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A SURVEY OF THE PINE LOADING
SYSTEMS

by

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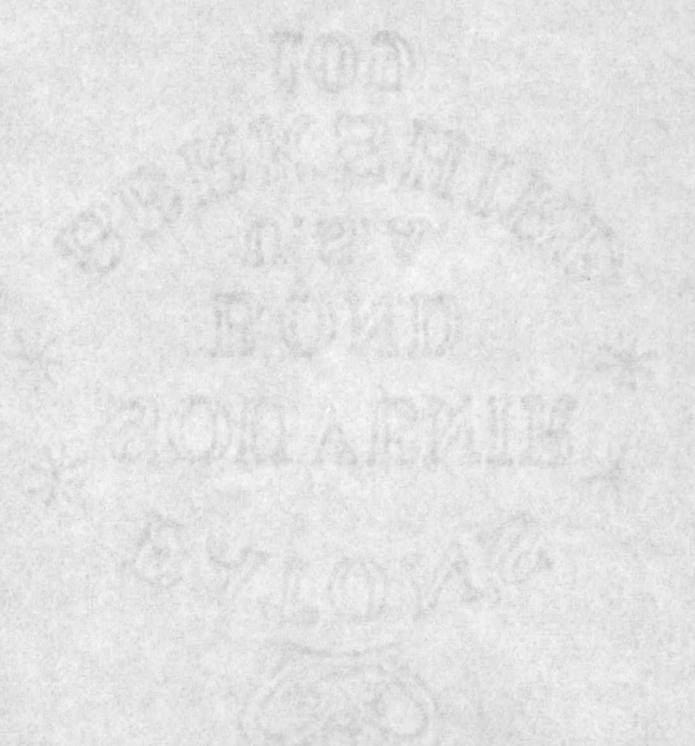
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A Survey of the Pine Loading Systems has been written with the idea of bringing together into one group the different loading systems that are used in the pine for the purpose of comparative analysis. Attempts have been made to obtain all the costs pertaining to loading for each loader as well as the physical characteristics of the loader.

It was necessary to contact the different operators and builders of these loaders to obtain pertinent material, but for reasons out of the writers control, all of the data for each loader was not obtained; however, in the following material and descriptions, a fairly complete picture of pine loading is presented.

Pine loading is greatly characterized by different types of systems than those that are used in the Douglas fir region of the Northwest. The day is fast coming when virgin forests will be depleted and inaccessible, and with this day will come the advent of portable loaders that will be able to go into a forest and pick out the logs to be loaded. Many logging operators are becoming to realize that the day of great logging operations in one complete setting is past, and that factory designed and built loading devices will be of great importance in the future. Radical changes in logging equipment will

be necessary, and a start has been made in that direction by certain companies and designers. As yet, the perfect loader is not here, and therefore, there is much room for new ideas.

Loading, today, in the fir is done mostly in one spot, but in the future loading will be done at many different points using a machine that will be mobile enough to move from landing to landing in minutes instead of hours. Today, there is a great congestion of tractors and arches at the landing, and a method will have to be worked out to relieve this time consuming element. Possibly, logs cold-decked or arranged in windrows in advance of a portable loader will be the answer. If so, there will be a great reduction in logging costs. This congestion might be relieved by the woods boss looking into the future logging day; by this, I mean, that loading in the pine is greatly controlled by weather conditions, and on days when the jammer is swamped with logs and the land tied up with waiting tractors, one of these cats should be used in preparing for those murkey days by rolling out logs along the road or cold decking them.

Truck logging used to take the "back seat" in the logging game, but it will be the salvation of many mills, cities, and contractors whose nearby woods are being depleted and cut-over. With the advent of truck logging is

coming portable loaders which can travel just ahead the trucks in the forests, pushing themselves back into the timber. The Douglas fir region in its entirety does not to any great extent feel the need of portable units as yet, but manufacturers and operators are looking for the suitable portable loader that can give maximum production.

This subject of portable log loading is one that is neglected in logging, but such modern equipment as tractors have revolutionized the logging industry, and today we find that falling, bucking, and limbing is where it was in Paul Bunyan's days, and loading is not far behind. Many companies have tried to interest manufactures in the designing of portable loaders, but with no avail. But now, as there has been a decided turn-about in the method of logging, particularly in the Pine section, old methods such as constructing expensive railroads into the timber, which included many expensive equipment items for logging, have given away to truck logging with the operation confined to tractors building truck roads, a portable loader, and a fleet of trucks for hauling the logs.

I have grouped the loading devices in the pine into four categories: (1) railroad loaders, (2) shovel converted loaders, (3) spar tree loaders, (4) portable mobile loaders. The railroad loading is characterized by the strong use of

the McGiffert loader and the American Locomotive crane; the shovel loaders are fast becoming the most popular in the pine for they can handle any log in that ditrict, and they are a very mobile and simple unit; the spar tree loaders are a carry-over of donkey loading using the crotch line systems or McLean boom or some such method of loading. Tractor power with double drums are becoming popular in this type of loading using the crotch-line system; and lastly the portable loaders which by far take the lead in number of loaders in the pine. Almost every operator has his method of loading and loading design, and builds one to his taste to meet his requirements in a local blacksmith shop or machine shop.

The sources of data for this thesis have formulated from the operator himself. Nearly a hundred letters were written to operators, contractors, superintendents, manufacturers, etc., asking for pertinent material concerning their loader. Not all letters were answered, and therefore, not every loader used in the pine is presented here. Scanning through issues of The Timberman and the West Coast Lumberman brought to attention many sources of loaders. There are probably more loaders than those that occur in the thesis, but a complete picture presents itself of loading in the Pine.

In the following pages you will find descriptions of

the loaders, operating costs of most of the loaders, and log production of most of them. I am indeed sorry that costs were not obtainable for all the loaders in question.

As a fitting conclusion to this thesis there is presented an unpublished United States Forest Service study on Time Loading of logs. The loading study covers nine different types of loading machinery on car and truck operations. Time elements affecting loading costs and the effect of size of log on loading costs is covered.

RAILROAD LOADERS

The following pictures on the McGiffert
Loader have been taken from a booklet
called Clyde Log Loaders, published by
Clyde Iron Works Sales Company, Duluth,
Minnesota.



CLYDE LOG LOADERS

THE MCGIFFERT LOG LOADER

The McGiffert log loader is one of the best pine loaders made today. It is a railroad logging, and therefore, can be used during winter or summer.

Among the companies that are using the McGiffert loader in the west are: McCloud River Merc. Co., California; Long Bell Lumber Co., California; Brooks Scanlon Lbr. Corp., Bend, Oregon; Lamm Lbr. Co., Modoc Point, Oregon; Walker Hovey Co., Klamath Falls, Oregon; Red River Lumber Co., California; and the Big Lakes Box Co., Klamath Falls, Oregon.

There are many sizes and styles of the McGiffert loader, and the prices (initial cost) range from \$8500.00 on the small two-wheel truck loader with rigid boom up to \$11,500.00 for the rigid boom machine with four wheel trucks. On the swing boom machines the prices range from around \$10,000.00 to approximately \$20,000.00. These McGiffert loaders can be built with gasoline or Diesel motors, in which case the prices run just a trifle higher, depending upon the motor used.

DESCRIPTION OF THE MACHINE

The McGiffert loader is the only log loader under which empty cars can pass on the main track without jacking the machine up on spuds. The loader does not require a locomotive for moving from landing to landing, but Mr. A. E. Baker of the Fruit Growers Supply Company says that they use a locomotive in long moves because the loader is not equipped with air brakes, and he believes it is easier on the machine.

The machine carries the loading mechanism on a platform supported above the track by means of δ curved standards or legs, terminating in long shoes which rest upon the ends of the ties outside of the rails when the machine is in operation. To facilitate moves from one loading place to another, it is equipped with swinging wheel frames and trucks driven from the engine by sprockets and chains.

The machine embodies simplicity, strength, stability, and durability. It is designed to support the loading mechanism directly over the tracks without in any way interfering with the passage of empty cars through it. /

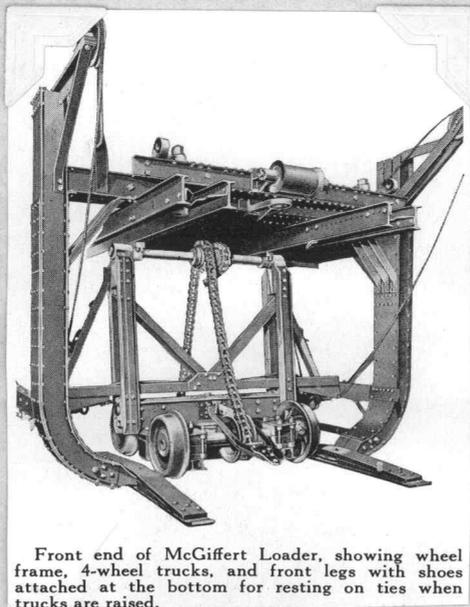


Figure 1

The standards or legs supporting the derrick platform are spaced sufficiently apart to permit the free passage of

1. Clyde Iron Works Sales Company, Duluth, Minnesota.

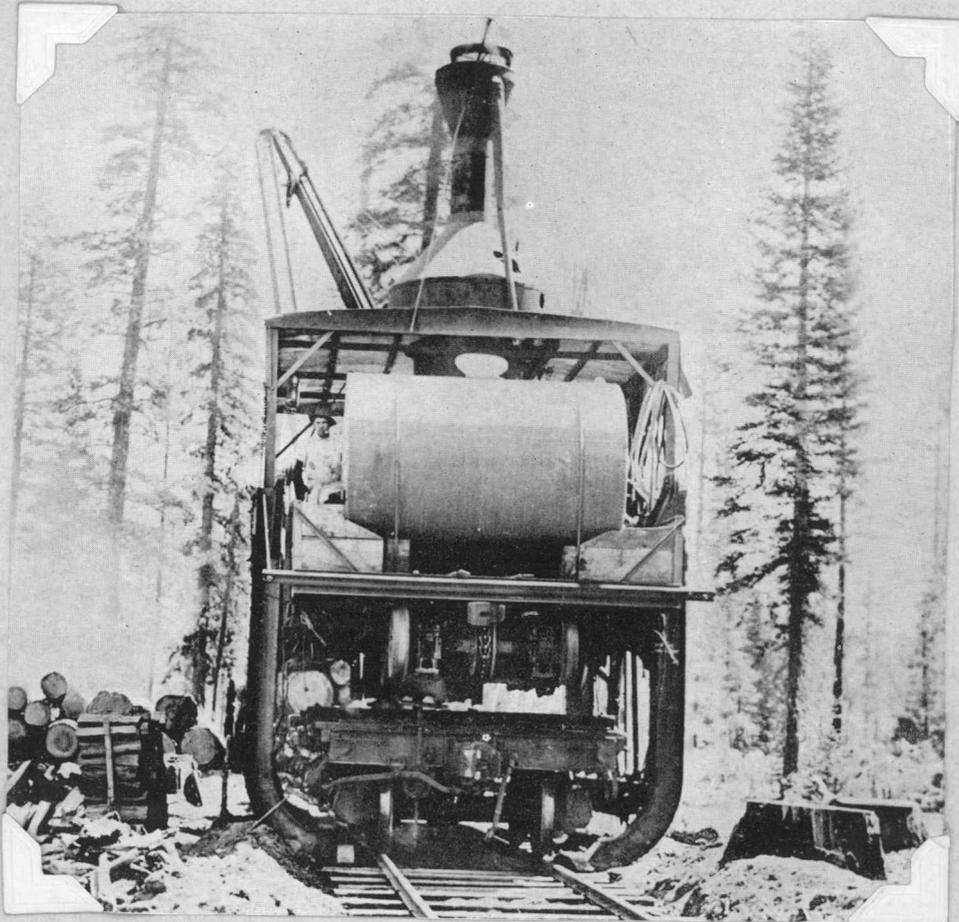


Figure 1a

Rear view of the McGiffert Loader,
showing trucks raised and standard
flat cars passing through.

empties, and are curved in at the base to obtain solid footing on the ends of the ties outside of the rails. These standards are composed of I-beams bound together with steel plates which are riveted to the outside and inside flanges to support a load of up to 50 tons each. A heavy adjustable steel foot casting terminates each standard. This flexibly engages the center of a long steel shoe which is thus permitted to accommodate itself to the uneven heights of the ties.^{1/} (These are long enough to rest on several ties at once).

The trucks for these McGiffert loaders can be both two or four wheel types. The four wheel trucks operate in much the same way as the logging cars. This facilitates in rounding curves and the like. It is constructed with a center plate and bolster, and are hung by a trunnion connected at the ends of the upper bolster. This swivel effect applies only to the four wheel trucks. In the two wheel the raising and lowering is done in the same manner, but there are sets of heavy coil springs in the makeup that compensate for the unevenness of the track.

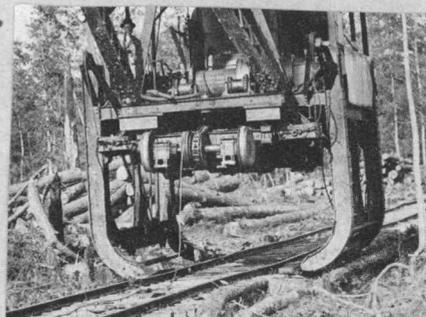
Wheel frames are swung from the vertical to the horizontal position to facilitate moving of cars under the platform. With this feature, the machine rests on the ties outside the rails. These same wheel frames are so constructed that they are longer than the curved support

^{1/} Ibid., p.7

standards, and they force the latter and the shoes off the ties and away from the rails as the trucks are lowered to the rails and the frame brought into a vertical position. After this process the machine is resting upon the tracks, and ready for movement.

This shows the McGiffert loader with the trucks in raised position, and the space for the cars to pass through.

Figure 1b



The entire operation of lowering and raising these trucks takes very little time, and is done by the one operator who doesn't have to change his position. All the levers operating the gears and cables are in easy reach.

ENGINES

The loader is equipped with a double cylinder horizontal engine provided with link motion which enables the machine to move in either position. A working pressure of 200 pounds constitutes the power that the loader works upon. The frictions are the double V-type which are very efficient in raising and lowering the logs.

BOILERS

Unless otherwise specified by the purchaser, the loader comes equipped with the full length tube vertical boiler. Different types of boilers can be used - boilers for 100, 150, or 200 lbs. pressure are made.



Figure 1c

McGiffert Loader, swing boom, 4wheel
trucks, with trucks down, resting on
wheels for moving along the tracks.
In the Southern pines.

The swing boom on the McGiffert Loader is of the rigid type, and is made of steel -the low ends hinged on an oscillating crossbeam. This crossbeam swings horizontally on a steel jaw secured to the girder which extends from the front of the loader. There is a U-shaped casting which is long enough for the specified swing attached with pins to each end of the front beam. (This attaches both the beam and front girder). Lugs are provided on the right-hand U shaped casting, forming a cross head and engaging steel guides secured to the upper surface of the two right hand deck beams. This casting is directly connected with the piston rod of the steam cylinder which moves the boom. When the valve is thrown into the central position, the steam is shut out of the cylinder and discharged from both sides through an exhaust pipe extending to the rear end of the loader. The proportions and construction of the cylinder and its openings are such that a steam cushion is formed in the cylinder as the boom approaches the limit of its swing, insuring both boom and loader frame against shocks.

The friction of the loading drum when pulled back for the next log is overcome by a slack pulling device from the crank shaft. This consists of a friction pulley which 1/

1/"Propelling mechanism of the McGiffert Loader", Clyde Iron Works Sales Bulletin, Duluth, Minnesota.



McGiffert, swing boom, 4wheel trucks, in the west loading short logs.

Figure 1d

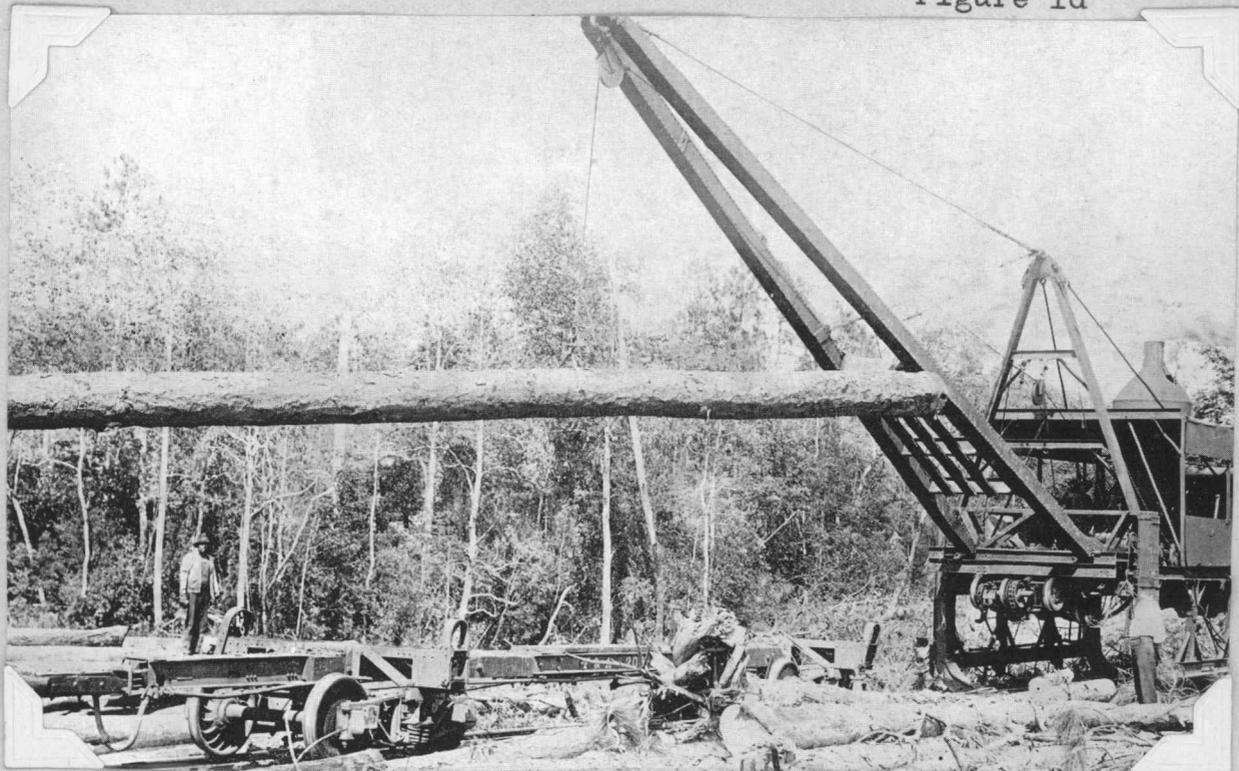


Figure 1e
McGiffert, swing boom, latticed at the base for heeling logs of extra length and loading with tongs. Southern pines.

engages the loading drum, and is operated by a foot lever. ^{1/}

HOW LOADING OPERATION IS ACCOMPLISHED

The loader goes to the new landing under its own power or otherwise bringing the empties along with it. The trucks are raised so the empty cars can go under the platform. These empties are at the rear of the machine and are made fast to one of the draw bars. After each car is loaded, a car is drawn by the spotting line and pushes the loaded car forward. This goes on until all the logs are loaded from that landing, and the trucks are lowered. The empty cars that remain are attached or coupled on the loader and taken to the next landing place. "any operations use a locomotive --The Euwana Box Co. of Klamath Falls and many others use a locomotive which hastens the operation, and the loader is used primarily for log loading.

