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End of an Era...

RAYONIER INCORPORATED now maintains one of the last of this nation's logging railroads. Through the acquisition of two Washington State pioneer logging firms the company's Northwest Timber Division took over the operation of some 250 miles of logging railroad on the state's rugged Olympic Peninsula at the close of World War II. Rolling stock acquired in these purchases included steam locomotives of many descriptions. There were Baldwin Mallets, Mikados, and other rod type engines as well as Climax and Shay geared locomotives. A selected few of these locomotives are pictured in this booklet; some of the photographs chosen reach back through more than half a century of the logging industry's colorful past. The engines shown are typical of the many types that did so much to give this period its color and greatness and which helped to make this an era of "railroad logging."

Of all of these locomotives, perhaps none contributed as much to the era it served as did the Shay. Certainly none served the logger more effectively, nor for so long. Other geared locomotives, such as the Climax and Heisler, found acceptance in the woods, but the Shay ruled supreme. It could travel almost anywhere that tracks could be laid; it could traverse steep grades and twist its way around short radius curves that rod driven locomotives could never have managed. It could find traction on rails laid on "floating" ties set on road beds of little more than forest humus; it could safely traverse the shaky timber spans that men of the woods put together with more optimism than skill to cross the rivers, streams, and deep ravines in the forests. Where other locomotives could not venture the Shay was sent to do the job.

In 1879 or about, a Michigan logger named Ephraim Shay built for his own operation the first of the geared locomotives that were to bear his name (later locomotives were built by Carnes-Agerter & Company of Lima, Ohio, finally to become the Lima Locomotive Works). This first Shay was an ordinary platform car on two trucks of four wheels each. On this was installed a portable upright boiler and two vertical engines. These were placed in the center of the car and then by means of a flexible shaft, power was transmitted to pinion driven bevel geared wheels. These geared wheels were installed in both trucks, but along one engine side only. A barrel of water was placed at one end and a box for firewood at the other end, thus the first Shay geared locomotive was born.

Shay's first masterpiece was not a thing of beauty, nor were subsequent models built to delight the eye. Later Shay models assumed something approaching the traditional locomotive silhouette, but in design and in detail of construction Ephriam Shay went it alone. The locomotive boiler was set off to the left side of the engine frame. On the right side were vertical steam cylinders with pistons connected by rods to a horizontal driveshaft running the full length of the locomotive. The driveshaft was joined together by a series of universal joints to permit sharp turning. This driveshaft was geared to all wheels along one engine side including those on the tender. Some Shay models were built with as many as 16 driving wheels. These wheels were small in diameter or seemed so by comparison with the massive driveshaft that propelled them. The engine presented a veritable maze of gears, eccentrics, universal joints, and other assorted moving parts. The late Rube Goldberg at his tongue-in-cheek best never approached in complexity of design the machines which the serious Mr. Shay actually put together.

Judged by modern methods, the Shay lubrication system was primitive. At each water tank or siding the engineer would circle the engine feeling each brass bearing by hand to test for overheating. He would then reach into a jungle of grease cups twisting each cup a turn to insure lubrication. In logger parlance this ritual was referred to as "counting the parts"—which perhaps the engineer actually did. It would have made little difference if some were missing since the redoubtable Shay would have moved on anyway with whatever parts remained. The Shay was built for "getting there." It should be acknowledged that the Shay didn't "get there" fast. One old-time engineer laconically said, "She'll do 13 miles an hour when the grade's her way, maybe faster off the edge of a cliff!"

The bulk of the Lima-Shay production was in the 60-90 ton class, although this concern did manufacture many lighter and some heavier Shays. In total, 2,761 Shay geared locomotives were turned out by the Lima Locomotive Works and its predecessor company. In 1880 only three locomotives were manufactured. In 1907 peak production was reached and 217 Shay locomotives left Lima, Ohio, for use in all parts of the world. One last locomotive built in 1945 closed out the long history of the Lima-Shay.

