4.12

TRANSPORTATION OF LOGS
ON
COLUMBIA RIVER

by

John Henderson

1928

Accepted
May 29, 1928
Geo. Peavy

INTRODUCTION.

Throughout the world, rivers have played an important part in the history of the lumbering industry. This is especially true in the United States. Each region has had its famous river and as the trend of the industry has been westward, the Columbia River has come to the fore. At present the Columbia River district is one of the largest producers of lumber and wood products in the world.

To be one of the newest districts, and yet one of the largest, has necessitated a very rapid development of methods and equipment. The general terrain, size of timber, demand for the timber, and competition caused rapid development of logging equipment and methods. The size of the mills and their location on the river made it necessary to develop a quick, economical means of transportation. The outcome of all this demand is the present day method of towing logs by boat from the various sources of supply along the river to the mills, most of which are in Portland.

Much is said of the lumber manufacturing and exporting industry in the Columbia district by the Chamber of Commerce circulars, but very little publicity is given to the well-developed towing methods that supply practically all the raw material for the wood-using industries of the Columbia River district. The purpose of this paper is to describe and explain the present methods of handling logs on the river and to show

what an important part they have in supporting the industry which has been responsible for the rapid development of the Northwest.

Territory.

The district covered by this report includes the lower one hundred thirty-five miles of the Columbia River, about twenty-five miles of the lower Willamette River, and the many navigable sloughs and rivers within these distances. These limits located are from a short distance above Multnomah Falls on the Columbia, to the sea, and from Milwaukee on the Willamette to the mouth. The railroad bridge in Portland is one hundred and fourteen miles from the crest of the Columbia Bar.

History of Steamboats.

The history of steamboats on the Columbia dates back to May, 1812, at which time a Hudson Bay Company steamer, called the "Beaver", came into Astoria. River steamers did not appear until 1850, when the first side-wheeler was built in Astoria and took up a regular run to Oregon City. A boat called the "Lot Whitcomb" was built in Oregon City in 1850, and launched on Christmas Day. These two boats marked the first river navigation. Boats were built rapidly after this, and competition became keen. Towns developed along the river and wood-cutting to supply the steamers became an important industry along the river banks.

With the development of the traffic came the necessity for river improvement, so the war department engineers surveyed

and marked the channel and began the work of building and maintaining a ship channel. The development has reached such a stage now that there is a continuous thirty-five foot channel from Portland to the sea and the navigation aids are so marked that accidents are rare, even among the largest of sea-going boats.

The ship channel is used very little for towing logs on account of the current in it and the danger of having a large boat cutting the raft up. Instead, the towing companies take advantage of the eddies and the short cuts across shallower water.

History does not note the time when log-towing started, but about 1900 several companies remodeled their boats and began to tow boats exclusively. Previous to this time the passenger boats occasionally moved a raft about in the river, but a change was necessary because of the design of the boats and the fact that they had to run on a schedule that called for fast running light.

Style of boats now in use.

The towboat now in use is the stern wheel type. The hulls of these boats are one hundred twenty to one hundred forty feet long and twenty to twenty-five feet abeam. The draught is from five to six feet and the displacement around three hundred fifty or four hundred tons. The hulls are not flat bottoms although commonly called such. The shape is quite round and flattening towards the stern. The ribs and planking are nearly all Douglas fir, and this material is used throughout

except for the siding of the house, which is ordinarily cedar.

The motive power consists of two single-cylinder engines, one on either side near the stern. The engines are of many designs and types, generally named by the valve action they embody, such as a poppet valve, slide valve, or piston valve.

The piston diameter varies from twenty to twenty-eight inches, and the strokes about six to seven feet. These engines working on a two hundred pound pressure are rated at 1800 to 2000 horsepower.

The power from the engine is applied to the crank on the paddle wheel by a pittman which is a strong wooden beam about 12 feet long attached to the crosshead of the engine at one end and to the crank of the wheel at the other. The crank is about three feet long and is attached to the axle of the wheel. The cranks are set about a quarter of a turn apart on the axle which position is the best for an even flow of power and the least likelihood of a dead center.

The paddle wheels on tow boats are smaller than on passenger boats because speed must be sacrificed to get the necessary power. The diameter of the average wheel on a towing boat is about fourteen feet. The wheels are ordinarily about ten feet wide. The buckets or paddles are divided into three sections in width and each section is staggered on the other so the force will be even. These buckets dip into the water about three feet while towing. The boilers are all oil burners at present, and are about sixty thousand pounds capacity, carrying two hundred pounds working pressure.