THE MCGIFFERT DECKER LOADER

This loader, as the following picture shows, remains on its trucks when moving along the track or when loading. The space for the empty cars to pass through is provided above the trucks and under the machinery deck. Instead of the curved standards resting upon the ties as in the other forescribed loader, the lower frame is mounted on

^{1/} Ibid., p.17

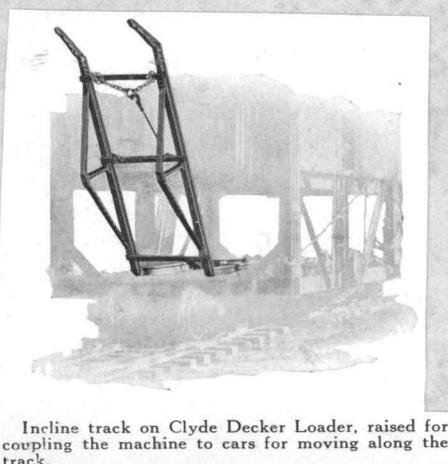


Figure 2

McGiffert Decker Loader with rigid boom. Note the incline track and car in the machine as passed through.

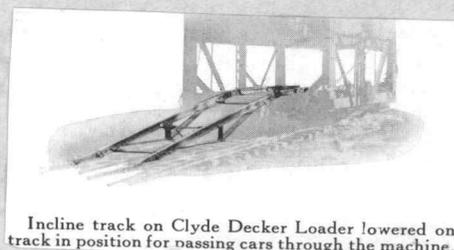
standard four wheel trucks with heavy body bolsters which support the entire structure. These loaders are built for any gauge track; ---some have been used successfully on wood rails.

The steel rails go through the machine on the lower deck and connected at front and rear with a trussed incline track reaching down to the main rails. These inclines are hinged to the fixed rails so that they may be raised off the main track when moving. This is shown in the picture below.



Incline track on Clyde Decker Loader, raised for coupling the machine to cars for moving along the track.

Figure 2a



Incline track on Clyde Decker Loader lowered on track in position for passing cars through the machine.

Figure 2b

The empty train of log cars is passed to the rear of the machine, and each car is spotted in front for loading by a cable from the front drum. This cable runs over rollers so as to hold the car in the proper position. ✓

The source of steam is supplied by steel water tanks which are located below the lower deck and between the

✓/ "The Decker Loader," Clyde Iron Works, Duluth, Minnesota.

trucks. These two tanks are so located that the chain operating the trucks runs directly between them; although both tanks are piped together and connected with the injector.

The swing boom is essentially the same as the loader described before this one. It can be either rigid or swinging. The power plant is a double cylinder engine with a two cone thrust friction drums. All gears are steel with machine cut teeth from a solid bank. The engine is link motion for movement either way of the loader.

There is an adjustable friction attached to the crankshaft, to engage the loading drum for furnishing slack in the load line. This entire engine and boiler is a complete unit in itself for they are mounted on a cast bed so that the piping, shafts, and gears are held firmly giving correct alignment. The same pressure rates are achieved on this loader as well as the others.

THE MCGIFFERT RAPID LOGGING MACHINE

The "Rapid Loader" has been used in the Southern Pine region. It is an early type, and one that is not used to any great extent. This machine is different in that the entire works slides over the top of the cars. It is shifted from one car to the other by its own power by means of a cable from the front drum of the engine leading under and back of the loader to a draw bar on one of the cars in the rear.

This loader requires a locomotive in the operation, but is applicable to places where the logs are scattered along the track or where there has been much loss from loss of logs during transportation. The boom may be either the quarter swing or the rigid as before. Wooden timbers are usually used for the boom poles, and is supported by a guy line running from the top of the boom to the top of the A-frame.

An upright steel water tank is at the rear of the loader (capacity for a days work). The tank is connected to an injector and also with a steam ejector or syphon with a suction hose for filling water from the side of the track. The engine is the standard grade as described in the preceding machines. The working parts, boilers, and other essentials are the same as in the other McGiffert loaders.



Figure 3

McGiffert Rapid Loader with swinging
boom, operating on standard flat cars.

The McGiffert Loader Used As A Skidder

At a small additional expense the loader can be equipped with all the essentials for skidding purposes. Extra drums and blocks and cable are needed. The boom must be guyed sideways to stumps or trees to insure rigidity. Loading in itself doesn't require side guying, but when skidding over 150 feet the boom must be guyed. In rough country, swampy, or bunched logs, one drum can be added for an outhaul cable which is run through outhaul blocks attached to stumps or trees to the distance required, and the end attached to the skidding line on the same plan used for mechanical outhaul skidders.

The logs can be loaded directly to the car as they are skidded, if necessary. 500-600 feet is a practical distance for economical skidding, although drums can be furnished that will hold 1000-1500 feet of cable.

Equipment needed will be: skidding cable, blocks, chokers, guide sheaves, guy lines, guy blocks, and can be attached to the Log Loader.

This is applicable when one or two skidding lines provide capacity sufficient for the requirements at the mill, or in timber where not more than two lines could be worked to advantage from one location. ^{1/}

^{1/} "Skidding With The McGiffert Loader," The Clyde Iron Works, Duluth, Minnesota.

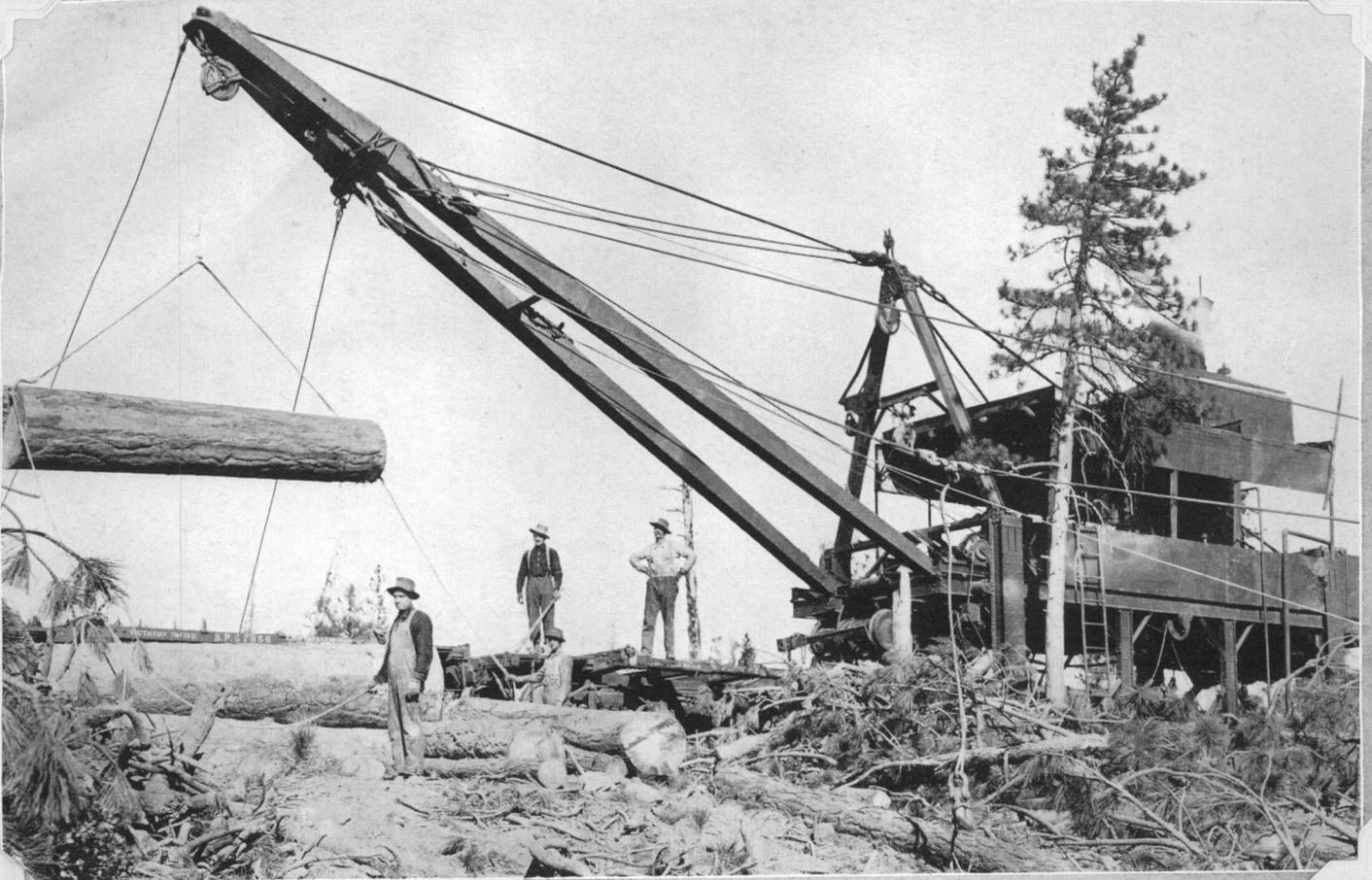


Figure 4

Mc Giffert Loader, Western type, used for
skidding and loading -using cable for haul
back.....



Figure 4a

McGiffert Loader, used for skidding with two lines, one running from each side and horse for taking the line out.

Photo on next page

COURTESY OF McLOUD RIVER LUMBER CO.

THE Mc GIFFERT LOADER AT THE
McLOUD RIVER LUMBER COMPANY.
McLOUD, CALIFORNIA



The California Fruit Growers Supply Company at
Susanville, California

Mr. A.E. Baker, Logging Superintendent for the Lassen operation for the above company, gives the following data for his McGiffert loader.

The operation is loaded entirely on railroad cars over their own tracks for a distance of 22 miles, and from that point is taken for an additional 18 miles by the Southern Pacific to the mill. The operating cost on this operation, including Main and Spur track runs to about \$3.70 per M. (Mr. Baker makes the statement that if this were hauled by truck, the costs per M would probably cost around \$6.00 per M.).

The boom on this McGiffert is 45 feet long, and swings through an arc of about 10 degrees each way from the center line, or enough to clear the brow log. They use a 3/4 inch hoist line and a 5/8 inch crotch line made with two 19' 6" legs spliced to a ring with a loading hook attached to each leg.

The crew on this jammer consists of the hoisting engineer, top loader, and two or more hookers whose function it is to hook the logs and steer

them on to the car by means of cotton hand lines attached to the hooks - these lines also enabling the hookers to pull the hooks clear after the log is loaded. The hoisting engineer receives $\$1.12\frac{1}{2}$ per hour, and at the operation Mr. Baker gives his hoisting engineer an extra half an hour at lunch to tighten his machine or anything else that needs to be done; it is a very skilled job as he has to use both hands for throttle and frictions, and use his knee for the boom swing engine throttle - which takes an expert to land the logs in just the right place and with a minimum of work for the hookers. The top loader receives $\$1.07\frac{1}{2}$ per hour and the hookers receive 80¢ per hour.

The record loading day on this operation saw 600M feet loaded in a nine hour day with six chains to the load. On an eight hour day it is easy to load 300M (varying with the type of timber). The average at this camp is not that high, and no records have been kept as to the average daily load. Baker says, " If we are loading 150M per day, I use three hookers -the extra man unhooking the chokers from the logs as they come into the landing and helping with the chains - and these men rotate on

this job as hooking is very hard work. Above 150M we use a frogger for the chokers job, and the extra hooker second loads and helps with the chains. Over 225 M feet we use four hookers, two hooking, one second loading and one on the far side of the cars throwing up and fastening the chains, all men rotating."

The chains are a large item in loading and take about four minutes per car. There are two over the first tier, two over the second, two over the third. Each set is bound by the tier above and then the top tier is bound by the top row of logs which have no chains around them. The chains have to be tight or the load shifts, the loose chains accounting for practically all the bad order cars on this operation.

Last year this company loaded 2801 carloads averaging 10,553 feet per car, and an average of nineteen logs per car - of this number they had but 30 cars rejected by the Southern Pacific which is a very fine showing.

The cost of loading is about as follows:
Labor 26¢ per M, Repair, labor, and supplies 2¢,

Fuel and oil 4¢ per M, and Hoist, car and squirrel lines at 1¢ per M giving a total of 33¢ per M cost of loading. This is exclusive of writeoff on the McGiffert which cost the company \$15,000 ten years ago.

An operation manufacturing Shevlin Pine in California send these figures upon their McGiffert Loader and operation.

This company employs the use of two quarter-swing boom McGifferts. At their White Horse Camp they produced in one season 60,429M feet loaded by a McGiffert, and at their Pondosa Camp, which was in a little better grade of timber, they produced 63,457M feet for the season. At the first camp they averaged 256 M feet per day while at the latter camp the average was 273M per day.

Operating labor at the White Horse Camp amounted to 21¢ per M and Repair Labor at 2¢ per M. At the Pondosa Camp the cost was 21¢ per M for operating labor, and 1¢ per M for repair labor. At the White Horse Camp supplies cost 9¢ per M and at Pondosa -7¢ per M. The total costs were nearly the same at the camps, but the Pondosa camp which had the better logs and better grade had a lower total cost. It was 32¢ /M at the White Horse Camp and 29¢/M at Pondosa.

The loads averaged 7,358 feet per car. The operation was entirely railroad using a standard bunk logging car with 80,000* capacity.

The initial cost for their machines was a little over \$21,000 each, and are depreciated on about a 7% rate. The loaders move on an average from landing to landing about every other day-- depending upon the

amount of timber that comes in at that particular landing.

The trees on this operation generally do not exceed 70 or 72 inches in diameter on the stump, and butt logs are usually cut in 16' lengths. They have some Sugar pine that runs as high as 11 pounds per foot, but the Ponderosa pine drops down to about 7 or $7\frac{1}{2}$ pounds per log scale foot. (You can judge from that what the strength of the machine would be).

There are about eight men at the landing - the engineer, the top loader, one or two knotters at the landing, and four hookers who rotate, one taking the place of a second loader, one unhooking chokers from the tractors as they come into the landing, and two hooking all the time. The number of knotters present is dependent on the type of timber coming in.

The machines both burn oil, and use about 200 gallons daily.

The wage scale is as follows: the engineer \$1.06 per hour, top loader 99¢, hookers 83¢, and knotters 70¢ per hour. Employed also is the grease monkey who greases loader, cats, and acts as watchman receiving 73¢ per hour.

Another Of The Operators Using The McGiffert
Loader

At the Big Lakes Box Company operation near Canby, California they employ two loading methods before the logs reach the mill. Their first loading is done by a $1\frac{1}{2}$ yard Lima shovel that will be taken up and discussed under the shovel loaders. Logs are loaded with the Lima onto trucks, and transported to the railroad where they are loaded by the McGiffert onto the railroad cars.

The initial cost of the McGiffert was about \$20,000, and it loads on this operation up to a half a million feet per day. The average is less than this figure. The logs vary in length from 12 feet to 40 feet.

The cost of loading per thousand feet is about 18 cents, and the average crew in this operation is the loading engineer, truck loader, and three hookers. The "jammer puncher" receives $\$1.47\frac{1}{2}$ per hour, the top loader at the rate of \$1.25 per hour, and the hookers at the rate of 77 cents per hour. There is also a wood buck who is paid 60 cents per hour.



Winter logging scene at the Canby, Calif. operation.

Figure 5a

Courtesy of H.C. Mesner

THE DIAMOND MATCH COMPANY

Stirling City, Butte Co., California

The Diamond Match Company at Stirling City employs two loading systems - a Locomotive Crane and a P&H shovel. The American Locomotive Crane is used on their railroad show while the shovel is used at their truck show. The logging superintendent heartily approves and endorses these two units. The machines are very simple to operate and to use, and are capable of much hard usage.

The company bought these above units second hand, and didnot disclose that initial cost to the company.

The following figures speak for themselves as to operation and costs.

American Locomotive Crane

This is a steam loader with a 10x10 engine size (serial number 1277). The operating cost is \$1.50 per hour which included repairs, maintainance, etc. (\$12.00 per 8 hour day). The number of men needed are one operator and three loaders with the jammer puncher recëiving top wages of \$0.90 per hour, the two helpers receiving ,65 per hour, and the top loader receiving .88 per hour (\$24.64 per 8 hr. day).

The average number of board feet per car load is 8000 b.f., with an average of 150,000 board feet the average number of feet loaded per day. The per

M operating cost, therefore, is a little over \$0.24 on an average basis of 150,000 board feet of logs.

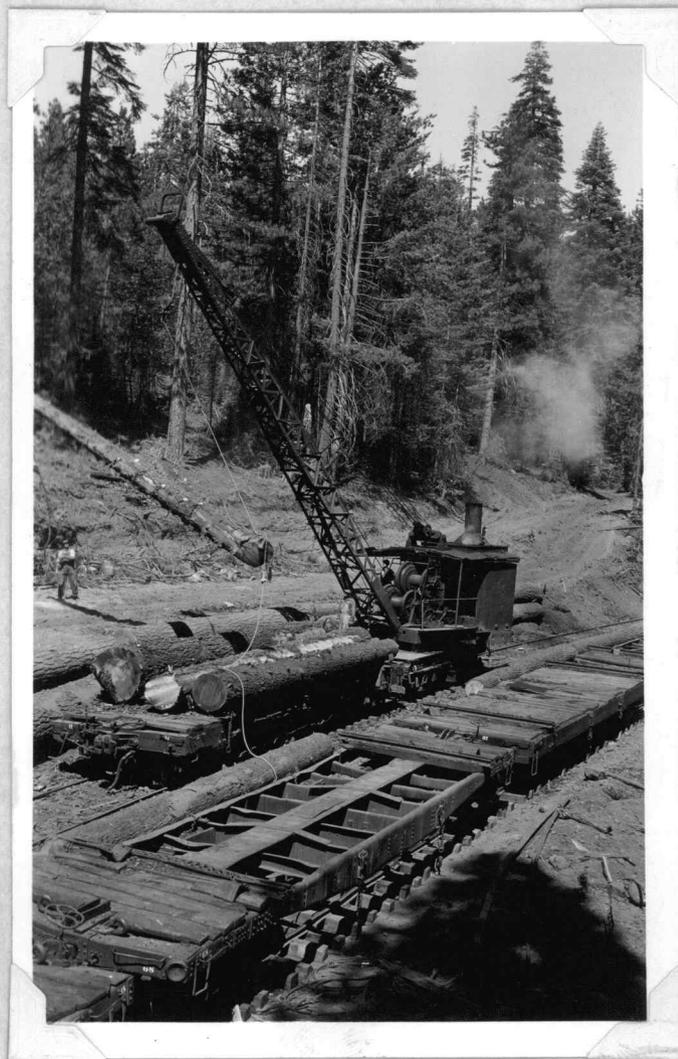


Figure 6

Courtesy of Diamond Match Co.
Stirling City, California.

The above picture shows a typical landing with the locomotive crane. Showing the steel boom, placement of drums, and cables holding boom in place. Note at base of steel boom the top loader, and also the clear vision the jammer operator obtains.

P&H Shovel

The second loader at the Stirling City Diamond Match Company operation is the $1\frac{1}{4}$ yard P&H gas shovel.

The operating cost per M is necessarily higher with this loader with the figures presented me. There is one less man at the landing, but the operating costs per hour is 15¢ higher. The average load per car is lower, and consequently the average number of feet loaded per day is lower. The operating costs per M is approximately \$0.37, while the Locomotive crane was about 24¢.

The operating cost per hour, including repairs, etc., is \$1.85. The number of men needed is one shovel operator at \$0.90 per hour, one helper at 88¢ per hour, and one helper at 65¢ per hour.

The truck loads at this operation average 6000 feet per truck with an average of 90,000 feet per day loaded.

AMERICAN STEAM LOG LOADER - STIFF BOOM

Donald MacKenzie, logging superintendent for the Anaconda Copper Mining Company at Bonner, Montana, has used the "American" loader for several years, and it has proven very economical and satisfactory to him.

For many years and up to 1937 all of their log loading on cars has been done with the stiff boom American steam loader, built on skid runners with hoisting and haul back drums by which the loader pulls itself back over the empty cars. They are still using these loaders, but are converting the unit of power from steam to the more economical gasoline powered engines.

For log sizes such as are required to handle in western Montana, they use a bunching line for the smaller sizes, taking up several logs at a time and loading the larger sized logs by hooking each log singly. They have found this type of log loader quite simple, and have been able to load, including engine switching time, an average of from 20 -25 cars daily, averaging 8,000 feet per car. This is equal to around 184,000 feet per day.