In November of 1922 the Willamette Iron and Steel Company of Portland, Oregon, completed and shipped its first geared locomotive. This engine and subsequent models were built along the lines of the Lima Pacific-Coast pattern Shay. A total of 33 locomotives were produced in Willamette's shops. The last Shay to leave this concern's Portland plant was completed in December of 1929.*

Following the close of World War II most of the nation's rail logging operations switched to the more efficient truck method of logging. Some tore up their tracks entirely, some removed only spur-line rails and rebuilt their mainline roads to accommodate the faster and more economical diesel locomotive. A new approach to forest-land management called "sustained yield" gained industry-wide acceptance and the old "cut out and get out" logging concept died at last.

This new approach calls for block cutting of timber leaving old growth stands to provide seed for new forests. Logging trucks can follow with greater ease as the tree harvesting operations move from place to place in the forest. Trucks can efficiently and economically move the timber harvest from woods to mainline or from woods to mill. The roads built for truck travel become permanent roads allowing access to all woods areas for fire patrols and for foresters looking after their far-flung timber crops. These roads also serve to open vast new areas to hunters, fishermen, and others for recreational enjoyment.

In 1956 Rayonier began the rehabilitation of its mainline system. Two new Baldwin-Lima-Hamilton 1200 HP diesel locomotives now handle the bulk of the mainline traffic in the company's Clallam County rail operation and similar diesels will soon replace the vintage steam equipment still in service on Grays Harbor County rails. The spur lines abandoned are being turned into roads for diesel-powered logging trucks. The Shay will soon be completely replaced in the company's forest-to-mainline log hauling operation and the rod-driven mainline engines will also soon be gone.

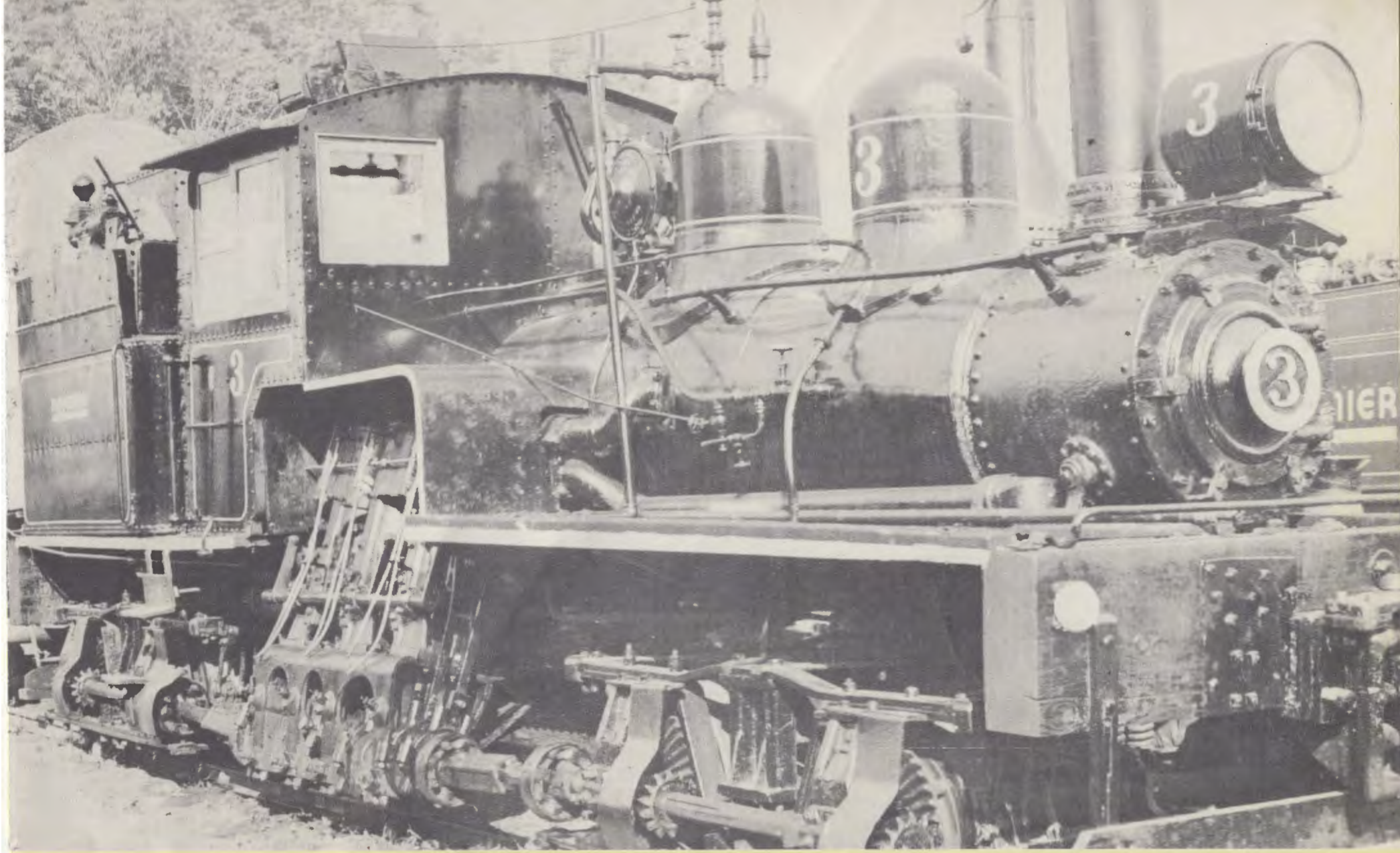
New concepts in forest-land management and the new logging techniques employed by Rayonier and others are fast changing the old forest scene. There will be no place in this new picture for the steam locomotive. This is the end of an era, a nostalgic era of logging greatness.