One feature of the stern wheeler that makes it so adaptable to this business is the rudder system. There are two sets of rudders called the main and the monkey. The main rudders, three in number, are attached to the hull in front of the wheel, while the two monkey rudders are in long stocks behind the wheel. The rudders are all quite large and the location makes it possible to use the wheel wash on their surface, whether turning forward or backward. The handiness of the boats in narrow sloughs and rivers and their ability to steer while backing makes them much more desirable than the screw type boat. The rudders are handled by mechanical steering apparatus of varying type, such as compressed air, steam, or hydraulic means.

The towing winch is usually a one drum auxiliary donkey engine set about midship just behind the king post, which is the mast or boom from which the towline leads. The engines are ordinarily 9 x 10 donkies, and they get steam from the boiler. The towline is usually about an inch and an eighth steel wire. The block on the king post is directly over the drum and is hung high enough so that the towline will not catch one of the hog chains or posts that support the sway in the hull.

The boats usually carry a crew of eleven men and a cook. They are a captain, a pilot and mate, two engineers, two firemen, two deck hands, and two loggers. All work a regular shift except the loggers, who only work when handling rafts, boomsticks, or a ship. The combined labor cost per month amounts

to about $1300. The deck hands, firemen, and loggers get $60 and board, and the scale goes from there to $200 for captains.

As to expense of operation, the labor and upkeep amount to very little compared to the fuel bill. Crude oil is the greatest single item of expense, and everything possible has been done to increase the boiler and engine efficiency. The consumption varies greatly for a single boat because of such conditions as stage of water, species towed, the tides, length of trips, etc. One boat observed in normal water and about the average tow, consumed ten barrels per hour. A larger boat consumed from 2800 to 3000 barrels per month, during several months of observation.

This fuel bill is the greatest factor in development of better boats and engines. The present trend is toward Diesels and one company recently remodelled a stern-wheeler into a twin screw boat, powered with two 375 horsepower Diesels. The boat has performed quite satisfactorily, but is still in the experimental stage. Some of the objections to it now are: it is too slow running light, it is not as handy in sloughs and narrow places, and the conversion was very expensive.

Rafting.

Rafting on the Columbia has reached a high stage of development and it would seem that little improvement is possible. The raft that is now practically standard on the river is the jointed type, square across the back, the sides parallel up to the peak sticks which are chained together at the front end

and form the point. The raft is held in shape by a set of boom sticks which consists of two strings of eleven logs each, chained together at the ends, and a header chained to the back end of each string acting as a spreader between the two strings.

Each boom stick is sixty-six feet long and of varying diameter. It has a hole bored in each end. Through these holes the boom chain which holds the sticks together is passed. The boom chain is made of three-fourths to one inch links about 3½ feet long with a large ring in one end and a toggle on the other. The toggle is a long link that permits it to turn in the link so it will be in prolongation of the chain or at right angles. The toggle is turned and put through the hole in one stick and brought up through the hole in the other. This puts the ring down tight on one stick and the toggle turned across and pulled down tight on the other stick, holding them together with a space of about a foot between sticks. Both strings of sticks are jointed this way, and the header or spreader is joined to each string but at right angles. The two peak sticks are also joined by a chain.

In making up a raft, a string of sticks are put in a stiff boom with the peak up in the sorting gap. The peak chain is unfastened and spreads. The logs are then let down into the header and put in position the full width of the raft. This is kept up until the raft is full and peaked off by leaving logs out of the sides, from the peak joint towards the peak.

Small cables with chains in the ends are then fastened from boom chain to boom chain across the raft at each joint. The peak is then closed and the raft allowed to drop down out

of the boom to be tied up along the bank. This style of raft is very satisfactory, as it is easy to make up, tow, and take apart. Sticks last for years and are quite inexpensive to make.

The contents of a raft depend upon the specie and the ease of towing. It also depends upon the specie. The ordinary fir raft will contain about three hundred thousand board feet of logs and their symmetry makes them quite easy to tow. Hemlock makes a small raft and is usually very hard to tow. Spruce are the largest rafts in scale, and also tow very hard.

Sea Going Rafts.

Another type of raft peculiar to the Columbia is the cigar or seagoing raft. These rafts range from five hundred to six hundred feet long and are approximately forty feet in diameter. Several have been constructed that contained over six million feet of logs. In addition to the raft proper, the shipper often puts on a deckload of shingles, cedar poles and piling. The deck load is held by posts set down into the raft itself.

This style of raft is built in a floating cradle that is shaped to give the raft its final form. Traveling cranes and cranes on scows range along the sides and place the logs in the cradle in proper position. As the logs are put in place the cradle and contents sink. The process is kept up until the desired size is reached, when the top is rounded off and the wrapper chains and cables are put in place. These wrapper chains are placed clear around the outside of the raft, and are cinched up by donkeys and later with large turnbuckles. Another

chain on the raft is a towing chain, about one hundred and fifty feet long, fifty feet of which is fastened well back in the center of the raft during construction. After completion the remainder is picked up and put on top. This is to fasten the towline of the sea tug in, and is allowed to hang in the water and act as a shock absorber for the tug. This chain keeps slack out of the towline and lessens the danger of breaking.