The crew necessary for the loading operation is one hoister at 83 cents per hour, one top loader at

68 cents per hour, four hookers at 61 cents per hour each, and one tail-down man at 58 cents per hour.

The average cost of loading for this American loader runs between 30 and 40 cents per thousand feet, and Mr. MacKenzie believes that with the loaders installed with gasoline motors the cost should be cut down 5 cents per thousand feet.

TRUCK LOADING FOR ANACONDA MINING CO.

On truck hauls where logs need to be hauled and loaded on trucks and transported to railroad sidings, the Anaconda Lumber Department has built up on their own operation several small portable log loaders which they drag with tractor power to different truck loading points. These are gas powered units, automotive power units changed over for the purpose of log loading, built on skids with a V frame and a loose swinging boom. They have found these units quite successful and are able to load the trucks without delay, at a labor cost of approximately \$25.00 daily on an average daily output of 80,000 feet -- or about 32 cents per thousand feet.

These loaders are patterned after the "American" log loader mentioned above for car loading, with hoisting drums only, no haul back drums being used. As long logs only are handled by trucks, all logs are hooked singly and no bunching is done on this operation. Mr. MacKenzie says that the costs of building such a loader with old material available, salvaged from discarded equipment, are - around \$350.00. The purchase of new equipment would, of course, run this up considerably.



Figure 6a Courtesy of Yale Weinstein^N
American Loader Loading log cars. Diesel
Caterpillar powered (loader transfers on
top of cars by means of transfer rails).



Figure 7 Courtesy of Yale Weinstein
Speeder Loader -3/4 yard - with 35 foot boom.
Logs are from 32' to 40' in length. This load is
approximately 8000 feet on a White 10 Ton truck.

AMERICAN LOADER IN WHITE PINE

Alex McGregor, logging superintendent for Potlatch Forests, Inc. in Idaho, has two railroad loaders in use. One with a swing boom, and the other a slide or stiff boom. The swing boom is used for loading the long logs. The logs are cut from 22 feet up to 38 feet in length. Cats skid them to the landing, and the landing men roll them upon a skidway from which the swing boom picks the logs.

The crew is composed of one hoister man, one top loader, two hookers, and one bull-cook. The bull-cook at this operation is the man who gets the cars and stakes ready for loading. This crew loads from 16 to 24 cars a day which, of course, depends entirely on the timber - if it is good sound timber it loads faster, but if it is small it is slower. The approximate feet loaded per day is 150,000 with about 7500 feet to each car. With the above conditions and crew, it costs the company about 39 cents per thousand board feet to load.

In other camps operated by Mr. McGregor, they use a slide or stiff boom to load their short logs. These short logs are loaded in bunches with a crotch line. The logs are cut from 12 to 20 feet, and the cost per thousand is a little more for there are four hookers. (The above costs donot include railroad engine work which is busy all the time switching cars and moving).

Photo missing

Figure 6b

From May, 1939, The Timberman

Loading white pine at Camp 20, winter operation of Potlatch Forests, Inc., of Lewiston, in the Clearwater section. This is the slide or stiff boom American Loader loading short logs in bunches.

SHOVEL LOADERS

THE LIMA SHOVEL

The standard Lima shovel is quickly and easily converted to a log loader by simply unreeving the cables from the drums and remove the shovel boom, dipper handle and bucket by removing the boom foot pin. A larger diameter drum lagging, which is split and easily installed, is applied to increase the hoisting speed and then the crane boom, which can be either a wooden boom or standard structural steel type, is applied and cables reeved on hoist drum and holding line. An automatic slack pulling device is applied on the hoist drum to keep slack in the line taken up at all times.

"I believe the heaviest load in the Pine country would be approximately a 3' diameter x 32' log, which will weigh approximately 14,000 lbs.," says Mr. W. D. Haley of the Lima Locomotive Works at Seattle, Washington. Therefore, the log loader must have a hoist line pull of at least 14,000lbs. to handle this log in one lift. If the capacity of your loader is less, this log can be loaded end for end, but this would decrease the speed of the operation.

The horsepower of engine, swing speed, travel speed vary on the size of the log loader. Mr. Haley believes that in the Pine country, the Lima 1-yard machine is

to handle logs and most of them can be handled in one lift with a slight few of the heavier logs to be handled end for end. The 1-yard machine carries a power plant of 103 horsepower, is full revolving, has a hoisting line speed of 146 feet per minute, and has a travel speed of $3/4$ mile per hour in low gear, and $1-3/4$ mile per hour in high gear, and will climb a 30% grade in low gear and a 15% grade in high gear. The swing speed of the machine is 4 revolutions per minute.



Loading Logs with a Lima Crane at Deschutes Lumber Co., Mowich, Oregon

LIMA LOCOMOTIVE WORKS, INC., Shovel and Crane Division, Lima, Ohio

SEATTLE—Lima Locomotive Works, Inc.
(Shovel & Crane Division), 1932 1st Ave. South.

SPOKANE—General Machinery Co.,
East 3500 Riverside.

PORTLAND—Western Steel & Equipment Co.,
734 N. E. 55th.

SAN FRANCISCO—Lima Locomotive Works, Inc.
(Shovel and Crane Division), 200 Bush Street.

VANCOUVER, B. C.—
Tyece Machinery Co., Ltd.

LIMA SHOVEL CONVERT FOR THE
BIG LAKES BOX COMPANY
KLAMATH FALLS, OREGON



Figure 8a

Courtesy Harry C. Mesner
Logging Supt.

At the Big Lakes Box Company operation in Canby, California, they employ the use of a Lima $1\frac{1}{2}$ Yard shovel. They took the dipper and dipper sticks off and put on a forty foot boom or "A" frame as in the above picture. They use $\frac{3}{4}$ inch loading line and a $\frac{5}{8}$ inch crotch lines with a set of #10 Bell hooks.

The shovel moves from landing to landing at a rate of about one mile per hour loading logs at these landings varying in length from 12' to 40', and on a direct lift will handle a log of about 2400 feet. Larger logs are lifted

one end at a time on the truck bunks.

Logs on this operation average about 4 sixteen foot logs to the thousand feet, and the average load per truck is about 6000 feet. From the time the truck spots at the landing until it pulls out the loading time is eight minutes. A loading rig such as this if kept loading every minute of the eight hour day, would load around 400,000 feet per day, but because of hang ups waiting for trucks and logs or anything else that may occur, 300,000 feet is a fair days work - perhaps more may be averaged during the season.

The shovel can be procured in either Diesel or Gasoline motors - the shovel at the Big Lakes Company is a gasoline motor, and uses about 35 gallons of gas daily. The cost of the shovel new f.o.b. Canby, California was about \$18,000, and the cost of the "A" frame about \$350.00.

The entire cost of loading per thousand feet is about 18 cents. The crew at the landing is: the shovel engineer which is paid at the rate of \$1.47 $\frac{1}{2}$ per hour, the top loader at the rate of \$1.25 per hour, and the hookers at the rate of 77 cents per hour.

PAUL B. KELLY
 LOGGING CONTRACTOR
 PRINEVILLE, OREGON

Paul Kelly, logging contractor in eastern Oregon, finds the Lima loader very profitable on his operation. He sends the following figures concerning his Lima Loader and operation thereof.

At f.o.b. Prineville, Oregon, Mr. Kelly paid \$15,000 for this loader for which he depreciates the machine over a ten year period. The crew that operates this machine and wages are as follows: Loading engineer at \$1.00 per hour, hookers at 75¢ per hour, and half time of 2 knotters is also charged to the loading operation.- the knotters receive 65¢ per hour. Half of the knotters time is charged to loading, and the other half is charged to skidding. (Because of keeping the landing clean and unsetting chokers from logs as they come into the landing.)

The operating costs are as follows:

Gas and oil, per day -----	\$4.00
Cable, Rope, Hooks per day ----	\$1.00
Depreciation, per day -----	\$6.00
Maintenance, per day -----	\$2.00
Wages, per day -----	<u>\$25.20</u>
Total, per day	\$38.20

This daily cost figure is necessarily high, but on a daily per thousand basis this figure drops to about 32 cents. The average scale per day is 120,000 feet with an average load per truck of 4500 feet.

LOADING SYSTEMS FOR THE GRANDE RONDE
PINE COMPANY OPERATIONS

The Grande Ronds Pine Company under the direction of E.S.Collins, president, and Truman Collins, General manager, favor the shovel converts with diesel power. This is one of the largest companies operating in the pine district of eastern Oregon - managing three logging companies, and using various types of loading systems. Here is a brief resime of their operations, and the loaders.

- a. At Pondosa, a Marion Diesel Electric Loader, No.21, of about 1 yard capacity, with a D8800 motor in it, length of boom 40 feet.
- b. At Lakeview they have a Northwest No.106, $1\frac{1}{2}$ yard capacity, weighing around 90,000 lbs., with a D13000 diesel motor (Caterpillar). Also they use a Lima No.447 with a D13000 motor at Lakeview, Oregon.
- c. At Willow Ranch, California they are using a Speeder $\frac{1}{2}$ yard loader, weighing around 30,000 lbs.
- d. At the Molalla operation another Lima is used, No. 701 with a D13000 motor very similar to the Lima at Lakeview.

Mr.Truman Collins personally favors a loader with

a diesel motor, and the D11000 Caterpillar has proven to be quite satisfactory, as well as the Cummins HB600. The larger loaders are being equipped with the Cummins Supercharged Motor, and with the Caterpillar D13000.

In the three companies that Mr. Collins manages, the operating costs run around 30¢ to 40¢ per thousand - the labor being around 25¢, the gasoline, fuel, and wire line about 10¢, and the depreciation around 5¢.

Mr. Collins says, "most of the pine operators purchase used loaders of about 1 yd. to 1 $\frac{1}{4}$ yd. capacity, and the cost is around \$8,000.00. A number have purchased new equipment of about the same size for around \$14,000.00." Here one can see that the initial cost will vary as to the type of equipment and the length of life wanted.

On these operations the system of using end hooks instead of tongs is favored, and this requires a loading operator, a man for each hook, plus the top loader - one of them being the driver of a truck. It takes but ten minutes to load a conventional truck carrying about 5000 feet (at these operations two new logging trucks are also employed which can carry 23,000 feet of lumber on one load), and if enough cats are available for skidding, a 1 yd. loader will

load rather easily 200,000 feet in eight hours; and, of course at their Lakeview operation they have averaged on good days considerably more than this because of the advent of the new trucks. In an operating season, a loader such as used by the Lakeview Logging Company, can average 200,000 feet per day. But, usually, the loader is not overworked, and the output of the job is limited more by the number of trucks or the number of cats, than by the capacity of the loader.

On the Pondsosa operation the company also employs a small loader on a Mack truck which gets them by for loading short logs satisfactorily, but it would not be adequate for the backbone of any operating set-up. This loader was not described.

Clifford L. Whitten, logging engineer for the Oregon Lumber Company, Baker, Oregon, have a shovel convert mounted on an old Mack truck which has proved very mobile and economical, as well as efficient.

The loader is mounted on a special-built Mack truck frame, that is, the frame of the truck is lowered and widened, the width is twelve feet and the bottom of the frame is about twelve inches from the ground. The center of gravity for the machine is about $4\frac{1}{2}$ feet. The truck unit is powered with a Bulldog Mack motor with a three-speed transmission and chain final drive.

The loader, itself, is a Hyster one-fourth yard shovel made by the Willamette Ersted Co. of Portland, Oregon. It was converted into a loader by putting an "A" frame wooden boom on it which is twenty-eight feet in length. It is full swing with a two-drum hoist. The power for the hoist is furnished by a four-cylinder International gas motor mounted on the back of the loader which also serves as a counter-balance.

The crew necessary for this loading unit consists of one hoister, two hookers, one top-loader, a knot-bumper, and a scaler. The cost records for this loader include all this labor besides the expense of running the machine, which amounts to 43¢ per M feet. The loader will load a

1200 foot log, but works better on logs of 1000 feet or less. This winter (1940) they loaded loads up to 7600 feet on trucks as shown in the following picture. The logs are 16 foot logs. The loads average 5100 feet for a two-month run, and the daily average for this loader was about 80M feet. (Size of logs in this area is five logs per thousand feet).

The unit is very mobile as it can be moved at six to fifteen miles per hour under its own power depending upon the steepness of the road etc.



Figure 8b

March 1940, West Coast Lumberman

LINK BELT SPEEDER YARDER

Mr. E.S. Young, logging superintendent for the Southwest Lumber Mills, Inc., has instigated the change of the Crotch Line System to a Speeder yarder. When Mr. Young came to this company in November, 1939, he found the Crotch Line system used there, but while this system is an excellent one for use in heavy stands of medium to large timber, it was entirely unsuited to most pine stands. Mr. Young then took immediate steps to change this system.

The new machine is full revolving, has Caterpillar tracks and rollers, and a Caterpillar D7 Diesel engine and is manufactured by the Link Belt Speeder Corporation of Cedar Rapids, Iowa.

Lifting capacity is changed by raising the boom so as to work on a smaller radius. The higher the larger the log that can be raised.

The crew necessary is 3 to 4 men - 1 machine operator, 1 head loader and 1 or 2 tong men depending upon the difficulty of reaching the logs, etc.

The capacity is about 25M feet per hour, and the cost is about 20 to 25¢ per M feet.

Mr. Young is more than satisfied with the new type of loader, and highly recommends it, but he certainly does not recommend the Crotch Line System in the pine.



Figure 8c

Courtesy of E.S.Young

Full revolving, Caterpillar tracks and rollers,
and a Caterpillar D7 Diesel engine manufactured
by the Link Belt Speeder Corporation of Cedar
Rapids, Iowa.

SPAR TREE LOADING

MICHIGAN * CALIFORNIA LUMBER COMPANY
CAMINO, CALIFORNIA

Sugar pine and Ponderosa pine are the two main products of this company which uses one of the few steam donkey engines in the pine belt.

The method logging on this operation is based on the use of narrow gauge railway, with construction of numerous spurs, so that the maximum yarding distance is usually from 1300 to 1500 feet. The yarding is done entirely by Diesel tractors, and being mostly down hill, is done without the use of logging arches. They have two Carco arches, which are used on long hauls or when the haul is slightly uphill.

Due to the difficulty of moving on narrow gauge tracks, the company does not use any special loading machinery, but use instead some small steam donkeys that were left over from some of the companys former loading operations employing the use of donkey engines. The railroad haul is a 15 -18 mile haul from woods to mill. The logs are bucked 16 feet in the woods and loaded on skeleton cars 24 feet over all, with 8 foot bunks spaced 12 feet apart.

According to Bill Berry, logging supt., loading for a mill capacity of 240 M feet is handled by two 9 by 12 steam donkeys which were formerly used for yarding. The fuel is cut from pine limbs in the woods. The man power for this operation employs a head loader, second loader, donkey puncher, and two hookers.

Loads average about 4000 bd. ft. per car. The loads range from 2500 - 6000 ft, but as the cars are equipped with the conventional cheesblocks, the average is 4000 feet.

The rig - up consists of a raised pole 60 - 90 feet guyed with five $1\frac{1}{2}$ inch guys, and a swinging spreader bar equipped with bell type hooks. As the donkeys furnish ample power no extra purchase is needed for the heavy butt logs, but straps may be readily substituted for the hooks for safety. This rig - up permits the building of 20 to 40 M decks during car shortages.

The loading crew, directed by the woods foreman and assisted by the head rigger and choker setters, can unrig, rigup, and move the loader on a special car in a period of four hours. The cats aid in raising the pole, pulling line, and spiking guys.

The average labor cost for loading during the past season (1939) was \$0.32 per M. There are no other figures available for the operation.

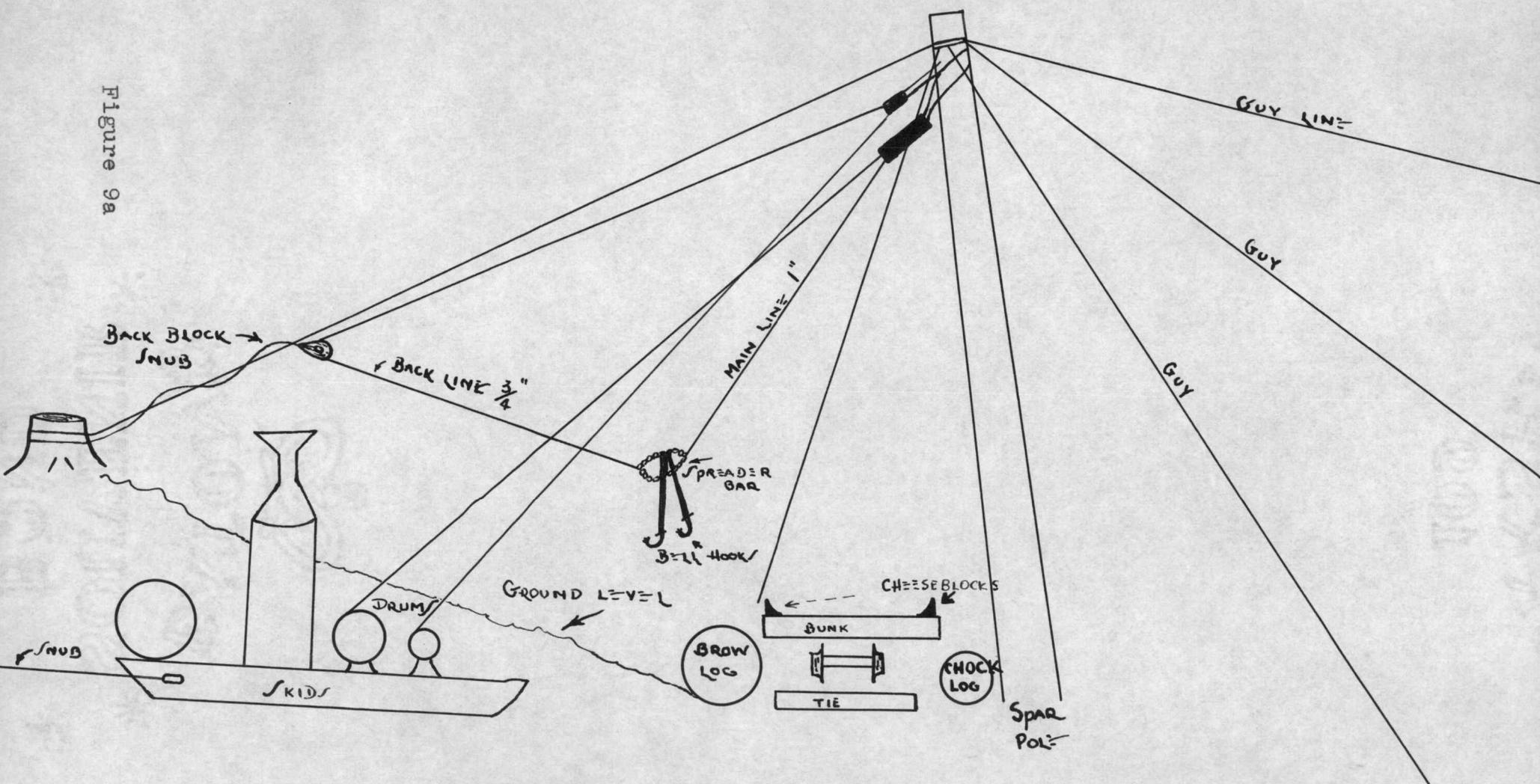


Figure 9

Picture Courtesy of Swift Berry
(Manager, Camino, Calif.)

The above photograph shows the location of the loading donkey, the spar pole, and the railroad car.

Figure 9a



SHOWING MICHIGAN - CALIFORNIA LUMBER OPERATION

REPRODUCTION OF PHOTOGRAPH

COURTESY OF BILL BERRY

GIN POLE

S.C.Linebaugh, of Arnold, California, uses a gin pole rig for his loading system. Mr. Linebaugh is very satisfied with this loader as it gives maximum performance with economical returns.