And much of that greatness was owed to Ephriam Shay and to his iron workhorse of the woods.

*Rayonier Road #2.

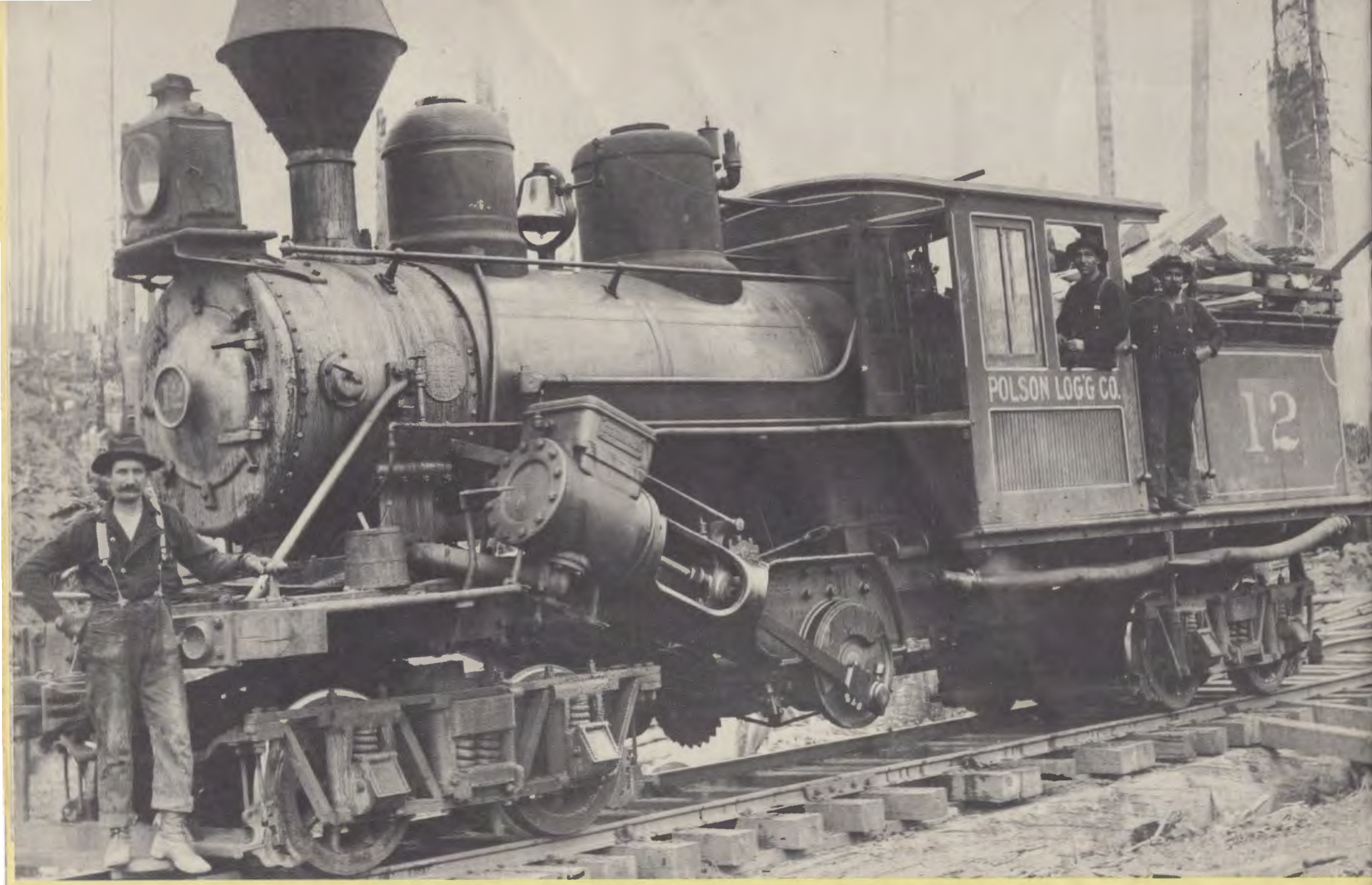
OL' BETSY. This 10-ton Porter rod-type engine is one of the first locomotives acquired by the Polson Logging Company, later to become Rayonier. She was originally the Northern Pacific's "Minnetonka" and was the first passenger engine to come West over the Cascade Mountains on that company's line. She saw many years of service in the woods where she was affectionately known by railroaders and loggers as "ol' Betsy."

