

SAW MILL ENGINEERING.

There was a time when it was the popular impression among millwrights and engineers that anything was good enough for saw mill work; that a common "nigger" engine, with any kind of a whirlingig upon it for a governor, was good enough; that any sort of a kettle, leaky or otherwise, was suitable; that the shafts had only to be strong enough not to bend too much under the heavy belt strains that were put upon them; that belts which would not be used for conveyors in a grist mill, would answer for transmission in a saw mill; that any kind of dope was good enough for lubrication; and that finally, any kind of a plug, who could feed the slabs, was good enough for an "engineer" (save the mark).

Now, public opinion on this subject is commencing to change, and to change for the better. The mere fact that fuel is not only plenty, but absolutely "a drug in the market," is no longer among the best saw mill proprietors, considered an excuse for such wastefulness in every department. I shall endeavor to give below some of the reasons which are influencing the most advanced proprietors in this change of opinion.

In the first place, as regards the engine properly speaking, the boiler should come first, but there is a reason why I should speak of the engine first: It is a well recognized fact that an automatic cut-off engine, particularly when the variations in load and in speed are frequent and considerable, is much more economical of steam than the ordinary trottler; that is when the power consumed exceeds 25-horse, at any rate.

"But suppose that fuel not only costs nothing, but the excess has to be cremated?" It makes no difference. It is cheaper to build or buy a crematory, than to pay for a boiler just for the purpose of getting rid of the waste. If you can get a small high-speed engine to consume high pressure steam with economy, you will need a smaller boiler than if you have some sort of a "steam chewer" back of your engine. It makes a difference whether you have to evaporate from 125 to 1,000 pounds of water per hour, or only from 60 to 480, which takes a smaller boiler. A smaller boiler costs less to commence with, and less freight to follow with, and to finish with, after it is set, will cost less than a larger one. No, I will not say to finish with; because it makes a difference whether you have to feed in enough fuel to evaporate 125 to 1,000 pounds of water, or only enough to evaporate 60 to 480. You will save upon a fireman's wages. Then come into the items of insurance, wear and tear, taxes, depreciation, repairs, etc. All these are greater for a boiler which has to make 125 to 1,000 pounds of steam per hour, than for one which has to supply only 60 to 480.

In the same way you may cipher up the steam pipes between the boiler and the automatic cut-off engine, using only 60 to 480 pounds of steam per hour, over those needed for the throttling engine needing 125 to 1,000.

When you get to the engine itself you have two advantages in buying the automatic; rotation speed being the same in both cases. You will save on boiler account, on piping from boiler, and in firemen's wages; but you will also have better regulations, and better governing means, better quality of lumber. It also means the saving of much annoyance in the mill.

We will suppose that you have six or eight gang saws, all of which are likely to be in the log at once; now with an engine which has a good range of governing, you can work right along and not stall anything; whereas with a throttling engine you will be apt to have trouble once in a while from belts slipping, and the engine refusing to do anything at all, until one or more of the gangs can be thrown off. The automatic engine will of course cost you a little more for the same power and same rotation speed, than the throttling engine; and this will of course run up your costs for interest, wear and tear, depreciation and taxes; but it will generally be more than made up in the saving on the boiler side of the mill.

As a general thing, you can get an automatic engine better built and capable of being driven at higher speed than one of the throttling type; and this means a big saving "all along the line," not only in the matter of fly-wheel weight required, but in shifting and belting. We will suppose that you have an automatic engine delivering 50-horse power at 250 turns, it will take a pulley of two-fifths the diameter (for a given belt width) to put the power in the jack shaft, of that required for the engine running only 100 turns for the same horsepower. Or with a given belt speed it will take a belt only about two-fifths the width. There can be saving in pulleys, belts and shafting, all through the saw mill, by the adoption of high speed; because most of the machines require to be speeded much higher than the engine itself. Of course with narrower or lighter belt width, giving out their power by reason of higher speed rather than greater belt tension, there will be less pull upon the shafts, and less lubrication required. This means also less likelihood of hot bearings stopping the mill.