Three guy lines of $1\frac{1}{4}$ inch wire rope about 200 yards long is needed. One block for the top of the pole with a $3/4$ " inch strap doubled - also a safety strap is used. They use a pole from 50-60 feet long with a top diameter of about 15 inches.

Raising pole is done by stringing out the guys and spike the back guys after you have put the top of the pole on a log. Put a line on the butt of the pole and string it along to the top. A tractor with a winch will raise the pole on a straight line. You can tighten the guys with the overhead guy and give it enough lean so that the block is over the center of the truck. It is necessary to place a brow log next to the truck, and then the rig is ready for work.

It takes two men about two hours to put up this rig for loading with the use of one tractor. They use a crotch line and bell end hooks with a line from them up through the block and hooked on the front of a 60 h.p. tractor. The tractor loads in reverse gear, and can pick up a 1500 foot log in average timber. If the log is to big to be lifted, they hook a line on the pole almost as high as the brow

log and roll the log on with the same hook-up. At this operation, Mr. Linebaugh has loaded 3 truck loads in 20 minutes with the loads averaging 4500 feet per truck. You can load any size log with this rig.

Mr. Linebaugh believes this to be the cheapest loading unit as any old tractor will load logs, and the guy lines don't have to be new nor the block.

At this operation, they generally put in 200 to 250M per day with two loading rigs (average of 125M for each). This is based on a shift and a half or 12 hours.

LIDGERWOOD GUY LINE LOADER

In a railroad set-up the engine car is taken to the next setting and located near a convenient tree which could be used for a head spar. Sometimes a switch is made, and then the skidder is put out on this switch, but the usual procedure takes into consideration the swivel trucks on the cars. The car is raised until the wheels are off from the rails (jacks are used to accomplish this). After the car is raised the trucks are turned at right angles and temporary rails are placed so that the car will be able to move sideways from the main tracks to a place in front of the spar tree. The skidder stays here until all logs are loaded. A guy line loader then made so as to span the main tracks for loading.

The loading engine has four drums - one for loading, one for changing line, and two heel block drums.

The Lidgerwood Guy Line Loader consists of a cable which spans the main track from spar tree to a stump on the other side, which also is used as a guy line. The cable is so placed that it is directly over the railroad track, and the loading carriage is slid over this cable. The cable used

loading goes from the drum on the loading engine, through a block on the main spar tree, then through another block that is suspended from the loading carriage, and then to the ends of this cable or rope are attached the hooks or loading tongs. As the logs are brought in from the skidding unit, the logs are hooked and drawn from under the main line up to the car. The logs are then hoisted clear and placed upon the cars. It doesn't make any difference as to which direction the logs are being skidded, as the loading is not affected. Skidding and loading can take place at the same time. The railroad cars are spotted by the loading engine, which makes it faster in that no locomotive is used.

It takes three men to compose the loading crew, 4 men for the rigging crew, and 8 men for the skidding crew.

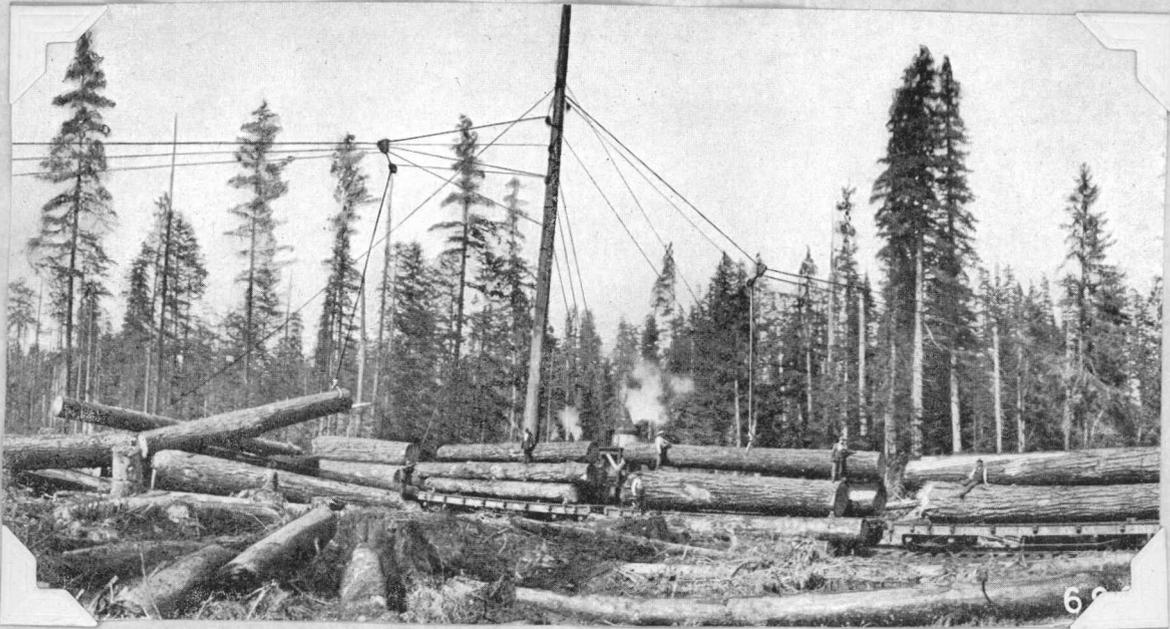


Figure 10 Bulletin 63 Lidgerwood Mfg.Co.

Lidgerwood Guy Line Loader

Skidding and loading operations are going on at the same time, and independent of each other.

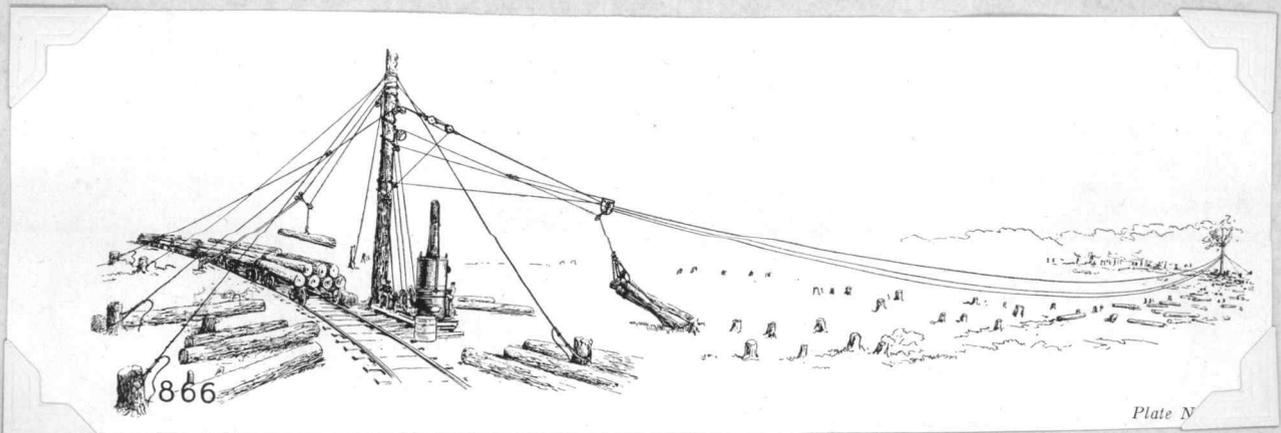


Figure 10a

Bulletin 63 - Lidgerwood Mfg. Co.

Showing complete operation of skidding and guy line loading with the tree rigged type of Lidgerwood.

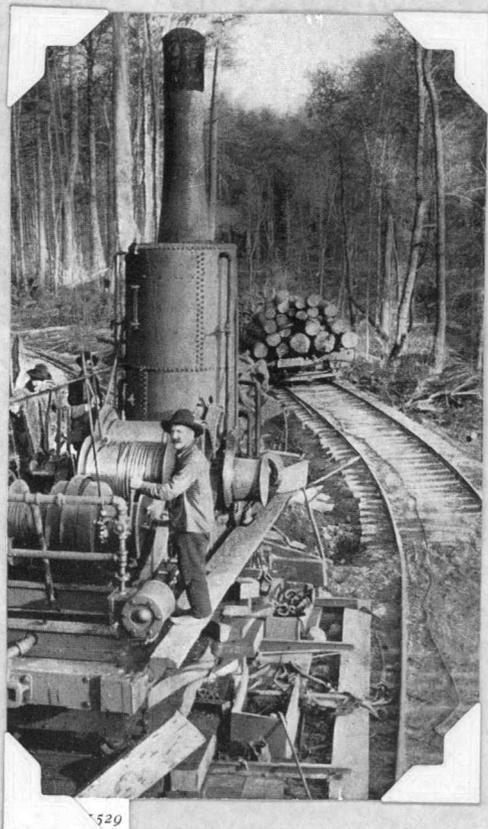


Figure 10b

Bulletin 63 -Lidgerwood Mfg. Co.
Skidder engine on temporary tracks at side
of railroad. Tracks can be seen on which the
Lidgerwood was propelled sideways from the
main track.

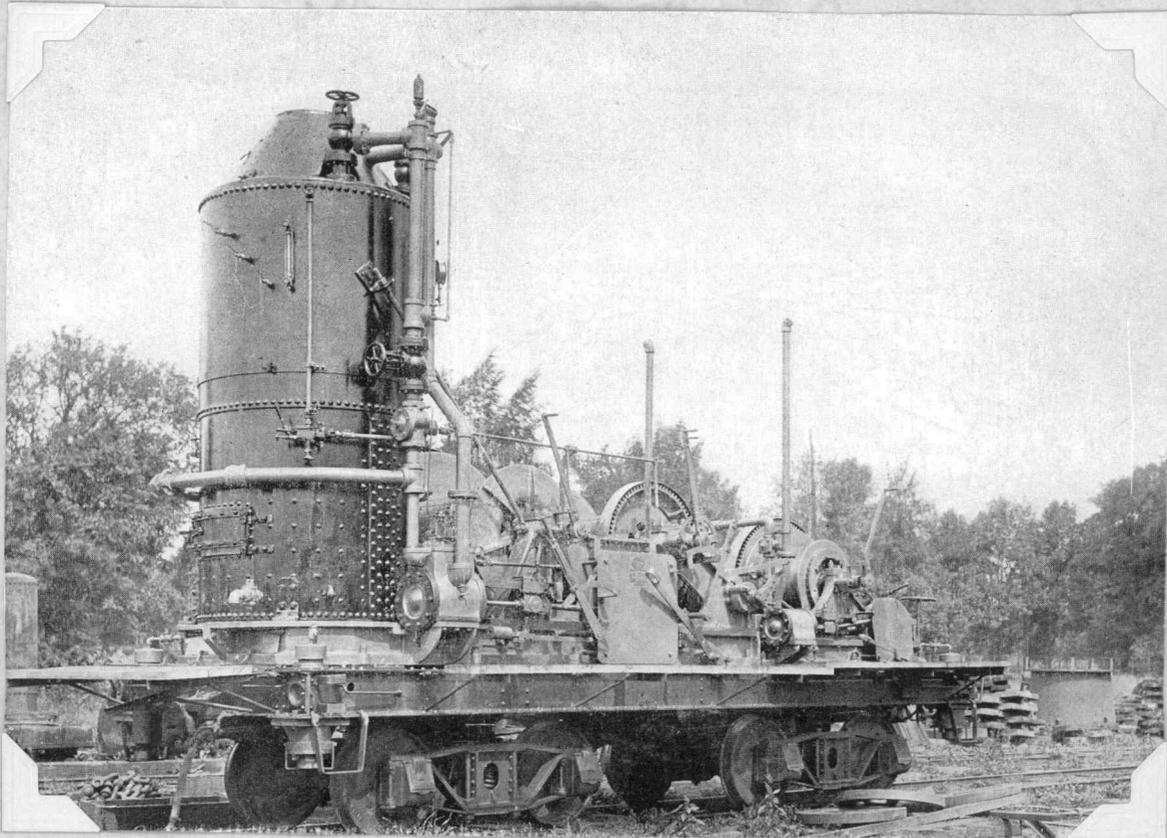


Plate No. 1610

Figure 10b

From Bulletin 63 -Lidgerwood Mfg.CO.

Cableway skidding and loading engines mounted on their own car ready to be sent across the continent on its own trucks. Housing was added when the outfit arrived on the Pacific Coast.

LIDGERWOOD SKIDDER & LOADER

The Lidgerwood Manufacturing Company are the originators of ground and overhead steam logging machinery. They have skidders and loading systems that are made of steel - a steel tower, portable platform which is mounted either on trucks or legs, and has interlocking mechanism.

These loaders and skidders are used in the pine regions of the Pacific Coast in a few cases, and to some extent in the southern pine region.

In the ~~preceding~~^{FOLLOWING} picture there is shown the Lidgerwood Improved Quick Moving Skidder and Loader with lowering high steel spar. This skidder straddles the track, and the empty cars go underneath in much the same manner as the McGiffert Loader for loading by the swinging boom loader.

The capacity of the swing boom loader is very high for there isn't much delay in loading as the logs are skidded and then loaded at the same operation and time. This prevents a pile-up of logs about the loader, and is quite advantageous in flat country where many logs are handled per day.

For loading this machine has three drums, and the swinging engine operates the swing boom loader. The

skidding engine has four drums for skidding, outhaul, slackpulling, and a drum for lowering or raising the spar; along with these features the skidder also has two drums for tightening the main cable and heel blocks, one drum for spotting cars and one for changing lines. Making all in all there are four sets of double cylinder engines in the complete unit.

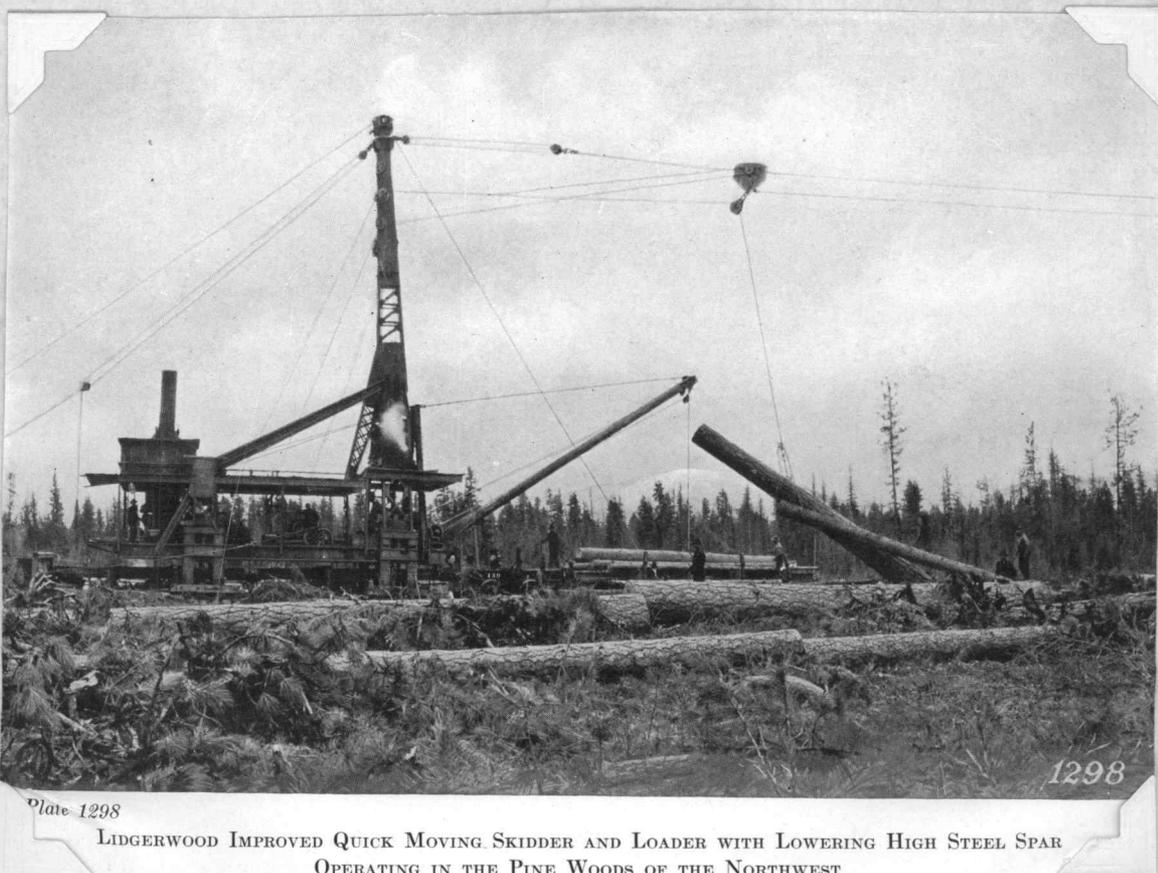


Figure 10d

From Bulletin No. 59A of The Lidgerwood Mfg. Co.

HYSTER TRACTOR DONKEY



Figure 11

Courtesy of Willamette Hyster Company
Portland, Oregon

The above picture is taken at the operation of
George Howell, Quincy, California using the crotch
line system.

HYSTER TRACTOR DONKEY

Hyster Tractor Donkey's are frequently used for loading logs on trucks with either the crotch line or the McLean systems. For such a set-up the Hyster Tractor Donkey mounted on a "Caterpillar" tractor takes the place of the ordinary steam, gas, or diesel rig, and has the advantage of its mobility for moving quickly from landing to landing.

In the accompanying picture of the George Howell operation they use a Diesel "75" loading 5 trucks, handling 80,000 feet per day. They can handle up to 150M and 175M b.f. per day. This is a Hyster double drum. With this type of loading (comparing with fir loading of same system) there is less main line required, shorter haul back line, fewer and shorter guys, and you can move easier from tree to tree.

Here is the usual method followed in rigging up the spar tree for the Hyster Tractor Donkey. After the timber is down the Caterpillar Tractor with double drums is moved into the the setting, and the first thing to do is to tie it down. A convenient stump is usually sawed off close to the ground so that the tractor can back over it, then a cable is attached to both ends of the main drum shaft which has provision on both ends for anchoring and this line is then run under several of the tree roots and tightened, using the "Hyster" !/

!/"Rigging the Spar Tree," Logs, second edition, Willamette Hyster Company, Portland, Oregon ,p33.

drums for this tightening operation. When sufficiently tight the cable is spiked and the tractor unit is ready to rig the tree.

The high climber first goes up to the top of the spar tree by means of climbers and climbing rope, taking with him a 3/8" manila pass line which he uses later to hoist the pass block and strap and then makes this pass block fast to the top of the tree. The 3/8" manila rope is then threaded through the pass-line block and the end lowered to the ground, to which end is attached a steel cable of approximately the same size. The steel cable is drawn up through the block and down to the drum and in this way a steel cable of sufficient strength is substituted for the manila line for setting rigging.

Having hung the pass-line block everything is ready to hang the guy lines while the high climber is still up in the tree to make the necessary fastenings of these guy lines, as the tractor drum hoists them up to the proper position. The guy lines are made fast about the tree^{well} toward the top before they are attached to the guying stumps at the bottom. Having the guy-lines hung at the top of the tree it is now necessary to tighten them. This is done locating stumps at convenient distances and, when these stumps are properly notched, the guy lines are tightened up using the drums on the cat. ✓

✓/"Rigging The Spar Tree," Logs, Second edition, Willamette Hyster Company, Portland, Oregon, p.33.

Next comes the hanging of the main and haul back blocks. The high climber is again put up the tree and main-line block with its attached strap is hoisted up to him, and it is only necessary for him to pass the yoke of the block through the loose end of the strap which has an eye splice, and this completes the hanging of the main-line block. Haul-back block is hung in the same manner. These blocks are located just under the guy lines, as high as possible to get the full effect of the high lead in logging operation.