Northern Pacific officials tried for some time to repurchase "ol' Betsy." In 1933 the line reached agreement with company officials and the engine was traded back to the NP even-up for an 80-ton freight engine. Again as the Minnetonka it was retired and placed on display in the railroad museum in Chicago. Here she remains to this day a featured attraction. *(Note link and pin coupling on drawhead.)*



This 24-ton Lima-Shay was built in 1910 and purchased new in that year by the old Polson Logging Company at a cost of $5,664.00. At the time of purchase, loggers came from far and near to observe at first hand this new revolution in railroad logging. The Three Spot held her own as the pride of the line for only a short time, for heavier and more powerful Shays were soon placed in service in the woods. Her last years were spent in lowly construction work on the company's lines.

This engine was last steamed up in 1955 for the Regional Convention of the National Model Railway Association. She was later moved to Rayonier's Promised Land Park on Highway 101 just North of Hoquiam, Washington, where she is now on display for the thousands of people who visit this park each year.



This Climax geared locomotive once found wide acceptance in the woods, but gradually gave way to the superior Shay. The difference between this engine's power transmission system and the Shay's can be readily seen. Power was transmitted through two connecting rods to a driveshaft running beneath the center of the frame. This driveshaft was in turn geared to all wheels on both sides of the engine.

Engineers, firemen, rail, and ties seldom lasted long in service with this engine, for the pile-driving action of the Climax shook everyone and everything loose. It is small wonder that the Shay was preferred.

Pictured is a 37-ton Shay with part of its train of logs visible. This photograph clearly shows how the boiler has been set to one side of the engine frame thus allowing room for the steam cylinders which are ahead of and below the engineer's seat.

These early Shays were built for saturated steam. Later models used superheated steam. The first Shays used wood for fuel as the loaded tender will attest. The spark arrestor on the boiler stack was not an ornament, but a very necessary item.

