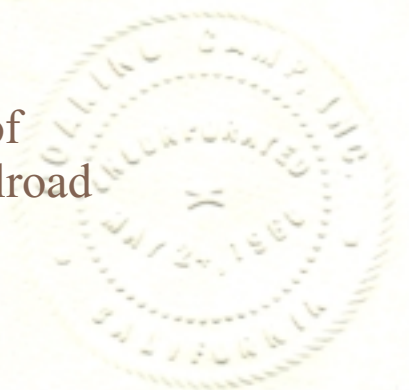
Dixiana "Shay"
Tuolumne "Heisler"
Bloomsburg "Climax"



A National Mechanical Engineering Historic Landmark
The American Society of Mechanical Engineers

Designated on
August 21, 1988

and **Celebrating the 25th Anniversary of**
Roaring Camp and Big Narrow Gauge Railroad



GEARED ENGINES



HISTORICAL SIGNIFICANCE OF GEARED LOCOMOTIVES TO THE INDUSTRIALIZATION OF THE NATION

Hard on the heels of the little rod engines came the geared engines. They were specifically designed to give maximum tractive effort with minimum weight. Speed was sacrificed to power, and flexibility was their hallmark.

Three manufacturers dominated the field of the geared engines. Of these three the Shay was undoubtedly the most popular locomotive used by Western loggers. Ephraim Shay, who was responsible for the design, was himself a Michigan logger. He knew the logger's problems and designed an engine to handle them. The Lima Locomotive Works never had occasion to regret the day that Ephraim Shay came to them with his plans. Over the years they built hundreds of geared engines, and the Lima Shay became an institution around the world.

The Shay made use of a vertical engine of three cylinders mounted just ahead of the cab on the right hand side. Connected to the crankshaft was a lineshaft that carried the power to all the axles. Provided with slip joints and universals, the lineshaft was flexible enough to allow the trucks full freedom of movement under the engine frame. Bevel gears on the shaft and on the face of the right hand wheel transmitted the power. The moving parts were easily accessible for servicing and shims in the axle journals allowed for easy adjustment of the driving gears.

The most notable characteristic of the Shay was its boiler. In order to compensate for the weight and position of the engines, the boiler was set over

to the left of the center line, giving it an odd, lopsided appearance. Another distinctive feature was the engine itself. The left hand cylinder carried its steam chest on the left side while the other two faced right, and the rapid rhythm of this three cylinder exhaust became part and parcel of the logging scene. No one who has ever known it could forget it. A Shay thrashing its slow course up a heavy grade was lost in an aura of sound and smoke and steam.

The Shay was an easy riding engine, and it was rugged and durable. It might strew the right of way with discarded parts, and its gears might be nearly devoid of teeth, but little short of complete derailment could thwart its progress.

No engine used in the woods was available in such profuse variety. Varying in size from tiny narrow gauge teakettles to huge mainline machines, they were designed for hundreds of specific jobs. Some had two trucks, some had three—or even four. For variety, some of the smaller engines had but two cylinders. So flexible was this design that of the 2,761 engines turned out between 1880 and 1945 it was difficult to find two alike.

In the late Twenties Lima brought out the Pacific Coast model. This was a 90-ton three-truck engine designed especially for West Coast loggers. It incorporated such refinements as a super heater and piston valves. The purpose was to provide an engine incorporating the savings inherent in a standardized model of advanced design. So success-

ful was the Pacific Coast that several are still in daily service, and it is not inconceivable that there might be a market for them today if they were available.

Second of the geared engines in popularity was the Climax. The Climax came to the woods of the Pacific Northwest soon after the loggers had taken to rails. The first Climax used in the West was bought by Mr. Hobart for his Dallas and Ellendale Railway. It was a Class A built in June of 1891. It was delivered and put to work the following month on Mr. Hobart's six foot gauge pole road.

This early Class A Climax made use of a vertical two cylinder marine-type engine. However, unlike the Shay, this was mounted in the centerline of the frame behind the backhead. The lineshaft ran through the center of the engine, driving each of the axles through a pair of bevel gears. These engines also incorporated a selective transmission which gave the engineer a choice of gear ratios. Some of the very early Climax engines, Mr. Hobart's among them, used a vertical boiler very similar to those used on the donkey engines.