Stringing the main line and haul-back lines is done by first taking up the small haul-back line, threading it through the haul-back block by means of the pass line and bringing the end down to the ground. The balance of the haul-back line is cut into sections which are easier to handle and saves considerable line-pulling in making the layout. These are taken out into the woods and strung out back to the tail block and into the tree and connected up to that part of the haul-back line which has been threaded through the haul-back block. The operator then goes ahead on his haul-back drum and pulls this line up through the block and down to the drum and the haul-back line is attached to the butt rigging on the end of the main-line. This makes the setting complete and ready to log. !/

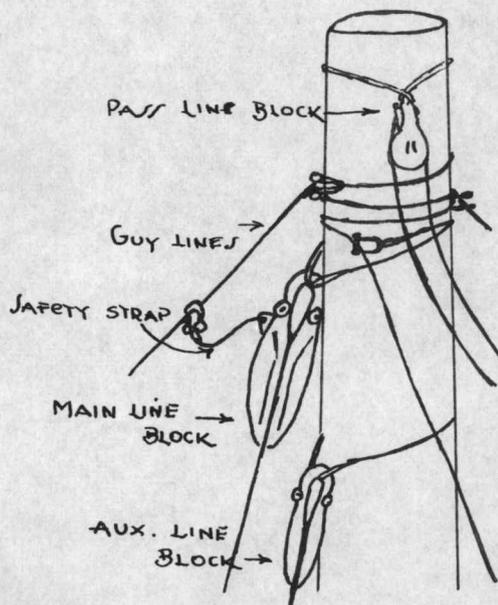
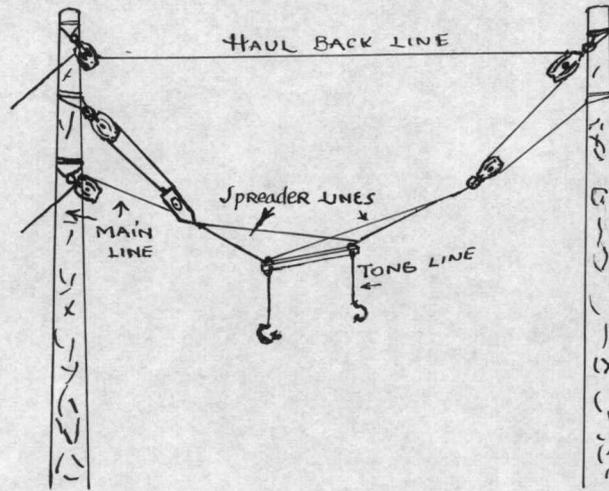


Figure 11a

Willamette Hyster Co.
"Logs"

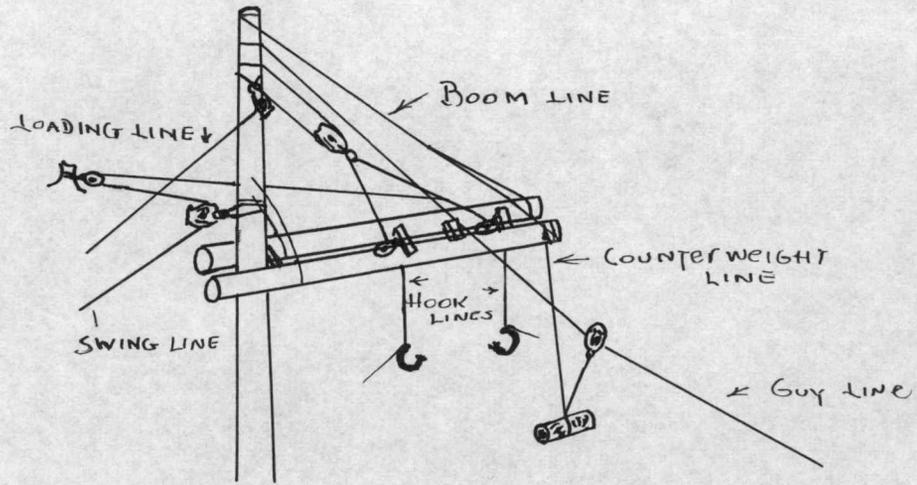
Usual method of rigging spar
trees for tractor drums logging.

Figure 11b



CROTCH SYSTEM OF LOADING

Figure 11c



COURTESY OF BRODERICK & BASCOM POPE CO.

BOOM LOADING MCLEAN SYSTEM

SAGINAW & MANISTEE LUMBER COMPANY

WILLIAMS, ARIZONA

Logging small timber in Arizona is especially applicable to the Loadmaster for the timber is small and the average log is but 180 feet. Mr. J.M.Bedford Jr., logging superintendent, has used this machine continually for six years and has found it very proficient and economical for the loading of short logs and scattered timber.

The initial cost of the machine was \$10,500.00. The operating costs per thousand feet are as

follows: Labor \$.28

Repairs.18

Supplies.02

Diesel oil .01

\$.49 is the total operating cost
per M feet.

Four men are required in the crew, which consists of one loaderman and three hookers, The wage scale for these men is \$.85 for the loaderman and \$.48 per hour for the hookers.

The average load hauled per truck for a period of several years has been 3000 feet, and the length of time for loading each truck is around six minutes.

*Note: The following pictures are taken on the shows of the Saginaw & Manistee Lumber Co., and given through the courtesy of J.M.Bedford Jr., Logging Supt.

FIGURE 12



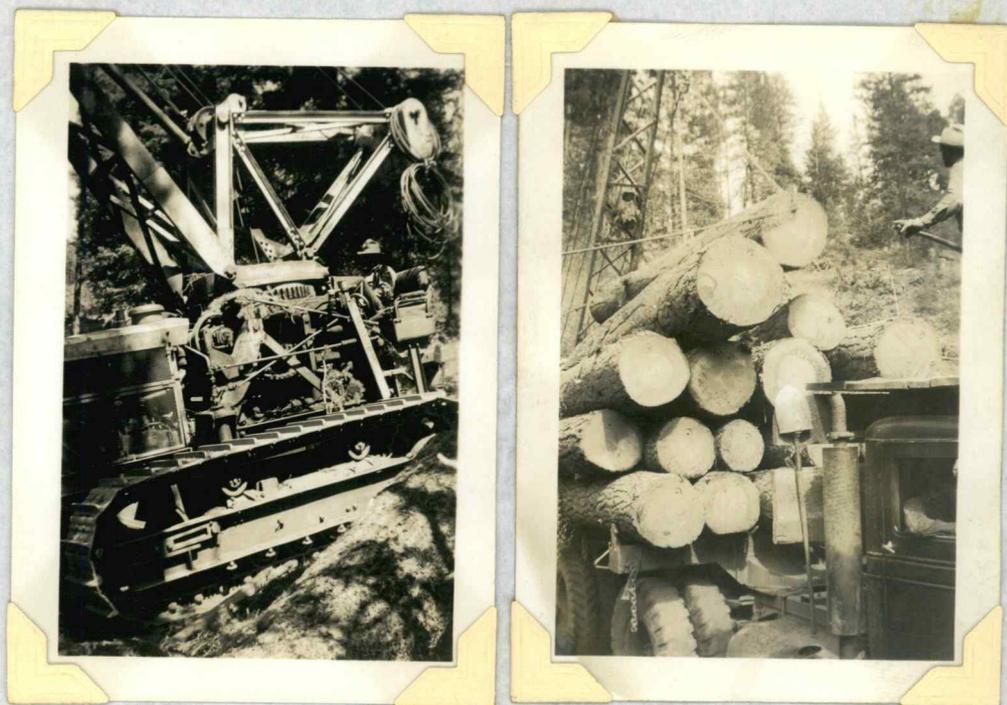
Figure 12A



LOADMASTER IN IDAHO

This very mobile loading unit which is used by Andy Anderson of Council, Idaho has proved very satisfactory because of its simplicity in operation and use. In the pictures below are typical of the loadmaster and loads.

The average loads over adverse grades of about 12 per cent are about 6000 feet of short logs. It is found by the operators using these machines that the loader works the best with short logs. The scale per day varies on this operation as to length of haul and weather, but the average is between 150 and 250 thousand feet.



Pictures courtesy of Andy Anderson

Figure 12b

Figure 12c

BUCYRUS-ERIE
LOADMASTER

In the following picture is shown another Loadmaster in use at a New Mexico operation. The owner is The Seligman and Prestridge operation of Grants, New Mexico.

The Caterpillar Diesel-powered Bucyrus-Erie loadmaster on this operation handles 125,000 feet of logs per eight hour day. They load a truck with 10 - 12 logs in less than four minutes.

The haul is 25 miles to Grants, New Mexico.

The picture is very clear in showing the working parts, swing table, balance, boom, and how it is attached to the RD-7 "cat".

The picture was given to me through the courtesy of the Caterpillar Tractor Co., San Leandro, Calif. The negative number for the tractor company is 19038N, and the picture was given to them by Orville L. Snider.

Figure 12d



UTILITY CRANE LIFTING

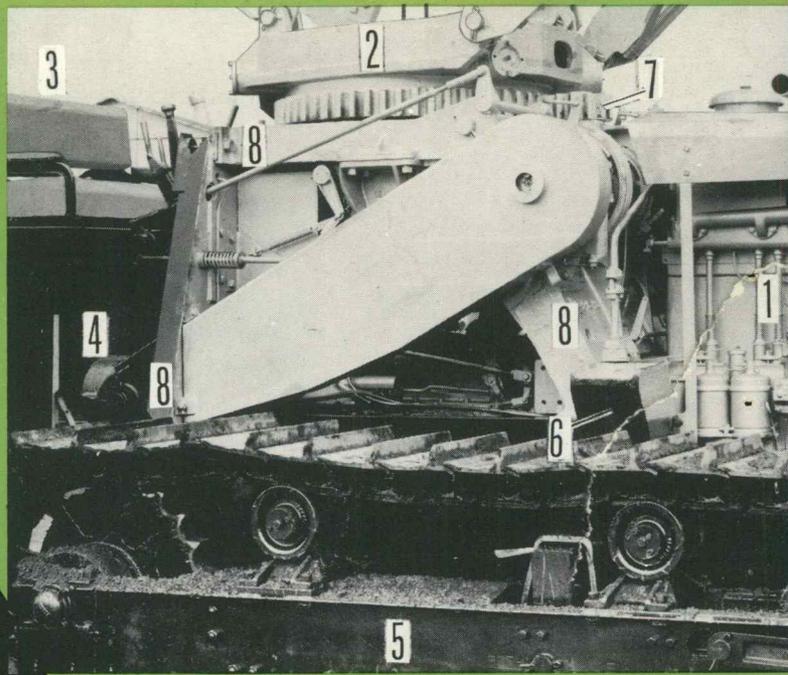
FROM the 20" treads on the extra wide mounting to the guarded boom-point sheave—every feature of the 60 Loadmaster has been especially engineered for heavy-duty, fast-moving, fast-operating crane service. A crane capacity of 13,900 lbs. at 12-foot radius gives the 60 Loadmaster a rating in excess of the average ½-yard excavating-type crane.

The Caterpillar Diesel "RD-7" 70 h. p. tractor engine provides high speed crane operation with ample power, dependable performance, and proven economy.

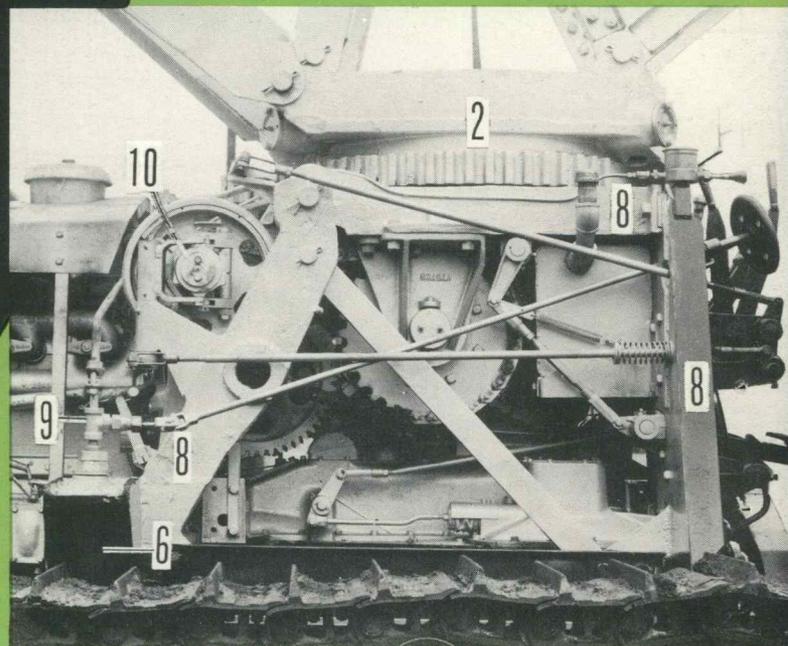
Primarily the 60 Loadmaster consists of Bucyrus-Erie crane machinery built as an integral unit into a modified RD-7 Caterpillar Diesel tractor. The main frame of the crane is carried on the special extra-heavy modified side-frames and axles of the tractor. This crane-frame is a strong box structure of cast and structural steel reinforced by rigid cross braces and fabricated by the latest process of electric welding. The revolving frame is supported by the crane-frame and revolves on hooked, conical rollers that travel in a double, flanged roller-circle and take both up and down loads. This revolving frame is a heavy steel casting with the main swing-gear, boom-feet, A-frame lugs, and hook-roller supports cast integral. The revolving frame centers on a large gudgeon cast in the top of the crane frame and carrying a heavy bronze bushing. Stops on the swing circle keep the boom from swinging beyond 240°.

The A-frame is welded structural steel, sturdy and rigid, and supports, on a 6' 6" arm, a counter-weight which is always in a counter-balancing position opposite the boom and its load. The 30-foot boom is of the channel, all-welded type, with strong cross members top and bottom. A special, telescoping boom-strut to prevent "bounce-up" is provided at small additional cost for work requiring moves over rough ground.

The 60 Loadmaster is a two-drum machine. When the machine is used for lifting service, one drum operates the hoist-line and the other one operates the boom suspension-line, giving a live boom at all times. These two drums are individually driven through roller chains and sprockets from a transmission shaft which in turn is driven through roller chains from the power-take-off of the tractor. The brake on the boom-hoist is spring loaded and hand-lever released. Thus the brake is set automatically when the operator releases the hand lever.



1. Caterpillar 70 h. p. Diesel tractor engine provides ample power for high speed operation.
2. Revolving frame operates on hook-type, conical rollers that take up or down loads.
3. The wide, spring-cushioned seat is so located that the operator has an excellent view of his work and easy access to the levers.
4. Transmission case encloses bevel gears which run in oil.
5. Cat side-frames are of strong, structural steel, arc-welded construction.
6. Oil cylinder of the dependable, hydraulic stabilizer.
7. Rigidly held, wide-faced, long-life, swing pinion.
8. Heavy combination cast and structural steel crane frame takes the working loads.
9. A simple valve controls the stabilizers—when open you have three-point support for moving, and when closed the machine locks rigidly for handling loads.
10. Readily accessible transmission shaft carries all operating clutches.



Model 60 SPECIFICATIONS

SPEEDS AND LINE PULLS:

Hoist rope-pull, Max., 9700 lbs.; Hoist rope-speed, Max., 187 f.p.m.; Boom-hoist rope-pull, Max., 9700 lbs. Boom hoist rope speed, Max., 187 f.p.m. Swing speed, 3.9 r.p.m. at normal engine speed. Traveling speed, in miles per hour:
 Forward, 1.6, 2.4, 3.4, 4.7
 Reverse, 1.9

OVERALL DIMENSIONS:

Width, outside tracks.....9'6"
 Overall length of tracks.....11'7"
 Height, boom lowered.....12'10³/₈"

MOUNTING:

Tracks and rollers are Caterpillar, modified by Bucyrus-Erie Company. Frames of heavy structural steel, with cast steel brackets and supports. Track links are heat treated. Track shoes are grouser type, 2¹/₄" high and 20" wide, area, 30.5 sq. ft. Low grouser shoes can be furnished if desired as an extra.

REVOLVING MAST:

Steel casting with structural A-frame and counterweight support. Four conical rollers take both upward and downward loads.

TRANSMISSION:

Roller chain-drive from tractor power-take-off to intermediate shaft.

SWING MACHINERY:

Arc of Swing 240°. Gear drive from intermediate shaft to revolving mast. Multiple disc clutches. Outside band brake to hold boom on grade or when propelling.

LENGTH OF STANDARD BOOM 30'

MAIN HOIST:

Internal expanding clutch on intermediate shaft. Chain drive, clutch to drum. Outside band brake on drum. Hoist drum—12" Av. P. Dia. of first wrap. Hoist rope—5/8" Dia. Single-line hook, standard equipment.

BOOM HOIST:

Same as main hoist. Boom hoist drum—12" Av. P. Dia. of first wrap. Boom hoist rope—5/8" Dia.

STABILIZERS:

Hydraulic type.

OPERATING LEVERS:

All levers conveniently grouped at operator's seat.

DIESEL POWER PLANT:

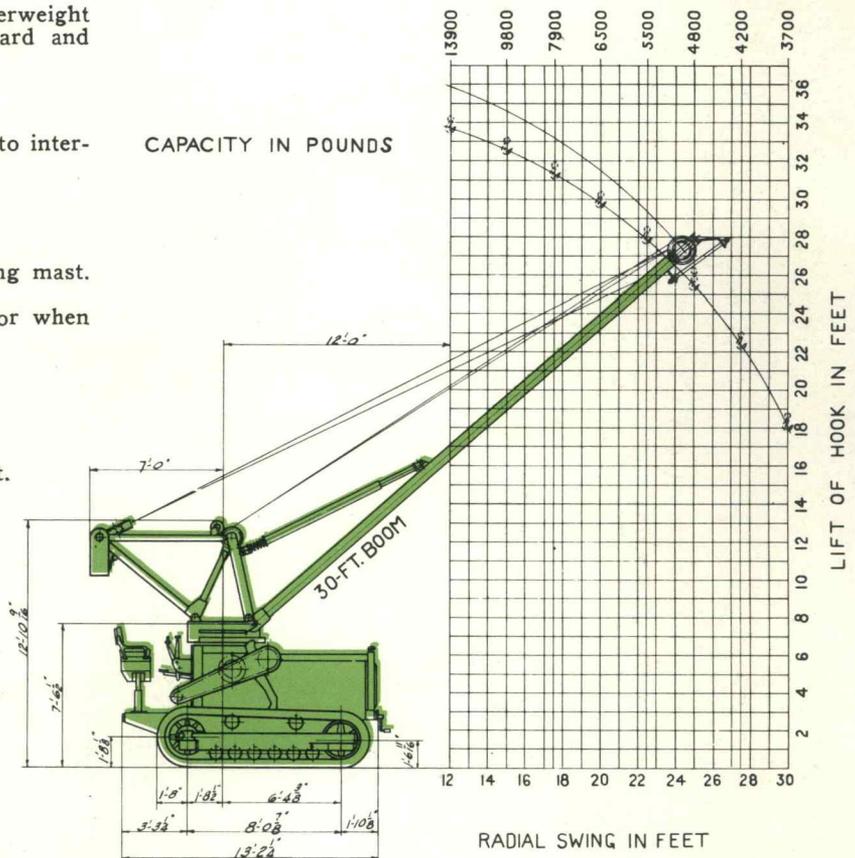
4 cylinder, 4 cycle, Caterpillar Diesel engine, 5³/₄"x8", rated at 70 horsepower at 850 r.p.m. Furnished with fuel tank of 25 Gals. capacity, air filters, radiator and fan and separate gasoline engine for starting.

SPECIAL EQUIPMENT: Available as extras.

Special track shoes; Boom strut; Electric light; Front bumper and radiator guard; Crankcase guard; Side screens for engine hood; Drawbar attachment; Front pull hook; Horn.