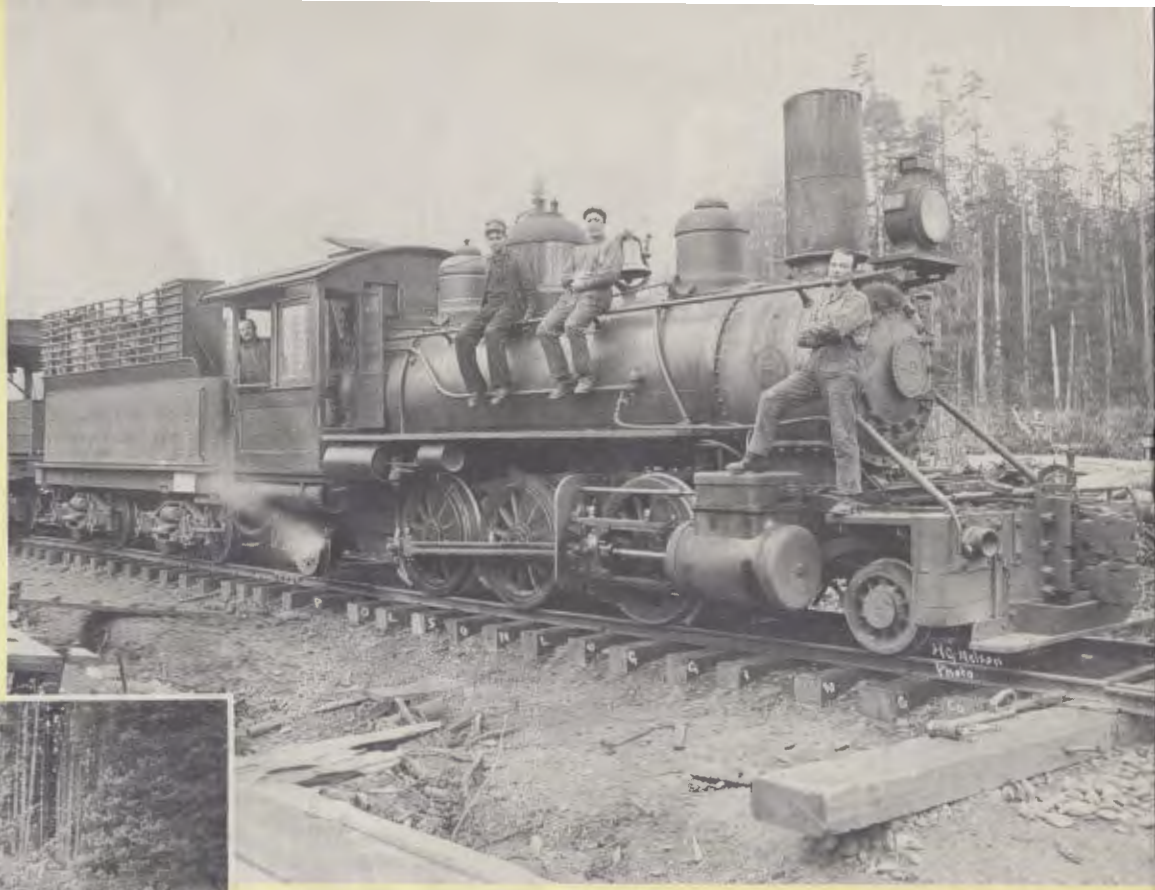
This photograph clearly shows the light rails used in early-day railroad logging. This picture also shows how sparingly ballast was used between the ties. Also note the absence of tie plates.

The brake stick, commonly called the brake "hickey" is in the hands of the brakeman directly in front of this Shay locomotive. In these early days logs were loaded onto 4-wheel wooden framed Russell trucks. One set of trucks was placed beneath each end of a load of logs with no connecting "reach" or "sill" between. Since there were no air brakes, each truck had to be independently braked by hand and thus the brake hickey became an indispensable railroading tool.