The later engines, which became familiar to loggers everywhere, had their engines mounted at an angle on either side of the smokebox. The engines drove a cross shaft just ahead of the cab which, in turn, was geared to the center driveshaft. The cylinders were not large, but with the reduced gearing employed they provided plenty

of power and used a minimum of steam. Most engines built by the Climax company were of the two truck design, although in later years they produced many of the large three truck engines. Generally speaking they were lighter than the other engines while holding their own in pulling power. Of the three main designs, they were probably the slowest.

Many companies included a Climax in their rosters for special jobs but few companies bought them in quantity. The flying mainrods had a tendency to set up a vibration in the engine that the crews disliked. It was claimed by their detractors that a Climax would disintegrate itself, the railroad and the engine crews with equal impartiality. With the passing of years a Climax tended to develop a sag in the middle—but to their credit let it be added that they

built up an impressive record for service and reliability.

The third of the great triumverate was the Heisler locomotive. It was the last to make its appearance but it proved a popular and useful engine. As with the Climax, early engines were of the two truck variety while later designs were more often of the larger three truck type. Aside from the fact that Heisler offered a wide choice of weights and sizes, there was little to distinguish one engine from another. Heisler probably came closer to standardizing its product than any other locomotive manufacturer.

The Heisler made use of a center driveshaft, although it differed greatly from the Climax in all other respects. The driveshaft was geared to the outer axle in each truck and siderods mounted on the face of the wheels car-

ried the power to the second axle. The two large cylinders were mounted in a “V” just ahead of the cab and drove the crankshaft which was a part of driveshaft.

The locomotive was designed to perform much like a rod engine while retaining the advantages of a geared engine. It was capable of fair speeds on good track and rode very well on poor track. The faster performance, which tended to reduce its effectiveness on heavy grades, was offset by an unusually large cylinder. There were times when this taxed the streaming capacity of the boiler, but generally speaking, the Heisler was an eminently successful engine.

*Railroad of the Woods
John T. Labbe
Vernon Goe*

ROARING CAMP



& BIG TREES NARROW GAUGE RAILROAD

FELTON
SANTA CRUZ COUNTY
CALIFORNIA

NATIONAL MECHANICAL ENGINEERING HISTORIC LANDMARK

GEARED LOCOMOTIVES

SHAY BUILT BY LIMA LOCOMOTIVES WORKS 1912

CLIMAX BUILT BY CLIMAX 1928

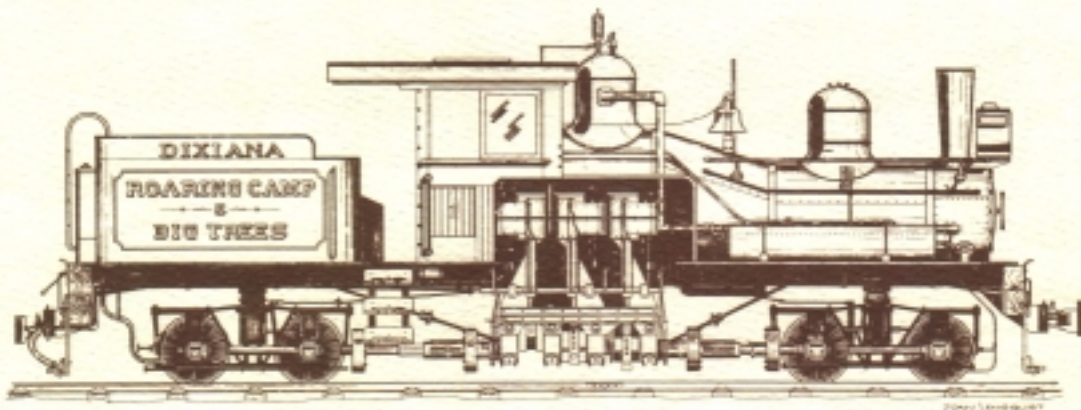
HEISLER BUILT BY STEARNS COMPANY 1899

THE SHAY LOCOMOTIVE PATENTED IN 1881, AND ITS TWO VARIANTS, THE CLIMAX AND HEISLER ARE SMALL HIGH-SPEED STEAM ENGINES, GEARED DOWN TO AXLES ON FOUR WHEEL TRUCKS. THEY WERE SUITED TO SLOW AND HEAVY HAULING WITH HIGH TRACTIVE EFFORT ON THE ROUGH AND TEMPORARY TRACKS OF THE LUMBER AND MINERAL INDUSTRIES. THEY HAULED HEAVY LOADS THROUGH DIFFICULT TERRAIN FROM CIRCA 1890 TO 1960 UNTIL REPLACED BY TRUCKS.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS - AUGUST 1988.