There will also be a less belting bill to pay, because there will be lighter belts to buy. Couplings, hangers, clutches, and all other appurtenances of the transmission will of course be lighter and cheaper, and will require less force of men to put them up and less strength of frame work to hold them.

There is this further advantage in having an automatic engine; you can at any time reduce or increase the amount of work done in the mill without seriously affecting the speed and general working of the engine. If you think that the boiler will stand a little more pressure, the engine will take it and be thankful. If the boiler gets a little weak and you want to ease up on the steam, the engine will simply reach out a little further with the cut-off. If you are burning slabs or any other kind of fuel giving greater variations in pressure, the automatic, being a better grade of machine, is apt to get better care, and for this reason alone will keep in better condition than the "nigger." Further, the "niggers" are generally delivered painted or unfinished, and consequently there will be poorer stock than must be put into a finely finished engine, where the grain of the metal shows.—*Wood and Iron, San Francisco.*

NEW WATERWAYS FOR MANITOBA.

The biggest scheme on hand for some time of interest to the lumbering industry, says a correspondent in the *Mississippi Valley Lumberman*, is the one now agitating the public here in connection with the improvement of our waterways. At intervals during the past five or six years efforts have been made to induce the Dominion government to undertake the work of improving navigation on our rivers and streams, but beyond taking out a few scow-loads of sand from the mouth of Red river, nothing has been done. The present phase of the question is a result of the agitation against railway monopoly. The Dominion government has intimated to certain of its leading local supporters that if Manitoba will submit for three years to railway monopoly and give up the attempt to build a road to the boundary, an appropriation will be made sufficient to carry out the river improvements demanded. With a little expenditure a vast stretch of navigation can be made tributary to Winnipeg. The Red river is now navigable to the boundary, a distance of 60 miles, but in the opposite direction down stream there are rapids, a few miles below the city, which effectually block navigation, except during a short time in the spring when the river is very high. It is estimated that a lock and dam, to cost only about \$400,000, would overcome this difficulty and render the river navigable to Lake Winnipeg. This would open a vast stretch of inland navigation, with a coast line of about 5,000 miles, including the Red river to Lake Winnipeg, 350 miles long, a portion of the Nelson river and tributaries, the great Saskatchewan river and tributaries, and other minor rivers flowing into the lake. About 300 miles of lake navigation on Lakes Manitoba and Winnipegosis could be added to its vast system of inland navigation by a little additional expenditure. When it is known that all this north country is more or less covered with timber, the interest to the lumber trade will be surmised. There are now half a dozen or more lumber firms opening on Lake Winnipeg. The lumber is now brought to Selkirk, the present head of Lake Winnipeg navigation, by boat, and there transferred to the Canadian Pacific railway branch line and brought on to the city. To bring lumber from Selkirk to the city, a distance of about 20 miles by rail, it costs as much as to freight it by boat the entire length of the lake. By making the proposed improvements in the Red river, it is estimated that the cost of rough lumber at Winnipeg would be reduced about \$3 per 1,000. The country tributary to Lake Winnipeg is a valuable timber district, and the opening of direct water communication with the city would undoubtedly stimulate the lumbering industry on this lake. But the most valuable timber area in the Canadian Northwest is in the countries surrounding Lakes Manitoba and Winnipegosis. This region has never yet been tapped, owing to its isolated position. Lakes Manitoba and Winnipegosis are really a chain of many lakes of varying size, connected by narrows. These lakes stretch along in a line parallel with Lake Winnipeg for a distance of about 300 miles, and are separated from the latter lake by a ridge of land, varying from 15 to 60 miles in width. The country between is mostly wooded, but the most valuable timber district lies to the west of this chain of lakes, on the opposite side from Lake Winnipeg. This long chain of lakes is navigable the entire distance, with the exception of a couple of miles between Lakes Manitoba and Winnipegosis proper, which could easily be overcome, the country between being of a low, swampy nature and usually flooded. The northern end of Lake Winnipegosis reaches within about half a mile of Cedar lake, the latter being merely a widening out of the Saskatchewan river, the river being already navigable from Lake Winnipeg. This would complete the circuit, and render available the vast timber country west of the Lake Manitoba chain of water stretches. The resources of this timber region were

referred to in a previous letter, but the country has not yet been sufficiently explored to give a very accurate approximation of its wealth. An engineer who spent two months in that country last summer, however, estimated the quantity of timber tributary to Lake Winnipegosis at 500,000,000 feet. The timber is of larger size and said to be much superior to the districts now being worked on Lake Winnipeg. If these improvements to the waterways are carried out, a very valuable timber region will be open for development, and the lumbering industry will be given a fresh impetus.