This particular Shay locomotive ran away on a steep grade after the brakeman failed to set the brakes on some of the twelve cars making up the train. The fireman and brakemen leaped to safety, but the engineer rode his runaway train around a sharp curve where it was finally halted. As each car rounded this curve it unloaded its logs and the engineer was thus able to stop his lightened train. However, despite his effort, the engine was ruined for all of the drive mechanism was torn loose from the frame.

This 45-ton Baldwin-prairie type rod engine was built in 1906 and in 1958, after more than fifty years of use, was still in active service at Rayonier's Railroad Camp just north of the city of Hoquiam, Washington.

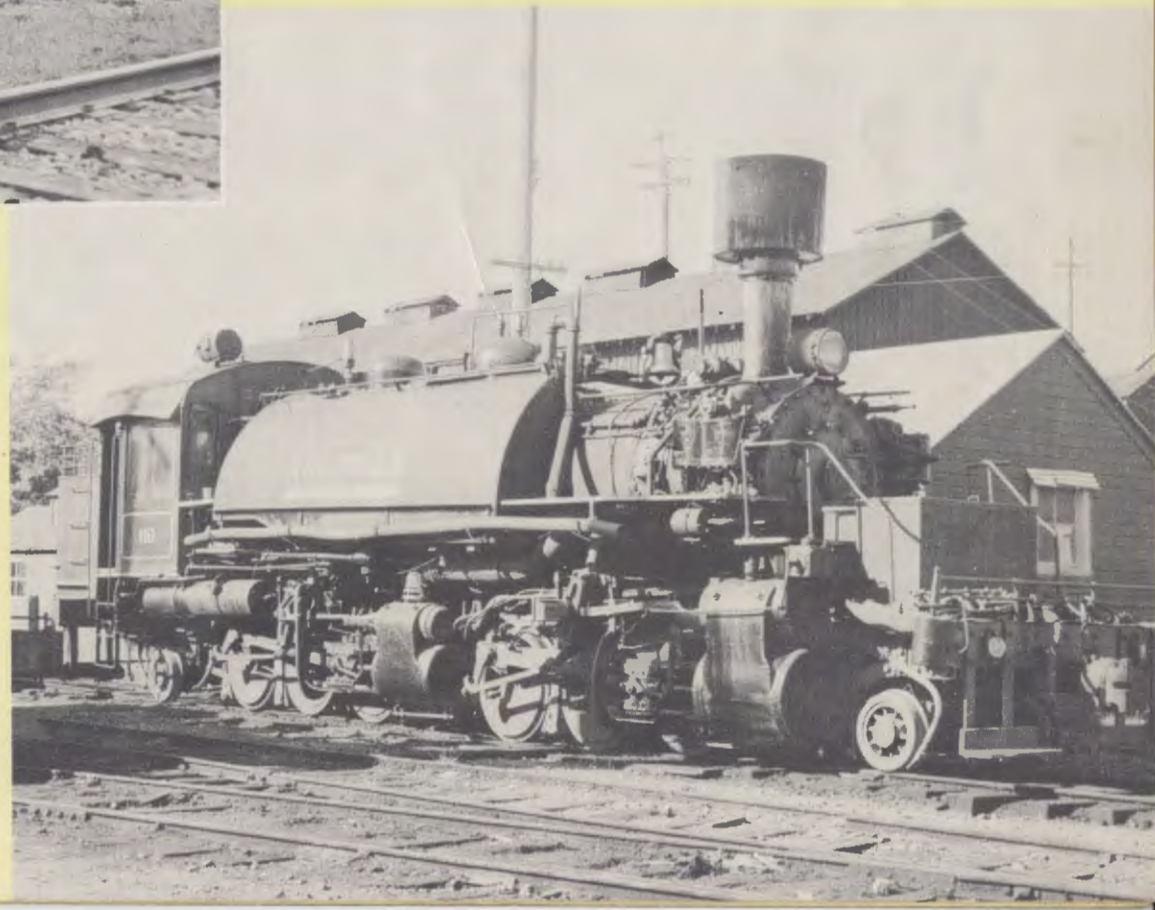
Some time after this picture was taken the engine crashed through a burned out bridge killing the fireman. Despite this tragedy, the engine was not badly damaged and soon after the accident was back in regular service in the woods.