When all the wrapper chains are tight the sides of the cradle are tripped by a cable and all the posts and timbers fall away from the raft, float to the surface, and are picked up by the crew. This leaves the raft floating free. The deckload is then put on, the lights put in place, and all is in readiness for the voyage.

Some facts of interest about these rafts are that they contain five million or more feet of logs. They require about four months to build, and when constructed are about six hundred feet long and draw thirty feet of water. Nearly all have gone to California ports. The trip requires two weeks.

The chain on one raft makes a good cargo for the ordinary lumber schooner. In fifteen years of towing only a few logs were lost from one raft. The last part of July is the most favorable time on account of tides and general weather. Some one has thought of this as a method to get logs to Japan.

Rigging and Handling.

The present method of rigging up a river raft has evolved through a long period of time, and is apparently very near the

ideal for quick, safe towing.

The common method of handling a river raft is as follows: The boom men drop the raft down out of the stiff boom and tie it up securely. The rafts are numbered by tags or by numbers chopped into the logs in the header.

A boat is sent to the slough to get a designated raft. As the boat nears its destination the loggers string out their swifters and doglines, get their axes and peavies on the bow and light the lanterns. When the raft is picked out the loggers jump off near the header, pulling off one dogline and the first handy swifter. The rear logger immediately begins putting on the dogline, which is a number of common dogs strung on a cable. A half hitch is taken around each boom stick, and the ends of the line dogged. Then a dog is driven in each log or two in a large log. This is simply a precaution in case the header or a header joint gets broken.

While the rear logger is putting on the dogline the peak logger is pulling a handy swifter across each joint and putting out the lamp stands and any other necessary gear. When all the swifters are out, the boat ties up to the raft and the loggers put the rigging in place. As soon as the rear logger finishes putting on the dogline he starts from the rear to fasten the handy swifters, while the peak logger starts at the peak and works toward the header.

The handies are heavy cable, about $\frac{3}{4}$", with a long chain in one end and a ring and toggle in the other. These are put around the boom sticks about eight feet back of the joint with a loop made by the ring and toggle end on one stick and a round turn around the opposite stick. By lifting up on the handy and

pulling on the chain end, all the slack can be taken out of the width of the raft. The swifter, when tight, is tied around itself by a couple of half hitches and a rolling hitch and the end tied with rope yarn. When all the handies are fast, the raft is quite stiff.

The lamp stands are then driven in the middle logs, one stand near the peak, one at the middle, and another near the header. Three lights must show on each raft. All joints and chains are inspected and often a brailer is put in the peak. If the logs are loose in the peak sticks a handy swifter is put across the peak taking a turn around the outside and center logs. This is to keep the logs from running back and to keep the peak sticks from lifting out of the water.

If two rafts are to be towed, the procedure is the same on the next raft and they are fastened together by a coupling chain. This is a heavy chain about six feet long that has a ring in one end and a ring in the middle with a toggle in the other end. A turn is taken around one header by dropping the end ring over and putting the toggle end through and pulling the chain down tight in the noose formed. The ring in the middle and the toggle then make a loop which is put around the peak chain of the other raft.

When the rafts are made up the boat drops back to the header of the rear raft and takes a headline. It then backs out of the slough pulling the rafts. The loggers ride the rafts out keeping the joints free from hanging up on other rafts and piling, by means of a peavy. Upon reaching the main river, the rear logger cuts loose the head line, climbs aboard and the

boat moves up to the peak joint of the leading raft. The head logger then hooks a stern line and while the boat is straightening up the rafts and checking their headway, he takes the buttchain of the towline, walks out on the peak and makes the towline fast by means of the ring and toggle.

The towline butt chains are of heavy material with a cleavis, a swivel and a ring and toggle. Altogether it weighs about fifty pounds. When the towline is fast, the peak logger drops back, unhooks the stern line, and gets aboard. The boat then pulls up until the usual length of towline is run out, whereupon it slows down until the winch is braced and dogged. The highball is then given and the tow is under way. In ordinary water and with a couple of good tides at advantageous points the boats towing will make about four miles per hour.

Upon arriving at the destination, whether a mill or a boom, the rafts are tied up and the rigging taken off, just the reverse of the pickup. Quite often the larger boats run into the mill booms, but more often they leave the rafts at some storage boom to be delivered by the harbor tugs to the various mills and plants. On the down river trips the boats usually take boomsticks back to the rafting grounds for subsequent rafting. These are towed on the towline. Two or three sets of sticks offer very little resistance to towing.

Handling Cigar Rafts.