APPROXIMATE WEIGHTS:

Working weight, approx.....36,400 lbs.
 Net weight, domestic, approx.....36,200 lbs.
 Shipping weight, export, approx.....38,200 lbs.
 Ships option tons..... 33



LIFTING CAPACITY (Over front or side)

Per Cent of Tipping Load LOAD RADIUS	75% For hard level ground	66% For soft un- even ground	66% For grades up to 15%, soft uneven ground	Clearance height under boom point sheave, 30' boom
12 Ft.	13,900	12,300	6,000	33'9"
15 Ft.	9,800	8,700	4,900	32'6"
17 ¹ / ₂ Ft.	7,900	7,000	4,200	31'3"
20 Ft.	6,500	5,800	3,700	29'9"
22 ¹ / ₂ Ft.	5,500	4,900	3,300	27'9"
25 Ft.	4,800	4,200	2,900	25'6"
27 ¹ / ₂ Ft.	4,200	3,700	2,700	22'6"
30 Ft.	3,700	3,300	2,500	18'0"



Figure 12e Courtesy of Yale Weistein
 Loadmaster loading short logs at the landing.
 16' to 20' logs -loading in New Mexico.



Figure 12f Courtesy of W.F.McCulloch
 Loadmaster loading long logs at Turkey Butte
 Timber Sale in Arizona. Load per truck abbut
 3000 feet.

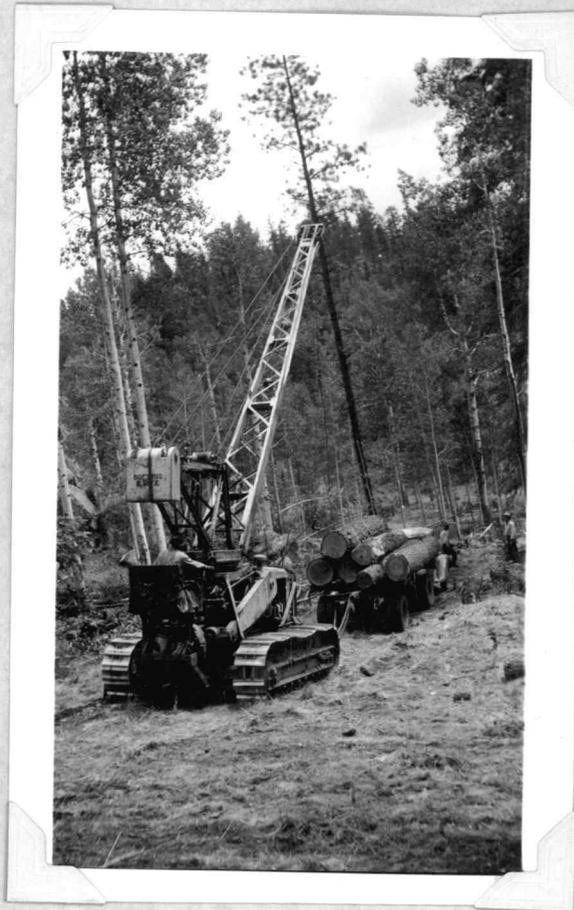


Figure 12g Courtesy of Yale Weinstein
Bucyrus Erie Loadmaster Caterpillar Diesel
Powered -loading $1\frac{1}{2}$ ton Ford truck with
short logs in
New Mexico

PORTABLE LOADERS

E.W.COURT LOG LOADER

This new machine was put into service in July, 1939, and was designed by Mr. E.W.Court for the Underwood Lumber Company, Lakeview, Oregon. This fast pine loader was built by the Klamath Machine & Locomotive Works, Klamath Falls, Oregon.

The initial cost is one of its main features - which is \$2500.00 not including the power unit.(60 Caterpillar) The Court loader can lift logs scaling 2400 feet, and has a fifty degree swing to either side with forty foot boom. This boom operates at a speed of 110 feet per second. The loading rig complete represents two separable parts - one, a 60 -horsepower gasoline tractor, and two, the loader itself. The loader deck has only an eight foot span mounted on Athey wheels which enables fast movement on narrow rough mountain roads. This deck is by dimension 8'x10' and supporting an A frame, two boom poles on a hydraulic swing, and a Model B Ford motor. Boom poles are mounted on a turntable which is moved by a chain drive from two hydraulic cylinders. A Model B Ford Engine is used for the power behind the hydraulic pump. The fuel cost for operating this swing motor is approxiamately six gallons per day. The reason for installing an auxiliary motor rather than using the hoisting motor, the mechanics of hydraulics are such

that it is not possible to set the pump up on the big motor and have the supply tanks and pump lower than the pump, so in order to make the assembly visible over the operator's seat, it was necessary to put the auxiliary motor in driving to a pump - then to a supply tank and to swing cylinders.

The tops of the boom and A-frame are connected by a strap. The boom has a slack guy which is fastened on either side. The A-frame is braced by two adjustable telescopic braces fastened to the deck. Mounted on the deck are winches which handle the guy lines. These guy lines pass from the winch to the top of the A-frame through a block, and from there anchored on each side to a tree. There is also a guy which passes from the tractor power unit through a block at the top of the A-frame, and over the tractor to a tree behind the power unit. It takes the crew but 4-5 minutes to set up these guy lines and have the rig ready to load, and it takes even less time to have it ready for moving. It is possible to load from either side without necessitating moving the slack guy line, but better efficiency is found with the slack guy on the opposite side of the landing. The hydraulic swing is directed and throttled by one lever. (150,000 feet per 8 hour day is loaded.)

*Note: An article similar to the above appears in the the August, 1939 -The Timberman.



Figure 13

Showing both hydraulic drums on each side and in front of the motor, the drums used in loading on the back of the "60" cat. The designer, E.W. Court is at the levers.

A close up of the Athey wheels, hand winch, model B motor and the hydraulic bar that operates the swing boom, the steel pole in the foreground is attached by a steel pin.... In front of the Model B motor is a clutch which is the standard shift, which regulates the speed desired in operating the swing of the boom.

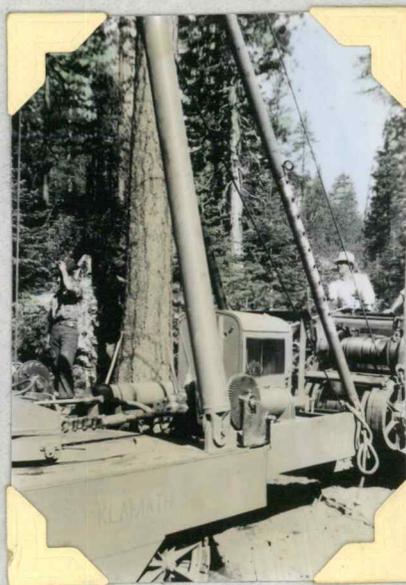


Figure 13a

Showing the boom in swing, the guy lines supporting the "A" frame, the width of the platform, and a truck partly loaded.



Figure 13b

The average loads per truck is a little over 5000 feet with a haul of nearly 30 miles to the mill. 150,000 feet and more can be loaded per day, but the average is nearer 115,000 because of the time wasted in preparing the bunks and trucks for the loading. A loader of this type gives operators a chance to put to use some of these old 60 cats, and the like, for use as a loader. It is very simple to operate, very mobile, durable, and strong.

The booms are made from logs or trees in the area, the Model B motor will have a long life because it runs at an uninterrupted, regular, slow speed, and the operating costs are nominal.

The number of men needed are the same -- two hookers, top loader, and jammer operator. Two knot bumpers are retained at the landing; the wage scale starts at 67¢/hr. for the limbers, 77¢ for the hookers, 87¢ for the top loader, and 93¢ for the jammer puncher.



Side view of the jammer showing "A" frame and supports, the connecting bar between the loader and the cat, and the old "60" cat.

Figure 13c



A closeup showing the swing boom and the rollers, also the raised portion that the rollers roll back and forth upon. The chain which swings the boom is built to stand 40,000 lbs. of pressure.

Figure 13d

Complete loading operating. Showing 40' boom poles and 60 cat which is used for power unit.



Figure 13e



Figure f

Sharp angle turn - mobility - loader ready for moving.

Truck ready for loading. Showing guy lines and winches, and the A-frame.



Figure 13g

P&H 3/4 YARD SHOVEL

At the Underwood Lumber Company logging show, E.W. Court also employed the use of a P&H 3/4 yard gas shovel. This shovel was used primarily for loading short logs, for the shovel was not sufficiently heavy to load logs near the 2000' mark; therefore was used for only 16 foot length logs. 1500 feet was about the maximum load for this loader. The average number of feet loaded per day was approximately 120,000 feet, with a fuel consumption (gas) of about twenty gallons. Mr. Court says in comparison with his new loader, the shovel is extremely slow in moving from landing to landing due to its extreme weight. He also says, " in heavy stands of timber, with the ground reasonably level, the shovel should not be less than a 1 1/4 yard capacity."

If the shovel is of sufficient power and capacity, and the stand of timber is adequate for good logging, the shovel would be the most popular unit in the pine country. (And if the moves are not too long).



Figure 14

Above is shown the P&H 3/4 yard shovel at the Underwood Lumber Camp, Lakeview, Oregon. The same crew is used as used with the Court Loader.

HIGH WHEEL LOG LOADER

Here is an ingenious log loading device which puts to use the old discarded high logging wheels that were once used for skidding. This is a good scheme of putting to use these discarded wheels, and at a very low price. It is probably one of the cheapest types of loaders to be built. It has been used during the past two seasons by the Underwood Lumber Company at Lakeview, Oregon until they brought into service their new loader at the end of this seasons logging (1939).

The wheels were purchased at a very low cost; and with the 45' boom that the company had installed on this, the complete cost of mounting the boom and attaching it to the hoisting cat was around \$100.00 Its disadvantages are that there is no action to the boom, there must be a brow log placed, the trucks must run close to it and the log hoisted against the brow log and allowing it to swing over and be placed on the truck. This would not be very satisfactory for long logs, due to the fact that the heavy end of the log would come up after the lighter end was high in the air - causing it many times to swing crosswise which provided a loss in time of loading.

125 feet of 3/4" steel core main line rope was used, which was good for about two million feet. The average load per truck was around 5000 feet,

putting out about 24 loads a day in nine hours. (An average of about 120M loaded per day).



Figure 15

Above is shown the High Wheel Log Loader as used by the Underwood Lumber Co. Showing the old depreciated "60" caterpillar, the high wheels, "A" frame, and attachment of the frame. Once the loader is at the new landing, it is only a matter of a few minutes before it is ready to load.

McVay Loader

Mr. W. McVay of Keno, Oregon has invented a truck loader that answers the purpose of portable log loading very well. He builds them on used Mack trucks of the chain drive type, with a separate frame for the loading unit. This frame is so mounted that the weight is directly over the truck wheels. A 30 foot boom with an "A" frame support is guyed into position for loading. The radius of the boom is 160 - 170 degrees, and can pick up a load of ten tons. This boom is swung, as in the Court loader, with hydraulic cylinders. The oil pumps are driven from the front extension of the crankshaft. The operator can adjust the guy lines at will for they are power driven (the Court loader uses hand winches). A conventional truck brake and clutch pedals are used, but are in dual arrangement. To get in position for the second set of controls, the operator's seat is turned around.

The winch handles four speeds which is provided by the hoisting mechanism. When in low gear, the line speed is 70 feet per minute, and in high gear 420 feet per minute. A crotch line with a spreader bar is used, and with this arrangement a 2500 foot log can be lifted.

There would, necessarily, be a terrific strain on the truck springs of the loader; therefore, wooden blocks are inserted between the frame and the rear wheels.

The "A" frame has back braces as shown in the Court loader, which are adjustable and provide for different heights or angles.



Calif. Forest Experiment & Range

This crane was especially designed by R.G. Le Tourneau, Inc., and has been successfully used at the Black Mountain Experimental Forest in Lassen County, California for the past two seasons. It is an industrial unit and has been loaned to the Experimental Forest on an experimental basis; therefore, there are no operating costs available or to be released until the development period is complete.

The unit consists of an arc welded steel tower with an overhanging tip at the top, mounted on hollow steel wheels and connected by a box beam tongue to the rear of the tractor. The tower is held in any position by cables running from the top to the hand winch through a block suspended from the overhanging tip. The design of the unit obviates the use of head and back guys, the only guys needed being two light side guys which prevent sidewise tipping when pulled at an angle. When changing landings the unit can be moved as fast as the tractor will travel either with the tower erect or lowered. Upon arrival at the new landing the unit is wheeled into position, the tower raised and the side guys put in a very few minutes. Moving time is considerably reduced by not using back or head guys, and at the landing it is possible to move the unit forward or

backward to facilitate truck loading or decking against the brow log. Man power used is standard; an operator for the tractor and winch, two hookers and a top loader. A 32' , 3000 ft. b.m. log can be handled without tipping the crane, larger logs are parbuckled onto the truck. During the 1938 season 1,675,000 feet of logs were loaded, and it has handled over 4,000,000 feet of logs since the camp started in 1937. ^{1/}

^{1/} Drew, R.E., Assistant Silviculturist at California Forest and Range Experiment Station, Berkeley, California.



Figure 16

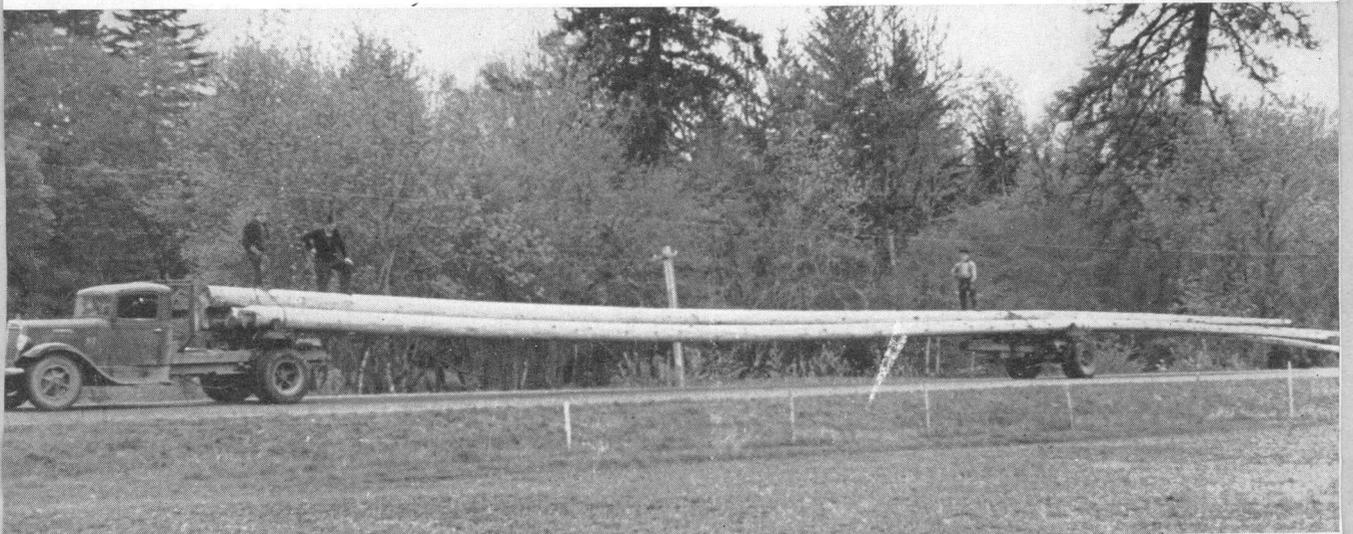
Courtesy of W.F. McCulloch

Approximately 55,000 pounds. Total weight of chassis, trailer and unit is in excess of 112 tons. This unit is operating over private roads in the mining area near Hume, Missouri.

reverse at the same speed as forward.

The operator anticipates an annual saving of \$6000 through the use of this unit. Before completion of the 80-ton

as used in the two-engine 80-ton driving through an eight-speed mechanical transmission. Several of these trucks have been powered by Hercules diesel engines, model DHXB, 5x6 inches.



OUR PILING GROW STRAIGHT AND LONG IN WILLAMETTE VALLEY — Daugherty Lumber Co. Cottage Grove, Oregon, has been shipping to San Francisco quantities of piling 125 feet long. The local firm is one of the leading concerns on the Pacific Coast and obtains most of its material tributary to Cottage Grove.

Figures 16ab

F.N.CARR LOADER

Mr.F.N.Carr, logging superintendent at Wenatchee, Washington, has invented a swing type loader that has proved very satisfactory and efficient. Mr. Carr has built five of these loaders, and believes that they are the only ones of their kind.

This is a swing boom type of jammer, which is much more efficient than the "A" frame stiff boom. As seen in the following picture, the jammer is mounted on a truck which makes it possible to move quickly from place to place. The mast pole, which is the pole perpendicular to the platform, is resting on a ball and socket joint, which allows one to swing the boom to either side. This is done by tightening the guy line on the side you want the boom to swing. By this method, one can lift a log, change it any way he likes or put it back on the ground with very little effort. It is also very easy to deck logs on either side of the jammer.

It costs around 700 dollars to build a jammer of this type, and if properly taken care of, it can be used for many years. When there is plenty of logs on the landing, they can load a 100,000 feet per day;

although the average is around 60,000 feet per day. The average truck load is 3500 board feet.

It takes one man to operate the jammer and two men to hook. Each man is paid five dollars per day. On this operation the average operating cost is three dollars per day.



Figure 17

Courtesy of F.N.Carr

This is the Carr loader showing how the frame is attached to the truck, the swing boom, the mast pole, supports for the mast pole, and position of the jammer puncher.

HARPER LOADER

The Harper Logging Company made its own log loader at their Montana camp. It was made out of an old truck chassis and parts of an old donkey. This loader, as the picture shows, is a swing boom loader. The power is furnished by a heavy duty truck type engine. The power is transmitted through a drum that was used on the old donkey.

The steel spar is fabricated and is held erect by guy lines which are anchored to trees or stumps. The guy lines have a B-B hand wrench for tightening. This method of having a hand wrench for each guy is very efficient in adjusting for swinging of the logs. There is no power required to swing the boom from side to side, which in itself is a very important function.

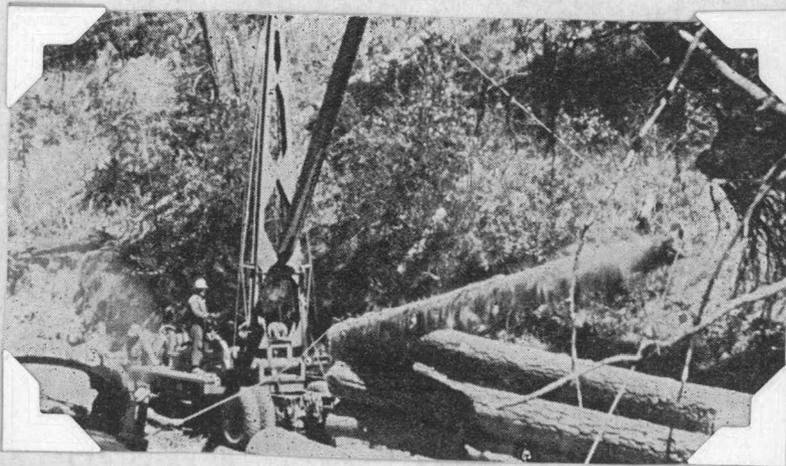


Figure 18

From TIMBER TOPICS, Allis-Chalmers Mfg.Co.

Portable Loader made by Leland and Lawrence Harper of Darby, Montana. Mounted on a truck chassis; showing swing boom, fabricated steel spar, and guys.

LOADING IN THE SOUTHWEST

Mr. H.C.Fosburg, with the United States Forest Service at Flagstaff, Arizona, has grouped the loading in that district into five types. Mr. Fosburg is at the Cochino National Forest.

He groups them as follows:

1. Cross-haul
2. Stationary crotch line
3. Semi-stationary crotch line
4. Mobile, swinging boom crotch line
5. Center-tong, steam, railroad loader

Cross-haul:

Either a team, truck, or cat is used as power, and the cable may be either forked or single depending on the operators preference. This system is usually employed on short or small logs. A chain or cable is fastened on the truck or object to be loaded, and is put around the log and then over the truck to the source of power which pulls at right angles to the direction of main haul. Skids are placed for the logs to elevate up to the bunks and assisted by men with peavies or cant hooks. Depending upon the number of men - if 5, this system can load up to 50,000b.f.; if 3, up to 20,000bf.