The Duty on Lumber.

Mr. Arthur Hill, of Saginaw, in a recent interview with a reporter, expressed himself as follows regarding the tariff on lumber between the United States and Canada:

"As I understand it, Mr. Hotchkiss, and others who side with him, believe that if the Canadian export duty is abrogated that Canadian logs will naturally come to supply Saginaw mills with stock; but I think that it is a plain mathematical proposition that if the Canadian export duty on logs of \$2 a thousand and the American import duty on lumber of \$2 a thousand are removed at the same time, that the Saginaw mills will stand in the same relative condition as to securing logs to saw from Canada as they do to-day. The cost of towing and delivering logs to the Saginaw mills from the Georgian bay is \$2 a thousand, and while Canadian labor costs less than ours, we will call the cost of sawing in Canada the same as here. The freight rate from the Georgian bay to Buffalo and the eastern market by water is substantially the same as from the Saginaw river. By rail it is less. If you call the rate from both points to Buffalo \$2.50 a thousand, you will have these results: Canadian logs sawed on the Saginaw river:

Cost of delivering logs, per thousand, to mills.....	\$2
Sawing.....	2
Freight to Buffalo.....	2 50
Export duty on logs.....	2

Lumber costs in Buffalo above cost of logs.....\$5 50

"Canadian logs sawed in Canada:

Sawing.....	\$2
Freight to Buffalo.....	2 50
Import duty on lumber.....	2

Lumber costs in Buffalo above cost of logs.....\$6 50

"These figures conclusively show that under present conditions as to duties the Saginaw mills are at a disadvantage of \$2 a thousand feet in handling Canadian logs, and since the imposition of the \$2 export duty on logs, it is well known that they have ceased to be brought in. Now let us suppose that both the duties are removed as is supposed, and we have: Canadian logs in the Saginaw river:

Cost of delivering logs to mills.....	\$2
Sawing.....	2
Freight to Buffalo.....	2 50

Lumber costs in Buffalo above cost of logs.....\$6 50

"Canadian logs sawed in Canada:

Cost of sawing.....	\$2
Freight to Buffalo.....	2 50

Lumber costs in Buffalo above cost of logs.....\$4 50

"Under the new conditions, then, the advantage of the Canadian mill owners over Saginaw mill owners of \$2 a thousand still remains, and the logs would therefore, then as now, be manufactured in Canada."

The irresistible conclusion is that there is still two sides to the tariff question.

In further conversation Mr. Hill said that in Canada at present the Norway and coarse logs were not cut, the lumbermen not owning the land taking only the best timber. He believed that if the tariff duty were removed it would enable the Canadians to cut closer and go over limits for a second crop. That is one reason why he opposed free lumber.

The Proper Way to Dry Oak.

A large amount of oak is spoiled in drying. It is the nature of oak to crack, not only on the ends but on the surface. This can be guarded against and reduced by care and the expenditure of a trifling sum of money. First of all, the ends of the logs should be thoroughly painted. Ordinary roofing paint is best, and the addition of a handful of salt to the gallon will improve it. In piling, the stickers should not be over two inches wide and not over three feet apart, and placed directly over one another. This method will keep the lumber perfectly straight. The piles should be thoroughly covered and thus protected from rain, heavy dews and the sun's rays. Oak that is allowed to gather moisture and dry out repeatedly, will soon become checked and surface cracked, and as such can only be graded as culls. If stained or badly twisted, it goes into the lower grades, all of which is frequently due to slack and unbusinesslike way of preparing what might be good and desirable lumber for market. An expenditure of \$5 for paint, would probably save \$5,000 worth of valuable lumber.—*Northwestern Lumberman.*