HISTORIC PLAQUE

DIXIANA SHAY



SHAY Built by Lima Locomotives Works 1912

Among geared locomotives, three companies (Shay, Heisler and Climax) are widely credited with dominating the logging and industrial market place. Shay locomotives were designed in 1872 particularly for Western U.S. logging operations.

Roaring Camp & Big Trees Narrow Gauge Railroad owns three Shay locomotives. They include the "Dixiana" Shay, the "Sonoma" Shay and the recently acquired "Morrison" Shay.

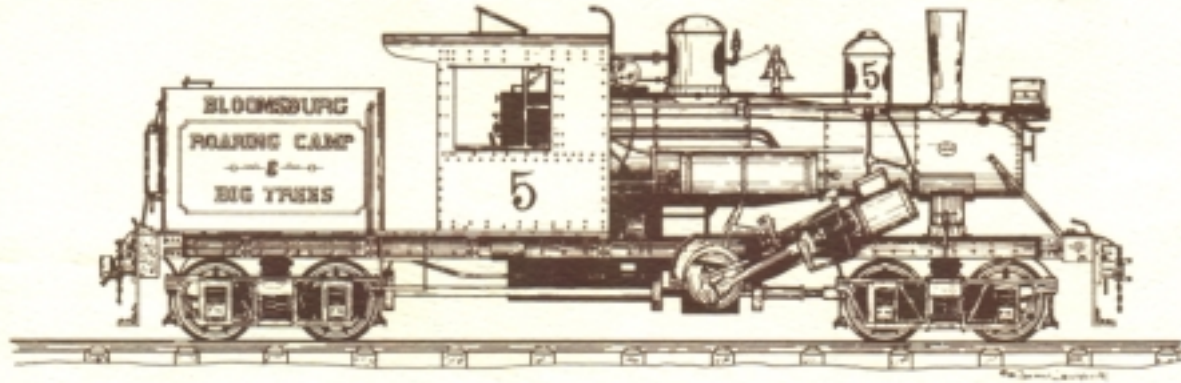
The Dixiana, Roaring Camp Engine #1, is one of the three engines designated a National Mechanical Engineering Historical Landmark.

The Dixiana has an historic and varied past. The "Dixie", as she is affectionately called, was outshopped by Lima Locomotive Works, Shop No. 2593, on October 12, 1912. She served on six different short line railroads before coming west to California. Although she saw service on the famous Smokey Mountain Railroad in Tennessee, it was a little narrow-gauge mining railroad (now abandoned) out of Dixiana, Virginia that gave her the name "Dixiana".

A two truck engine, the Dixie weighs 42 tons with a tractive effort of 17,330 lbs. and has 29 1/2" drivers. Three 10" x 12" cylinders can maintain 180 lbs. working pressure.



BLOOMSBURG CLIMAX



CLIMAX Built by Climax 1928

The Climax locomotive was probably the second most popular among the three dominant geared locomotive manufacturers. These engines were most notable for their selective transmissions providing optional gear ratios to further improve overall operational flexibility and tractive power.

Roaring Camp's collection of geared locomotives was rounded out in 1977 with the acquisition of its "Bloomsburg" Climax, Roaring Camp Locomotive #5. The Bloomsburg holds the distinction of being the last operating Climax used for logging in the West.

The locomotive was built at the Cory, Pennsylvania locomotive works and outshopped as locomotive #1692 in 1928. The locomotive was built for the Elk River Coal and Lumber Company at Swandale, West Virginia. It was successively purchased by the W.M. Ritter Lumber Company (1959), Georgia Pacific Lumber Company (1960) and the Carroll Park and Western Railroad before its purchase by Roaring Camp, Inc.

The Bloomsburg was last operated at the Carroll Park & Western Railroad in Bloomsburg, Pennsylvania, from which it received its present name.

The locomotive was originally a 48" standard gauge and later converted to 42" gauge.