Stationary crotch-line:

A conveneint tree -preferably leaning - is used in which to hang a block; the truck then pulls between the

tree and the skid pole. The ends of the crotch line are fitted with tongs which bite into the ends of the log and to which ropes are attached for guiding the logs as they are pulled into the air and set on the waiting truck. A brow log is usually set beside the truck to prevent damage.

Mobile, swinging-boom crotch line:

These loaders have their own motive power, and a boom which may be swung through a considerable arc as well as raised and lowered. (Loadmaster)

Semi-stationary crotch line

This is a gas-powered loader on crawler wheels. It has a movable "A" boom which can be lowered and raised. A picture of this loader is on a following page, and was from an article written by G.A. Pearson.

Center-tong, steam, railroad loader:

This loader is used in connection with the Arizona Lumber & Timber Co. logging railraod. It is operated by steam and uses only a single tong which is placed as near the weight center of each log as it is possible to judge. The boom swings through 360 degrees of arc, but cannot be raised or lowered. Each car has rails laid on top of the bunks. In loading a string of cars the loader starts at the head end and pulls itself back to the next cat as the one ahead is loaded.

COSTS

Contractor	Yr.	Equip. used	'Output'/day	'Hrs. wrked' per day	'Wages of Operat.	Hookers.
1. Gibson	37	Loadmaster	?	12	80¢/hr.	40¢hr.
2. Butler	37	Semi-stat.	?	12	\$6/day	\$4/day.
3. McCoy	37	Loadmaster	?	12	\$6/day	#3½"
4. Gibson	38	Loadmaster & Gas loader	98M	9-12	80¢/hr.	45¢hr.
5. Butler	38	Semi-stat.	21M	10	60¢"	30@"
6. McCoy	38	Loadmaster	40M	10	60¢"	40¢"
7. Gibson	39	Loadmaster & Gas loader	98M	9-12	80¢"	45¢"

Butler 39 "either contractor operated on the large
McCoy 39 sales during the 39 season.

Contractor Cost per M
Net scale

1.	45¢
2.	78¢
3.	45¢
4.	60¢
5.	68¢
6.	45¢
7.	\$1.00

Mr. Fosburg has a breakdown of this cost per M as follows:

Supervision	\$0.058
Depreciation	.106
Miscellaneous	.126
Soc. Security & Unempl. Comp.	.017
Direct labor	.290
	<u>\$0.597</u> or 60¢per M.

The higher cost is due to paying time and a half for everything over 8 hours.

SEMI-STATIONARY CROTCH LINE



Figure 19 From a reprint from THE TIMBERMAN,
Volume XLI, Number 3, by G.A. Pearson.

Gas-powered loader on crawler wheels used in
loading motor trucks for 15-mile haul.



Figure 20

This is an American Railroad loader which has been put on the bed of a 20 ton truck.

A gas engine is used instead of steam. A very mobile unit.

Shows height of boom

The loader again



Figure 20a



A close-up to show the angle in the boom which puts the weight nearer the center, and lessens the danger of heavy loads tipping the truck over.

Showing swing unit, gears, drums, platform, and motor.

Pictures courtesy of H.C.Fosburg

Figure 20b



Gibson's
Loadmaster
(Bucyrus Erie)

Figure 21

This is McCoy's Load-
master which he uses
as a skidder part of
the time.



Figure 21a



Shows to good adv-
antage crotch line,
tongs, hookers with
guide ropes.

Figure 21b

"A" FRAME SIDE LOADER

At the logging chance of the J. Neils Lumber Company at Libby, Montana, the use of a side loader for truck loading has proven very satisfactory. The loader was designed after the horse loader which was used in sleigh logging in Minnesota and Michigan some years ago. It is quite mobile, as it can be hauled by one of the skidding tractors from one landing to another, which are generally about a quarter of a mile apart on this operation.

The loader can be set up and ready to go in approximately fifteen minutes.

The average number of logs which is handled by this machine in an eight hour day is around 500 logs, and the scale varies according to the number of logs required per thousand - anywhere from 125,000 to 165,000 feet in an eight hour day.

Below is listed the daily operating costs and approximate initial cost for this operation. Figuring 145,000 b.f. of lumber or logs hauled in an eight hour day, the operating costs per M would be about \$0.18.

Operating costs:

2 hookers at 69 ¢ per hour, 8 $\frac{1}{4}$ hrs. per day	--\$11.38
1 hoisting engineer, 81 ¢ per hr. 8 $\frac{3}{4}$ hrs.--	7.09
able, gas, grease & other supplies, (approx.)-	7.00
	<u>\$25.47</u>

Total operating costs / day =

The machinery used was an old 60 gas cat, a "20" drum, and an "A" frame on sleds or skids. Below are the figures for the initial cost:

Old depreciated 60 gas cat, approx.	\$500.00
"20" Carco Drum, single speed	\$1200.00
"A" frame leads on sled or skids	200.00
Cable, blocks, etc.,	<u>75.00</u>
Total initial cost -----	\$1975.00



Figure 22

Courtesy of Caterpillar Tractor Co.
(Booklet "From Stump to Lumber")

The above shows the side jammer at the J. Neils operation - at the right is the "Cat" 60 with double drum which is the power plant for the loader - the "A" frame and brace can be seen resting resting on the skids.

SLIDE JAMMER WITH CHERRY PICKER FRAME

The Cascade Lumber Company at Ellensburg, Washington uses this type of loader for loading upon flat cars, and a modified loader using much the same kind of equipment for loading of trucks.

This slide jammer with the cherry picker frame is purely a 7 x 9 American hoist with two 14" drums powered with a boiler 39" in diameter, 85" in height, and has 90 - 2" flues. This entire set up is on a steel sled. The sled is made up of 14" I beams. The top or hoisting drum is lagged up with hardwood lagging so that it is about 18" in diameter.

The cherry picker frame is made from two fir poles that are about 16" in diameter on the big end, and about 12" in diameter on the small end. These poles are fitted together in an A form.

For hoisting they use a 5/8" preformed wire rope. This wire rope passes through a 16" block at the top of the "A" frame, and for loading they use a crotch line on the end of the hoisting line - at the end of each crotch line is a bell hook. These hooks are hooked into each end of the log and it is then hoisted up onto the car.

The crew consists of two hookers and a top and a top loader. The men are paid eight cents per thousand, which is a different mode of payment than

most operations. This crew will load twenty car loads of logs in eight hours at about 7500 feet per car. At this rate they load 150,000 feet per eight hour day, and at eight cents per M, the crew would receive \$12.00 per day.

The logs are mostly short logs running from twelve to twenty feet. They sometimes load thirty-two foot logs with this machine, which requires a longer crotch line.

The most expensive part of this machine is building the sled. This was done by the Draper Iron Works in Seattle, Washington, and cost the Cascade Lumber Company \$1100.00 (not including the freight).

For loading logs on trucks, they use much the very same kind of equipment. The hoist is generally powered with a gas engine, and the whole works is set on a logging truck that has been depreciated. Roads or makeshift roads must be made for this loader, and the cats skid the logs down to spots which is convenient to the loader.

It requires about a ton of coal to fire the boiler for the flat car loader, and there are no figures available as to the amount of gas used for the truck loader. Mr. B.B.Colwell, logging superintendent, recommends this loader very highly because of its efficiency, simplicity, and low costs of operating.

" THE TRUCKLOADER "

CLYDE IRON WORKS of DULUTH, MINNESOTA

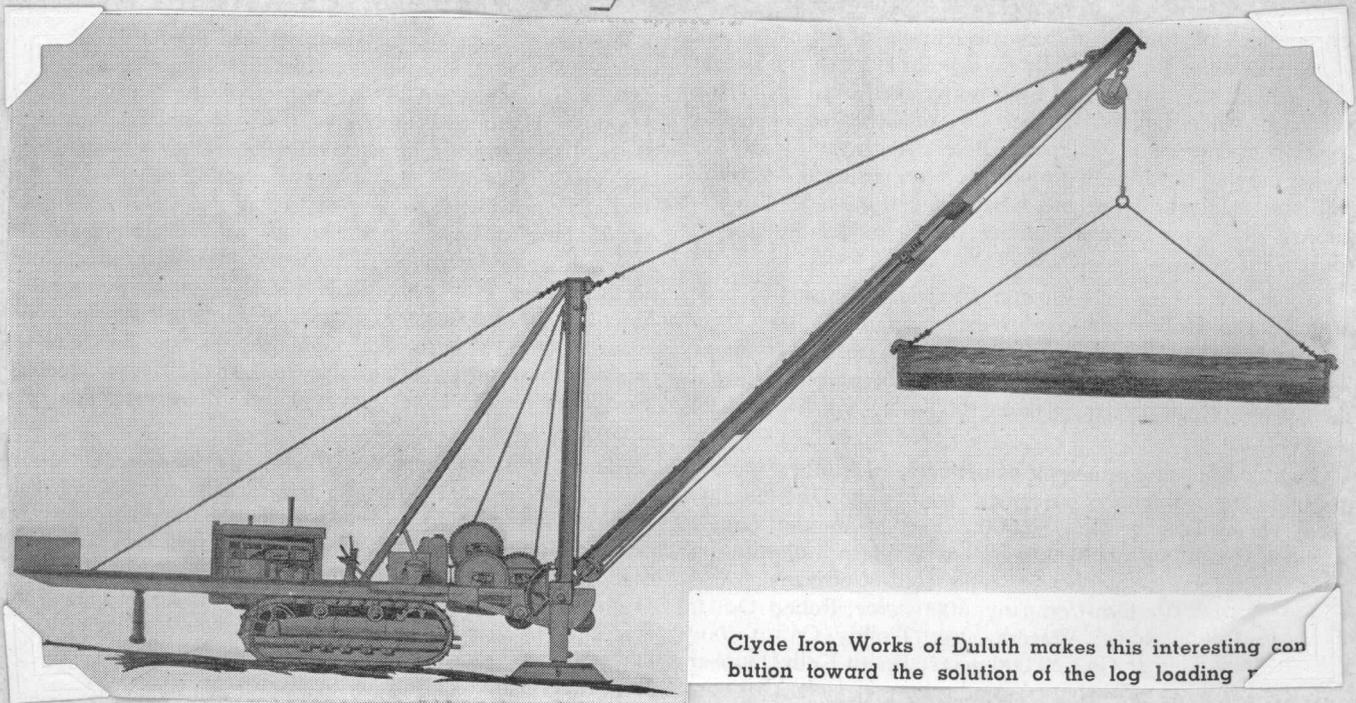
In the development of the log loading rigs, and the aim for a better mobile loading unit, the Clyde Iron Works have added to the many loaders one of their own design.

The loader consists of a steel frame, designed for attaching to the body of a standard tracklaying tractor. It is furnished in two sizes, for load capacities of six and nine tons on a single line, with maximum capacities of 10 and $12\frac{1}{2}$ tons on two parts of cable. It is designed primarily for the loading of logs on motor trucks, sleighs, or other vehicles; and is adaptable to many other uses, including general hoisting and material handling.

The live boom swings in a 20-foot arc by means of cables from friction drums. Hoisting of the load and raising of the boom is accomplished by cables from the double drum hoist, or, if desired, either friction drum is available for operating a guy line, a haulback line or for general utility purposes. Power for the drums is furnished by the power take-off of the tractor, through a chain drive and gearing. ^{1/}

^{1/}"Loading and Unloading," The Timberman, vol. 37, p.12-13 (April, 1936)

When in operative position, the frame of the boom base is supported by two steel legs which, at their upper ends, are hinged to the corners of the frame, relieving the tractor of all the stresses due to the loading operations. When traveling, these legs are raised out of the way. A counterweight box is provided on the main frame as illustrated. !/



Clyde Iron Works of Duluth makes this interesting contribution toward the solution of the log loading r

Figure 23

April, 1936, The Timberman

!/ Ibid., p.13

WASHINGTON MACHINERY & SUPPLY CO.

SPOKANE, WASHINGTON

A loading device was developed by the Washington Machinery and Supply Company, Spokane, Washington, and has been in practical use in the woods of Washington and Idaho since 1918.

The loader is of simple construction. Power is transmitted from the main drive shaft through a jack-shaft and two sprockets, then through a steel worm and phosphor bronze gear running in a housing filled with oil. Inside the drum is a powerful friction clutch controlled by means of a hand wheel in easy reach of the operator. When clutch is released, the drum revolves freely on the drum shaft, allowing the easy withdrawal of the cross haul line.

The winding drum is placed immediately in back of the drivers seat below the bolsters in such a manner as not to interfere with the loading of a truck. A center bunk is equipped with four sheaves arranged in such a manner that the cable is taken from the drum to the center of the truck, thence to either side, across the truck and around the log and back to the opposite side of the truck, where it is hooked securely in the bolster. When the cable is hauled in ^{! /}

^{! /} "Loading Device for Trucks," The Timberman, p.132
(January, 1923).

by the revolving drum, the log is rolled up on skids onto the bolster, where it is secured. This operation is repeated until the load is complete, when it is bound securely by the cable used in loading.

Should the entire load settle while on the road, the driver has perfect control at all times and may tighten the binding at will. These loaders have been found useful in loading heavy machinery, moving cars, and in pulling the truck out of mud holes as well as in loading trucks. ^{! /}

In the pine, no doubt, this type of loading takes place which is entirely supplementary to the main loading job. The following pictures are taken in the fir, but it is essentially the same in the pine. No figures are available as to operating costs or etc. The pictures explain themselves.



Figure 24

From THE TIMBERMAN

Loading with an RD7 Caterpillar and a LeTourneur dozer with a cable side lift, operation of B.M.Hegewald, Stevenson, Oregon.



From The Timberman

Figure 24a

McKenzie Lumber Co., McKenzie Bridge, Oregon, C.R. Belknap manager, put a new RDS Caterpillar to work, not only doing the skidding but the loading - not in the usual method but with line and block. After ground skidding the logs to the rollway, the tractor swings around and literally scoops the logs to and onto the truck with a LeFournneau dozer. Pat Brown, truck driver, stated that logs were loaded five high with the former tractor and dozer, and that the same would doubtless be done with the new one.

The following material is an unpublished report compiled by the United States Forest Service, and given to me through the courtesy of Mr. Yale Weinstein of the New Mexico Lumber & Timber Co., at Bernalillo, New Mexico. The data was so pertinent to this thesis that I have placed the report in its entirety to so give a picture of loading, and the loading time in the New Mexico district.

Loading Time Studies

Loading studies covering nine different types of loading machinery on car and truck operations were analyzed from data representing approximately 6,880 logs scaling in gross volume 3,338 M feet board measure.

Time Elements Affecting Loading Costs

The activities of loaders while in the process of loading logs, one by one, have been classified for convenience in compilation into two divisions; namely, (1) time while loading trucks or cars and (2) time (waiting) between trucks or cars. The former has been subdivided into net loading time and miscellaneous loading delays; the latter into spotting time and waiting delays.

Direct loading time was considered as the time consumed in the process of loading, log by log. Miscellaneous loading delays were segregated into working time (delays in which loader was active in removing debris from the landing, shifting loads on trucks or cars, moving the loader, yarding, etc.) and idle time (delay in which the loader was inactive as a result of blocked landings, loader trouble, waiting for tractors, logs, the chaser or knotter, etc.)

Spotting time was clocked as the time elapsing from the moment the loading truck was driven from the landing until another truck was placed in position for loading, excluding all intervening delays. Waiting delays, time consumed in waiting for trucks or cars, were grouped into working time (activities spent in moving loader, preparing landing, yarding and decking, shifting trailers, etc.) and idle time (inactive time consuming elements such as waiting for trucks, cars, or tractors, loader trouble, blocked landing, etc.)

From data including 120 hours of detailed stop-watch time observations a percentage analysis of loading activities on seven truck operations (table 5) was compiled in an effort to expose non-productive time consuming elements which to some extent reflect the continued efficiency of a loading operation.

Operations #8A and 8B:

Two three-quarter shovels were converted into loaders by removing the dippers and dipper arms and installing crotch lines for loading. These loaders worked on a highly developed network of roads from which most logs were lying within 100 feet of the roads. Propelled by their own power, the loaders, replacing the crotch line with tongs, yarded and decked logs while waiting

Table 5
 Percentage Analysis of Loading Activities On Seven
 Truck Operations.

Index No.	Type of loader	Time While Loading Truck			sub-total
		Net loading time	working	idle	
		%	%	%	%
8A	3/4 yd. Diesel shovel	31.2	5.7	1.4	38.3
8B	3/4 yd. gas shovel	35.1	5.3	1.3	41.7
2	1/2 yd. speeder shovel	18.0	20.2	1.1	39.3
1	Sled moun- ted, boom loader; V8 Ford motor	41.8	14.1	7.5	63.4
1B	Sled moun- ted, boom loader; For- dson motor	57.5	11.1	6.1	74.7
2B	Truck mount	30.2	28.1	2.0	60.3
	Average	36.8	13.4	4.2	54.4

* Note: The continuation of this chart is on the next
 page.....

Table 5 Continued

Index No.	Time between trucks				Total time %	Production per hour Board feet
	Spott'ing %	work'ing %	idle %	sub-total %		
8A	10.3	36.5	14.9	61.7	100.0	10,060
8B	11.6	35.3	11.4	58.3	100.0	14,450
2	6.9	4.9	48.9	60.7	100.0	7,200
1	8.1	2.0	26.5	36.6	100.0	11,090
1B	4.7	--	20.6	25.3	100.0	10,700
2B	4.3	1.9	33.5	39.7	100.0	8,340
Avg.	7.4	12.9	25.3	45.6	100.0	12,360

*Note: This is a continuation of the table on the preceding page.

for trucks. The few areas beyond the reach of the loader's tongs were yarded with a 60 h.p. tractor which skidded logs in windrows along the truck roads.

Loader No. 'A with an hourly output of 10,060 board feet (gross scale) loading three $1\frac{1}{2}$ ton trucks was actively engaged in loading 38.8 per cent of the time of which the small proportion of 1.4 percent was clocked as idle time. While waiting for trucks, 10.3 percent of the time (comparatively high due to frequency of spotting) was spent in spotting trucks; 36.5 percent in yarding and decking; 14.9 percent in idleness.

Loader #8B (a faster loader, see table 6) operating under identical conditions as loader 8A but feeding four $1\frac{1}{2}$ ton trucks, an hourly output of 14,450 board feet showed a similar time performance in its loading activities.

Loader #2

This converted one-half yard shovel with a 28 foot boom having a full circle swing of 360 degrees was timed over a period of 29.7 working hours. Nearly one-half of the total operating time of this fast loader was spent in waiting for trucks with a consequent low hourly production of 7,200 board feet (gross scale).

On the same operation a loader (operation #2B) mounted on a five-ton Mack truck was used to good advantage through its ability to move under its own power from setting to setting in a very short time. Such a flexible loading unit was able to travel along a road with the truck to be loaded following to a new setting where logs had been assembled for loading. The high proportion of working time (28.1%) was credited mainly to the time, while loading trucks, involving yarding, moving loader, and shifting load on trucks.

Loaders #1 and #1B:

Both of these sled mounted boom loaders were similarly equipped except that the former was powered by a Ford V-8 engine and the latter by a Fordson engine. One-fourth of the total loading time of the V-8 loader, which loaded five and sometimes six trucks at an hourly rate of 11,090 board feet (gross scale), was consumed in waiting for trucks. The Fordson loader (production per hour of 10,700 board feet) timed for only a short period, was found to be slightly slower than the V-8 loader in loading time per log.