While handling cigar rafts, three or four river boats are used. The size and weight of these rafts in the narrow channels

makes good control necessary. The boats are generally made fast as follows: One boat is out in front on the towline and can control the direction of the peak by swinging in an arc. The other two make fast on either side of the stern and can check the headway of the raft or swing the stern in either direction desired. If another boat is used it is put right at the peak of the raft with its stern free to swing so it can push or pull sideways, or back up, as is needed.

In making fast to the raft the boats at the stern bind themselves securely a number of lines such as are commonly known as ship lines. They are: a ship's headline, which is a line straight to the front to give a long lead for power and to pull back on; a ship towline, which is just at the shoulder of the hull to pull forward on; two breast lines leading straight over the side; and two stern lines to keep the stern in place. The boat on the peak of the raft uses a ship towline and two breast lines. When it changes position one line or the other must be slacked off.

The river pilot who moves these rafts stays on one of the rear boats and signals the others by means of the whistle. River boats are not permitted past Flavel so the rafts are either tied up there or turned over to the sea-going tug while in the channel.

Number of feet of logs towed in 1927.

Some figures which give an idea of the extent of the towing on the river are contained in the 1927 lumber output of Portland,

based on log scale. In the Portland district, which includes the Willamette River below town, the lumber output amounted to 826 million feet. Of this amount it is save to estimate that 90 per cent of the logs consumed were towed into Portland by boat. In addition to the lumber output there were 50 million feet of logs used in cooperage, veneer and shingles, all of which was towed into the mill booms.

Outside the Portland district on the Columbia there was consumed 562 million feet during 1927, all towed, and 445 million involved in a combination haul which can hardly be counted, because this includes the Long-Bell operation. In addition to these, there was another 50 million feet consumed in this district in veneer, shingles, and exported logs. No figures were obtained on the logs towed for the pulp mills, but this would certainly be an appreciable amount.

The above figures show the scope of the towing industry, and what an important link it is in the great lumber industry of the Columbia district. It must be noted that these statistics stand for one of the poorest years the industry has had to weather for some time.

Costs of Operating Boats.

No detailed study of the operating costs of boats was made because of the many variables. These include the many sizes and types of boats and fluctuations of business. One quite uniform item is labor, which amounted to $1300 per month on the average boat operating the entire year. The fuel oil is the

greatest single item and is the indicator of expenses. It is decidedly a variable, changing with the season, the boat, general line of work, etc. At present, crude oil is quoted at a dollar and a quarter per barrel; so for a consumption of 2800 barrels per month, the expense would amount to $3500.

Insurance on the boats is a very expensive item. The company is required to carry insurance on each employee with a private company because the state industrial accident commission has no authority in marine industries. The employees are charged three cents per day for insurance.

Items such as upkeep are variables to such an extent that no figure could be estimated. Breakdowns are rare because during the monthly boiler day the boats are worked on and kept in shape. On boiler day all minor repairs are made and the boiler is washed out.

In depreciating the value of the boats one would run into difficulties too, because the majority were built so long ago and their value has increased so that the item depreciation, except on new boats, is a mystery.

Other Uses for Boats.

Beside towing rafts the river boats perform services in the harbor by moving ships from dock to dock or taking them out of some narrow river and so forth. Formerly towing windjammers up and down the river was a regular thing, but this is becoming rare. Many times large ships get aground in the river and the sternwheelers can pull them off during a high tide.

Perhaps many people do not appreciate the fact that the tides effect the Columbia and Willamette materially. During a low stage of the rivers, the tide will make a difference of three feet in Portland. Ordinarily, though, the tide does little more than slack the current, but is still appreciable when under tow.

Prices for towing.

The prices are subject to change depending upon the conditions in general and of course vary for each specie. The specie and the distance is the important fact.

The companies have agreed to the extent of setting somewhat of a standard price for general towing. These prices vary from prices of 25¢ per M. from Lake river near Ridgefield, Washington, to $1.50 from Deep River and Skamakowa, Washington. The scale that the towing is paid upon is the Bureau scale or the boom scale. Boomsticks are towed for about 10¢ per stick regardless of destination.

Conclusion.

In trying to visualize the future of the towing industry, one can see little change in the rafting methods, because the methods and systems are quick and economical and all plants are built to conform with them. There will unquestionably always be a large demand for logs in Portland, and along the river; so there will be work for the boats. Perhaps not so much as in the past, but still enough to make towing a profitable business.

The only radical change which appears possible, is the style of boats. Competition, necessity of economy, and efficiency will surely do away with the old sternwheeler, because business does not include sentiment.

The trend is bound to swing towards Diesel engines and these require a different hull to be most efficient. With the girst boat of this type in operation now, it appears certain that improvements will come rapidly and that we have seen our last new sternwheeler slide off the ways.