The Present:

The Bloomsburg Climax had lain idle for many years awaiting restoration. During the last year she has been dismantled and is presently undergoing

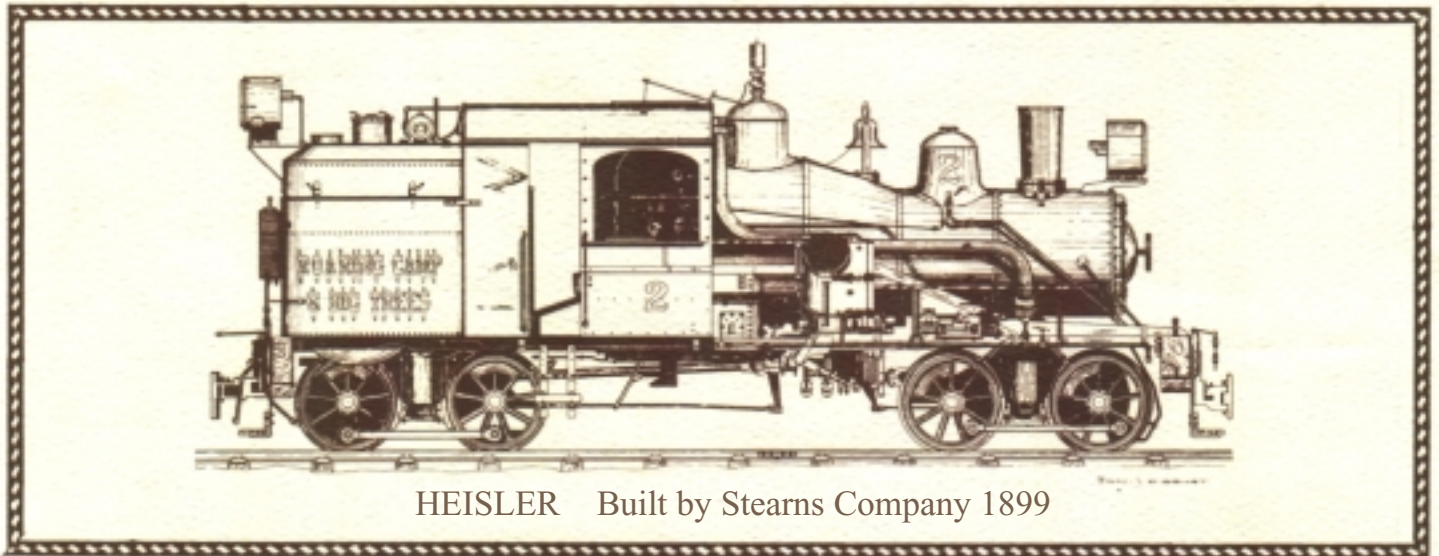
extensive rebuilding. The boiler is being replaced and will be ready for installation during 1989. It has yet to be decided whether at the end of rebuilding, the locomotive will be returned to standard gauge (to be used under contract to the Santa Cruz, Big Trees & Pacific Railway, which is managed by Roaring Camp) or whether it will be narrow gauged to 36" for operation directly on the Roaring Camp & Big

Trees Narrow Gauge Line. In either case, the rebuilt Bloomsburg, which is believed to be the last ever Climax outshopped, will again be riding the rails to the enjoyment and education of succeeding generations.

The Climax, like the Tuolumne and Dixiana, is a two truck locomotive. She weighs in at 50 tons, with 33" drivers, a cylinder size of 12 1/4" x 14" and a tractive effort of 22,000 tons.



TUOLUMNE HEISLER



HEISLER Built by Stearns Company 1899

Named "Tuolumne", Roaring Camp's Heisler Engine No. 2 was ordered by the Hetch Hetchy & Yosemite Valley's Railroad in 1899 to operate at

the West Side Flume & Lumber Company Sawmill near Tuolumne City, California. The Engine was originally named after the first general manager