This photograph shows a 75-ton Willamette-Shay locomotive, the last to be built in that concern's Portland, Oregon, shops. It was first sold to the J. Neils Lumber Company of Klickitat, Washington, in December of 1929. Rayonier purchased this engine in December of 1949, just twenty years later. This engine saw considerable service in the Company's Clallam area operation.

This is a 110-ton Baldwin "side tank" Mallet engine. Note the water tanks built alongside the boiler. This added weight over the drivers gave the engine additional traction. These side tanks also eliminated the need for a locomotive tender.

This photograph shows a 110-ton Baldwin "saddle tank" Mallet. The principal difference between these two engines is in the shape of the water tank which on this engine is built in the shape of an inverted "U" curving up over the top of the boiler to the sand dome.



SCALE: 1" EQUALS APPROXIMATELY 4½ FEET

LIMA LOCOMOTIVE WORKS, INCORPORATED

LIMA, OHIO

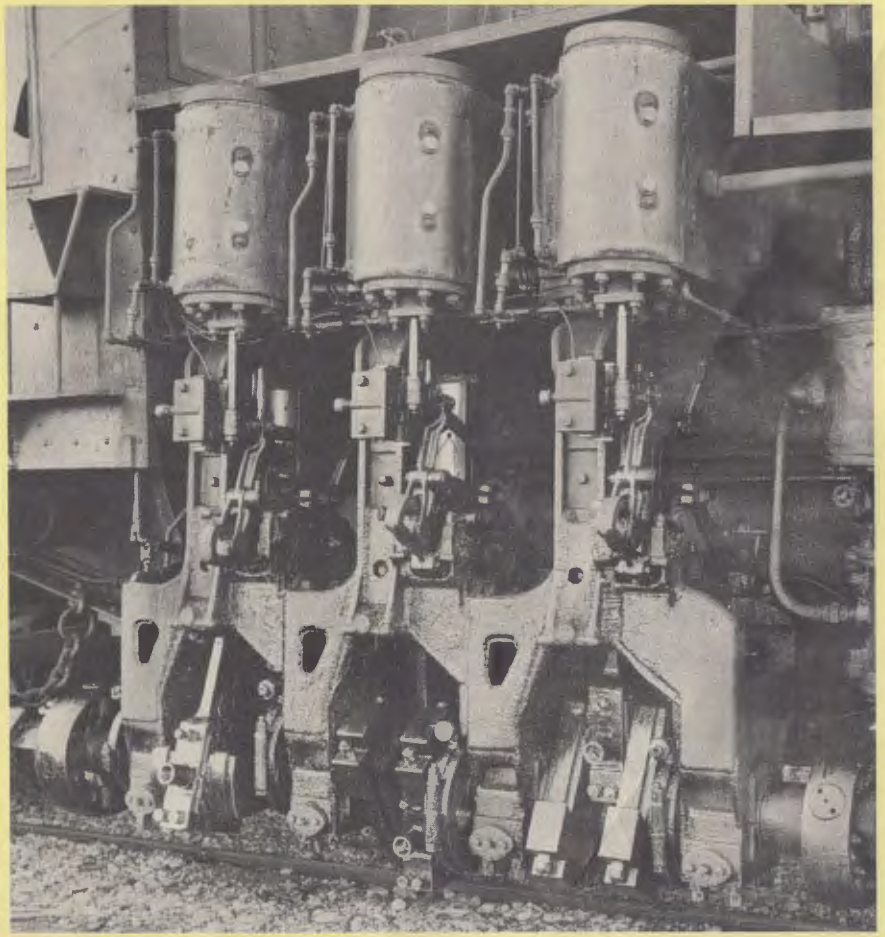
Class: Pacific Coast Shay Geared **Road No. 11**