Loader #6:

A three-quarter yard P&H Excavator was converted into a loader by equipping it with a A-frame loading

boom and crotch line. Two 60 h.p. tractors skidding 32-foot logs short distances to a fixed landing supplied the loader with logs. The converted excavator shovel loaded a fleet of three $1\frac{1}{2}$ -ton trucks and four 2-ton trucks at a rate of 24,710 board feet per hour. Idle time listed under miscellaneous landing delays accounted for 9.7% of the total operating time of the loader. More than two-thirds of this idle time was consumed in waiting for logs at the landing. This shortage of logs occurred at times when several trucks became bunched at the landing. Consequently in such situations the tractors set the pace of loading. However, after the bunched trucks were loaded, the loader remained inactive for long intervals (actually 20.6% of the total operating time of the loader was spent in waiting for trucks). At such times the loader set the pace for skidding - the tractors remaining idle as soon as the landing was filled.

The lack of synchronization of skidding, loading and hauling activities was particularly noticeable in the effort to maintain on the operation a uniform daily production of 200M feet B.M.

From the percentage analysis of the loading activities of seven types of loading machinery the time element

comprising the total operating time of the loader was averaged and listed in table 5 as follows:

Net loading time, 36.8%; working time (grouped under miscellaneous loading delays), 13.4 percent; idle time, 4.2%; spotting time, 7.4%; working time (while waiting for trucks), 12.9%; idle time (as a result of waiting for trucks), 25.3%.

The most efficient loading system (efficiency measured by proportion of working time) was recognized as the loader which while not engaged in actual loading was yarding and decking logs. However, the loader which operated at a single, fixed landing was limited in its capacity to use idle time. At a fixed landing, in spite of the careful planning to synchronize skidding and hauling with loaders, congestion of tractors and trucks inevitably occurred at times, where skidding was independent of the loading operation (logs conveniently placed in windrows along roads or logs within reach of yarding lines of a mobile loader), the problem of synchronizing hauling was relatively a simple matter.

Operation #7:

On this operation logs were laid in windrows along railroad tracks enabling the American Locomotive crane to move, at will, along the tracks building up a maximum carload (average load, 8,710 bd.ft., gross scale, Scribner Decimal C.) through log selection. This crane loading

on disconnected trucks (16 - 64 feet in length) at a rate of 25M feet b.m. per hour spent 49.3% of the total operating time in actual loading, log by log, 17.2% in spotting the disconnected trucks, 21.3% in waiting for cars, and the remainder of the time (12.2%) in various loading and waiting delays.

The Effect Of Size Of Log On Loading Costs

In the loading operation logs were handled, singly, over approximately same distances. Consequently the size of log was the only variable to be measured in the determination of its effect on loading costs. This was accomplished by timing with a stop-watch the loading operation, log by log. The time required to load each log was treated as a single operation or observation, segregated by one-inch diameter classes, and averaged. The values were plotted over their corresponding log diameters and a curve (net loading time per log) was fitted.

Size of log was shown to affect the loading time per log in that heavier logs required more time in loading.

The relative net loading time of log of various diameters (table 6) has been computed for five truck and two car operations. The seven types of loading machinery have been put on a comparative basis showing the relative

Table 6.--Relative net loading time of logs of various diameters; assuming time for a 20 inch log equals 100; based on two railroad car and five truck operations.

Log Diam. Inches	Loader #7 %	Ldr. #3 %	Ldr. #1 %	Ldr. #6 %	Ldr. #2 %	Ldr. #8A %	Ldr. #8B %
6	74	84	66	68	75	85	81
8	77	86	68	73	78	87	83
10	80	88	72	77	81	89	85
12	83	90	76	82	84	91	88
14	87	92	81	86	87	93	91
16	91	94	87	91	91	95	94
18	95	97	93	95	95	97	97
20	100	100	100	100	100	100	100
22	106	103	108	105	105	103	103
24	112	106	116	111	111	107	107
26	120	112	125	118	118	112	112
28	131	120	137	126	129	117	117
30	145	133	151	136	146	123	122
32	162	154	168	150	176	131	128
34	185	192	192	169	223	142	135
36	215	250	223	197	285	157	143
38	252		265	239		176	153
40	300			300		203	163

Note: Car loading operations Nos.7,3; truck loading Nos. 1,6,2,8A,8B.

Operation No.	Type of loader	Log Length	Net loading time of 20" log.
7	American Locom. Crane (steam)	16-64'	0.80
3	85h.p. gasoline jammer	32'	0.64
1	Sled mtd., boom loader, V8 Ford	32'	0.99
6	P&H 3/4 yd. excavator shovel	32'	0.58
2	1/2 yd. "speeder" shovel	16'	0.38
8A	3/4 yd. Diesel shovel	16'	0.39
8B	3/4 yd. gas shovel	16'	0.40

effect of log-size on loading time per log. Log size-to loading cost relationships can be computed by translating loading time per log to time or cost in minutes per thousand to which is applied the cost per loading minute (machine rate).

Truck Load Studies

As a part of the loading time studies an analysis of the effect of log size on truck load capacity was conducted on four trucking operations.

The correlation of number of logs per load with size and number of logs hauled was solved by the method of least squares (the advantage of this mathematical method over the simpler method of plotting "number of logs per load" over the average diameter of the individual load lies in the fact that, besides giving the most probable location of the curve, the reliability of the outer extremities of the load is assured).

Knowing the number of logs per load for any given diameter class the corresponding load volume in board feet was determined. (This in turn could be translated to cost per unit of volume by dividing load volume into hauling cost per load).

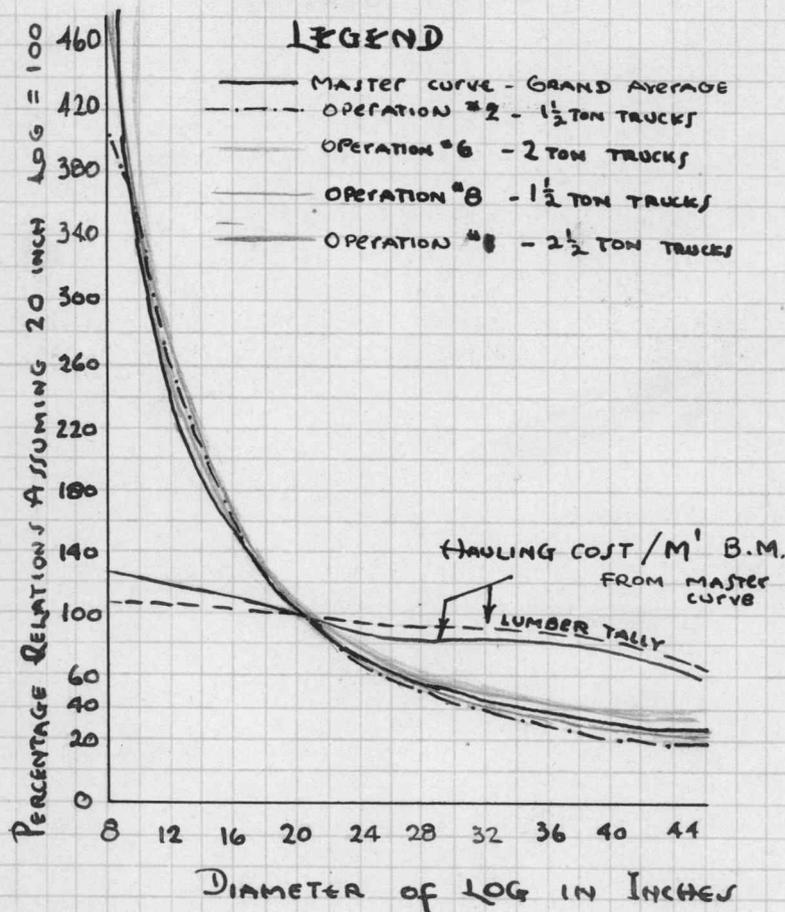
As a means of comparison the relation of number of logs per load and hauling cost per M feet b.m. to diameter of log (figure 1) was computed on the assumption that

a 20-inch diameter log equalled 100 percent. * In spite of the difference in tonnage capacity of the trucks, the variety of road conditions, and the length of log handled, the trend in relation of log size to number of logs hauled per load showed a distinct similarity in all of the four operations.

*Note:

Operation No.	No. of 20-inch diam. logs per load	Log length.
1	7.2	32 feet
2	8.8	16 "
6	6.8	32 "
8	9.9	16 "

Graph 1. Relation of number of logs per load and hauling cost per M feet B.M. to Diameter of log.



Through the " number of logs per load " curve a master curve was drawn from which was obtained the relative cost per M feet B.M.,lumber tally and Scrib. Dec. C log scale. Relative cost was obtained by dividing the load volume of 20-inch diameter logs (assumed to be 100%) with the load volumes of logs of other diameter classes.

The costs of hauling small logs was found to be not appreciably greater than the cost of hauling large logs. This fact was reflected in the master curve (number of logs per load) which illustrated that in loading small logs large dimension loads were built up and in loading large logs only a few constituted a capacity load. Consequently approximately the same weight per truck load was attained in loading small logs as in loading large logs (the weight of the truck load was judged by watching the deflection of the truck and trailer springs, carefully selecting the logs which will build the maximum load, and properly utilizing all the space which the bunks provide).

Analysis Of Time For Truck Hauling At
Operation #8

This company uses 8 Ford V8's with Maust slide loading single axle trailers for hauling 16 foot Ponderosa pine logs over a private road. The main road is 20 feet wide with a good natural pumice surface, and it is practically level.

Road maintenance is done with McMillan scraper and cat, together with day and night sprinkling by tank truck during the dry season.

Length of haul at the time of the study was $6\frac{1}{2}$ miles from the shovel loaders to the jammer at the railroad, $1/2$ mile of which was on a narrow dusty truck trail.

During the loading study, 88 loads were timed and the following data obtained:

Total volume loaded	257,670 gross log scle.
Average load volume	2,928 "
Number of logs	904
Avg. no. of logs per load	10.27
Avg. loading time	6.30 minutes
Average unloading time	3.82 "

24 round trips were ridden with the trucks and the following data obtained:

Average loading time	6.30 minutes
Average chaining time	1.58 "

Average hauling time	21.78	minutes
Average unloading time	3.83	"
" return time	15.32	"
" total round trips time	55.37	"

The trucks traveled at 18 miles per hour with load, and 25 miles per hour on return trip.

The above data has been broken down in detail with average time for 24 trips and also for the number of trips wherein the item occurred, as follows:

Time at shovel loader:

Loading time	151.30	minutes
Average for 24 loads	6.30	"

Delay time:

Fix bunks and blocks	7.40	"
Avg. for 24 trips	.31	"
" for 6 trips	1.23	"
Waiting for loader	35.20	"
Avg. for 24 trips	1.47	"
" for 4 trips	8.80	"
Waiting for load to leave	1.55	"
Avg, for 24 trips	.06	"
" for 1 trip	1.55	"
Waiting to load	53.10	"
Avg. for 24 trips	2.21	"
" for 5 trips	<u>10.61</u>	"

Total delay time	97.25	"
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Chaining time	37.85	"
Average for 24 trips	1.58	"
" for 21 trips	1.80	"

Hauling time:	522.65	"
Average for 24 trips	21.78	"

Delay time:

Repairs	2.30	"
Average for 24 trips	.09	"
" for 1 trip	2.30	"
Stuck	11.60	"
Average for 24 trips	.48	"

Average for 1 trip	11.60	minutes
Accident, hit by truck	2.70	"
Average for 24 trips	.11	"
" for 1 trip	2.70	"
Wait by hiway crossing	.75	"
Avg. for 24 trips	.03	"
" for 1 trip	.75	"
Load trouble	1.30	"
Avg. for 24 trips	.05	"
" for 1 trip	1.30	"
Landing blocked	7.10	"
Avg, for 24 trips	.29	"
" for 3 trips	<u>2.37</u>	"
Total delay time	25.75	"
Unloading time	92.05	"
Average for 24 trips	3.83	"
Delays:		
Landing blocked	12.05	"
Avg. for 24 trips	.50	"
" for 4 trips	<u>3.01</u>	"
Total delay time	12.05	"
Return time	367.60	"
Average for 24 trips	15.32	"
Delays:		
Taking gas	6.40	"
Avg. for 24 trips	.27	"
" for 4 trips	1.60	"
Waiting at hiway crossing	.95	"
Avg, for 24 trips	.04	"
" for 3 trips	.31	"
Load trailer	1.20	"
Avg. for 24 trips	.05	"
" for 3 trips	.40	"
Wait for load to leave	1.75	"
Avg. for 24 trips	.07	"
" for 2 trips	.87	"
Waiting for loader	1.00	"
Avg. for 24 trips	.04	"
" for 1 trip	1.00	"
Repairs	9.10	"
Avg. for 24 trips	.38	"
" for 2 trips	4.55	"
Waiting for load to pass	2.10	"
Avg. for 24 trips	.09	"
" for 3 trips	<u>.70</u>	"
Total delay time	22.50	minutes

Total loading time	151.30 minutes
Average for 24 trips	6.30 "
Total chaining time	37.85 "
Average for 24 loads	1.58 "
" for 21 loads	1.80 "
Total hauling time	522.65 "
Average for 24 trips	21.78 "
Total unloading time	92.05 "
Average for 24 loads	3.83 "
Total return time	367.60 "
Average for 24 loads	15.32 "

Delay time segregation:	<u>Time</u>	<u>% of delay</u>	<u>% of total</u>
		time. (157.55	(1329 min.
		minutes)	
Fix bunks and blocks	7.40	4.70	0.56
Waiting for loader	36.20	22.98	2.72
Waiting for load to leave	3.30	2.09	.25
Waiting to load	53.10	33.70	3.99
Repairs	11.40	7.24	.86
Stuck	11.60	7.36	.87
Accident	2.70	1.71	.20
Landing blocked	19.15	12.15	1.44
Waiting at hiway	1.70	1.08	.13
Load trouble	1.30	.83	.10
Taking gas	6.40	4.06	.48
Load trailer	1.20	.76	.09
Waiting for load to pass	2.10	1.33	.16
Total delay time	157.55	100.00	11.85
Total loading time	151.30		11.38
" chaining time	37.85		2.85
" hauling time	522.65		39.33
" unloading time	92.05		6.93
" return time	367.60		27.66
Total round trip time---	1329.00		100.00

Distance variables:

Fixed time:

Repairs	.47	Fix bunks	.31
Stuck	.48	Wait. for loader	1.51
Accident	.11	Wait. to load	2.21
Load trouble	.05	Wait. for load. to leave	.13
Taking gas	.27	Wait. at hiway	.07
Wait. to pass	.09	Loading	6.30
Hauling time	21.78	Chaining	1.58
Return time	<u>15.32</u>	Unloading	3.84
		Landing blocked	.80
		Load trailer	<u>.05</u>
Total time	38.57		
varying with distance.			

Total fixed time 16.80
per load.....

$$\text{Time per mile} = \frac{38.57}{13} = 2.9669 \text{ minutes.}$$

1 mile haul	= 2 x 2.9669	/ 16.80	= 22.73	minutes per. rd.
2 "	"		28.67	trip.
3 "	"		34.60	
4 "	"		40.53	
5 "	"	ditto	46.47	ditto
6 "	"		52.40	
7 "	"		58.34	
8 "	"		64.27	
9 "	"		70.20	
10 "	"		76.14	
12 "	"		88.01	
14 "	"		99.87	
16 "	"	ditto	111.74	ditto
18 "	"		123.61	
20 "	"		135.48	
25 "	"		165.15	
30 "	"		194.81	
35 "	"		224.48	
40 "	"		254.15	
45 "	"		283.82	
50 "	"	ditto	313.49	ditto
60 "	"		372.83	
70 "	"		432.17	

The above table is worked out on the basis of "distance variables" which vary with the length of haul, and the fixed time per load which is the same regardless of length of haul.

Variable time per mile is obtained by dividing the variable time, in this case 38.57 minutes, by the round trip distance, in this case 13 miles, to get a variable time per mile of 2.9669 minutes.

This variable time per mile times the number of miles in the round trip plus the fixed time per load gives the total round trip time per load for any desired distance.

May 15, 1936

SUMMARY

Initial Cost	'Operating Cost' per M	'Average Production' per M	Type of Loader
Approx. \$21,000	Approx. 32¢	200M per day	McGiffert Load.
?	33¢	155M " "	American Loader
?	37¢	90M " "	P & H 1¼ yd. shov.
\$350.	32¢	80M " "	Anaconda portable
\$18,000	30¢	150M " "	Lima 1½ shovel
\$8M to \$14M	30-40¢	200M " "	Aggregate, North-west, Speeder, Lima, Marion Diesel used by Collins.
Approx. \$200.	32¢	?	Spar tree -steam donkey.
?	?	80M " "	Hyster Tractor Donkey
\$10,500.	49¢	Avg. 150M " "	Loadmaster
\$2500.	?	120M " "	Court loader
\$100.	?	115M " "	High wheel log loader.
\$700.	25¢	60M " "	Carr loader
?	?	50M " "	Cross haul
?	68¢	21M " "	Semi-stationary
\$1975.	18¢	145M " "	"A" frame side loader.
\$1100.	?	150M " "	Slide Jammer with Cherry picker frame.

Note:

The above costs per M and production have been averaged between the different loaders of the same type.

SUMMARY CONTINUED

<u>Machine</u>	<u>Production</u>	<u>Operat. cost.</u>
Link Belt Speeder (p.43C)	25M feet per hour.	<u>23¢/M'</u>

It is found that the cheapest loader to build is the loader which is built in the local machine shop and designed by the operator to suit ^{his} ~~their~~ own needs. The most popular loaders in the pine region are these loaders which are very mobile, easy to operate, cheap to build, strong, and are very satisfactory for the job in which they were designed for. The most popular of these loaders for short logs is the Loadmaster, and for the longer logs such loaders as the Court loader and the McVay loader have proven very satisfactory.

The shovel converted loaders are fast becoming the greatest attribute to pine loading as they are cheap to operate, can average a high production per day, and are mobile.

The most expensive as to initial cost are the railroad loaders, such as the McGiffert and the American loader, but they are found throughout the Pine region because of their low cost of production. The use of the McGiffert is limited to the larger operations, and in the pine most of the operations are small and require more mobile units to literally bite into the forest itself. And, another limitation to the small contractor or smaller companies is the high initial cost; even though the loaders are among the best in loading systems.

As can be seen on the chart, the operating costs of

all types of loaders are very nearly the same. These costs average for all types of loaders to approximately 33 cents per thousand feet; although, there is a cost range from 18¢ to 50¢ per M.

However, for the pine district, the portable small loader or the shovel convert are the better loaders. Virgin stands are fast becoming cut-over, and in their place are left residual stands which will best be logged by mobile units. In the future, loading shall be done with these portable units of some such design that may be patterned after one of these loaders that has been featured in this thesis, or a modification thereof.

There is plenty of room for the universal mobile loader that will be cheap enough, strong enough, and mobile enough in the pine region. In every district the logging conditions may be different, and therefore, the loader that best will fit that condition will be the logical one to use. In the preceding pages you have been able to formulate an opinion of the most desirable log loader that might satisfy you - in that case the purpose of this paper is complete.

For a more complete picture of each loader as to its loading capacity, log production, costs per M, operating costs, etc., please see the write-ups on each type of loader.

It has just been revealed that there is being made a

pine loader that will be patterned after a couple of loaders that I have incorporated in this thesis. This new loader will revolutionize log loading, and make such loaders as the shovel or crawler loaders antiquated in a year or two. It is being made by the Osgood people, which will be practically the same as a shovel, but it will be mounted on pneumatic tires, somewhat on the order of a lumber carrier, with hydraulic pacs. The advantage of this loader will be its extreme mobility - for it will be able to travel at the speed of 6 miles per hour, and will be able to handle any log in the pine district.

For an idea of what one of these new loaders may be like, please turn to figure 20 on page 93 which shows an American Loader mounted on a 20-Ton truck, and figure 8b, page 43B which shows a shovel convert mounted on a Mack truck.

At present there isn't any more available data on this Osgood loader, but it will (more than likely) be on the same order as the above two loaders.

I hope that I have presented a clear picture of the pine loading systems to you, the reader, and that you have been able to formulate opinions of your own on the need for mobile loading systems on any logging chance.

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