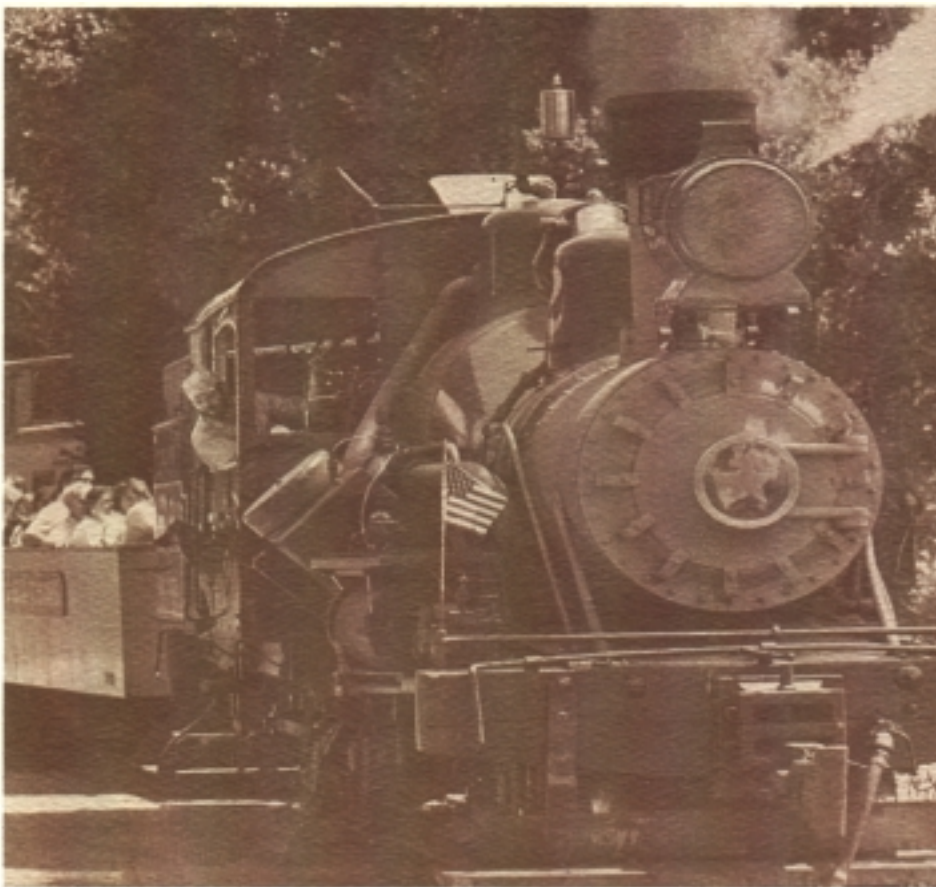
of the West Side Flume & Lumber Company, "Thomas S. Bullock". She was built by Stearns Manufacturing Company, Erie, Pennsylvania, with Shop #1041.

When she was saved from the scrap heap and purchased in 1962 by the Roaring Camp & Big Trees for \$7,000, the engine was the last operating steam locomotive of the old West Side Lumber Company. It holds the distinction of being the last steam engine in commercial lumber service at Tuolumne.

Built by Stearns Manufacturing Company in Erie, Pennsylvania, the Tuolumne was designed by Charles L. Heisler. The Heisler locomotive was particularly favored by lumbermen for its geared drive, which allowed it to dependably operate up steep grades and tightly turning mountain tracks, while hauling heavy loads.

This 2-truck Heisler engine weighs 37 tons, has a tractive effort of 14,000 lbs., has 36 inch diameter drivers and can maintain a steam pressure of 200 pounds with its cylinders that measure 10 by 15 inches.

In 1985 the locomotive, the World's oldest operating Heisler steam locomotive completed a two year reconditioning and was there again brought back into regular narrow gauge service.



Today at Roaring Camp, Tuolumne has distinction of being the world's oldest operating Heisler locomotive



F. NORMAN CLARK



The late F. Norman Clark, founder of Roaring Camp. Behind him is Roaring Camp's No. 1 steam engine, the "Dixiana Shay."

F. Norman Clark was born into a railroading family and became a fifth generation railroad man with a passion for history. As a boy Clark left Los Angeles to spend many summers with his grandparents in Arizona. During these formative years he traveled with his railroad conductor grandfather by train and auto throughout the Western hinterlands. He developed an early fascination with the history and technologies that had made the West great. His love of trains was matched by an ever increasing knowledge of the history, development and operation of railroading. In later years it was often observed that Clark had an encyclopedic knowledge of the pioneer West.