GAUGE OF TRACK	DRIVING WHEEL DIAMETER	FUEL KIND	CYLINDERS			BOILER		FIREBOX	
			NO.	DIAMETER	STROKE	DIAMETER	PRESSURE	LENGTH	WIDTH
4'-8½"	36"	OIL	3	13"	15"	50⅛"	200 LBS.	89¼"	44¾"

WHEEL BASE			MAXIMUM TRACTIVE POWER	FACTOR OF ADHESION	TUBES AND FLUES		
TRUCK	ENGINE	ENGINE AND TENDER			NUMBER	DIAMETER	LENGTH
4'-4"	30'-8"	41'-2"	38200	4.74	97 15	2" 5⅜"	11'-0"

AVERAGE WEIGHT IN WORKING ORDER, POUNDS		GRATE AREA SQ. FT.	HEATING SURFACES, SQUARE FEET			
ON DRIVERS	TOTAL ENGINE		TUBES AND FLUES	FIREBOX	TOTAL	SUPER-HEATER
181000	181000	27.75	783	122	905	189

Capacity, Water 3000 Gallons **Fuel 1200 Gals.**



This is a close-up view of the three cylinders on a Willamette-Shay locomotive. This photograph clearly shows how the vertical connecting rods transmit power to the triple-throw driveshaft running horizontally the full length of the engine. The reversing cam can be traced in back of the castings and the oil lines and grease cups in the lubrication system are clearly shown.

Pictured on the preceding page is a 90-ton Lima Pacific Coast Shay. Specifications and dimensional data are included for model builder use.

THE NEW ERA...

This 1200 HP Baldwin-Lima-Hamilton diesel-electric locomotive is the new "workhorse" of the woods. Designed for fast and efficient service, engines of this type will soon completely supplant the rod-driven steam locomotive on Rayonier's mainline tracks: Diesel-powered logging trucks are also fast replacing the colorful Shay in the company's forest-to-mainline log hauling operations.

And so ends one era with the birth of a new!

THIS IS RAYONIER... One of the world's leading producers of chemical cellulose... an aggressive growth company supplying foreign and domestic industries with basic material for more than 500 products... a research oriented organization dedicated to providing superior cellulose and chemical products for its world-wide customers of today and to the development of new product end uses for markets of the future... a conservation-minded land owner pledged to manage its one million acres of United States forest lands so as to insure a perpetual tree crop yield... an employer of nearly 7,000 men and women, people with a wide range of professions, crafts, and skills... a public corporation with over 11,000 stockholders, investors in every state in the union.

Rayonier was formed in Washington state in the year 1937 when the Rainier Pulp and Paper Company of Shelton joined with the Grays Harbor Pulp and Paper Company of Hoquiam and the Olympic Forests Products of Port Angeles to begin the first large scale production of high-grade chemical cellulose from Western Hemlock. Later processing methods were perfected for producing chemical cellulose from Southern Pine. In 1938 a fourth Rayonier mill was constructed at Fernandina Beach, Florida to process this abundant species. To meet increasing world demands for Rayonier products, a fifth mill was constructed at Jesup, Georgia in 1954 and in 1957 a second Jesup mill was put into operation, doubling the capacity at this location. In 1954 the company further expanded and diversified its operation by acquiring Alaska Pine & Cellulose Limited in British Columbia. This brought into the Rayonier group two additional cellulose producing mills as well as a large lumber operation. These mills make Rayonier one of the largest producers of chemical cellulose in the world as well as a major supplier of market paper pulps.

A forest land acquisition program was started in 1945 to insure a continuing wood supply for present and future production needs. The company has since gained wide recognition for its conservation efforts and for its progressive land management policies.

Rayonier is more than mills and forests capably staffed and managed; the name is synonymous with Research. We have three separate, but highly co-ordinated research centers, each primarily engaged in basic and applied natural resources chemistry. Through these centers come constantly improving cellulose types and new non-cellulose products called "silvichemicals." Customer processing and product development problems are another vital concern of Rayonier Research.

RAYONIER

NATURAL RESOURCES CHEMISTRY