Back home in Los Angeles, his interest led him to take the trolley from his home in San Marino to the grand old Los Angeles Public Library where he studied old railroad manuals and engineering plans in order to satisfy his evergrowing passion for western technological history. He early on manifested an interest in the preservation movement and in his teens was an active lobbyist against the destruction of the famed Los Angeles Redcar System. Clark formed a non-profit corporation while still a teenager to promote the acquisition of retiring steam locomotives for display in Southern California parks and public areas. A dynamic force even in those early years, Clark was instrumental in the development of the famed Los Angeles Railtown at Griffith Park, now enjoyed by millions

of visitors every year.

By the age of twenty, Clark had decided that he was going to live his dream. He began plans for development of an 1880s town reminiscent of the heyday of the ghost towns he had visited as a youth. He had lamented their passing and sought to revive them in memory. Of historic necessity, a central feature of his town was to be a railroad. For authenticity, he planned to include other primary industries such as mining, logging and milling.

Always meticulous in planning, Clark set about to cover the West and Hawaii looking for that one special location on which to build his dream. A dream which, if accomplished, would allow succeeding generations to experience the sights and sounds of that golden age of opportunity in the "old West".

In 1959 Clark came upon the famous Big Trees Ranch in Felton, California, deep in the virgin redwood forests of the Santa Cruz Mountains. The property itself was unique from a preservation standpoint. It had been purchased in 1867 by Joseph Welch specifically to protect the giant redwoods (*Sequoia Sempervirens*), thereby becoming the first property ever acquired for that purpose and still owned by the original family today.

About the Big Trees Ranch Clark once stated, "By its very nature, the rustic environment of Roaring Camp sets the stage for a trip to 19th century California—a trip to an era when

narrow-gauged railroads were pushed into virgin territory, mining towns boomed overnight and logging camps sprang up to harvest the untapped riches of the forest primeval".

With just \$25.00 in his pocket, a well-developed business plan and a group of dedicated supporters, including his parents, Clark went about making his dream a reality. A loyal group of stockholders were enlisted to provide development capital and the new venture was on track.

In 1985, Clark achieved a long sought after goal when he completed purchase of the 9 miles of Southern Pacific track between Santa Cruz and Felton. Incorporated as the Santa Cruz, Big Trees & Pacific Railway Company, the line went into service in the fall of 1985. Soon after the opening, F. Norman Clark took ill unexpectedly and passed away. His wife, Georgiana, long time Vice President of Operations for the Railroad, took over the helm of the organization and is working hard to keep alive Norman's dream and to further the historic character and economic growth of the enterprise.

1988 is the 25th Anniversary of operation of the now world famous Roaring Camp & Big Trees Narrow Gauge Railroad. In addition to the railroad, the town now contains an authentic steam donkey powered sawmill which still operates to the delight of visitors throughout the year. Special events are held featuring the operation and display of technological devices of times now gone. Visitors can view steam engines, antique internal combustion engines, railroad handcars, antique fire equipment and other machinery reminiscent of those earlier days.

It is with great pride that Roaring Camp & Big Trees Narrow Gauge Railroad accepts the honor bestowed upon it by the American Society of Mechanical Engineers. The Society's recognition of the contribution that the geared locomotive has made to the development of the West is much in keeping with the goals and direction that F. Norman Clark set for Roaring Camp and for which the Board of Directors, stockholders and management rededicate their energies.

THE ASME HISTORY AND HERITAGE MECHANICAL ENGINEERING LANDMARK PROGRAM

The History and Heritage Landmark Program of the ASME started in 1971 as part of the Society's effort to note, document and acknowledge mechanical engineering achievements of particular significance.

The National History and Heritage Committee includes mechanical engineers, historians of technology and the curator of mechanical engineering from the Smithsonian Institution.

An ASME Landmark represents a step in the evolution of mechanical engineering and reflects its influence on society, here and abroad. This landmark is one in more than 120 landmarks in USA and the world that are part of our engineering technological heritage.

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Bibliography

Railroads of the Woods, John T. Labbe, Vernon Goe, Howell-North Publishers, Berkely, California 1961

Climax-An Unusual Steam Locomotive, Thomas Taber III and Walter Casler, Publishers, Railroadians of America, Inc., Morristown, New Jersey

Heisler-Company Manual, Heisler Locomotive Works, Erie, Penn. Reprinted 1966 by R. Hungerford, Hartford, Conn.



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