

boards turned off by the band-saw are put through the edger, which has one fixed and two movable saws, by means of which three boards of varying widths may be cut at the one operation. The slabs go to the drag saw, are sized, and cut into the required dimensions. The refuse slabs and edgings are passed down a shoot to the "hog," or edging-grinder. This machine will take a slab up to 6 in. in thickness and in a few seconds convert it into chips about 1 in. in thickness, according to the setting of the knives. These chips, or "hoggings," drop into a conveyer shoot in which runs an endless chain. The sawdust from the saws is also conveyed by creepers into this shoot, and, mingling with the hoggings, is carried to the stokehold and deposited as required on the tops of the furnaces. From here by gravitation it drops through hoppers into the fire. The furnaces are specially constructed to burn this fuel. A fan or blower is attached to give the forced draught necessary to burn the green kahikatea sawdust, which contains about 50 per cent. of moisture. Any sawdust in excess of that necessary for fuel is carried by an extension of the conveyer past the stokehold, and falls into a large box truck, and is taken on the return trip of the locomotive to the bush, where it is used to pack the sleepers in the bush tram. The amount so used is not great—in fact, contrary to the usual state of affairs at a sawmill, the quantity of fuel is barely sufficient for the furnaces.

The power is derived from three longitudinal boilers, 14 ft. tubes, carrying 120 lb. pressure. The engine is a twin-cylinder, 16-in. diameter, 20-in. stroke, 100-horse power. A small compound engine, 37-horse power is used to drive the deal-frame.

The saw-shop is equipped with an automatic grinder, saw-stretching rollers, brazing-bench, and lap grinder for the band-saws, and other emery wheels for the deal-frame and circular saws.

The trade is wholly export, the bulk of the timber going to Australia. Some shipments have been made to the United Kingdom. Steamers of 1,000 to 1,800 tons are frequently loaded: on one occasion a steamer of 2,600 tons loaded for Australia. Sailing-vessels of from 200 to 700 tons are also employed. Vessels of 20 ft. draught can load with safety.

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(2.) WAIMARINO DISTRICT.

In going through a New Zealand forest one is always impressed by its density, but of the many varieties of trees composing it there are generally not more than two or three kinds that are at present of commercial value; and of these two or three kinds there are probably not more than 75 per cent. of them that are of sufficient size or of good-enough quality for milling purposes. In some localities the red-pine (rimu) are to a great extent bark-galled, twisted, or the barrels bifurcated; and in some localities the totara is largely affected by dry-rot; so that there is a very small proportion of the sawn timber that can be disposed of as best heart. I have heard no satisfactory explanation of the causes that are responsible for these defects, nor have I any explanation of my own that is applicable to all cases. This, however, I have observed: that rimu growing in a locality where mountain-cedar is the dominant tree is nearly always more or less dwarfed or twisted and often bifurcated; and, as the cedar predominates only on very poor soils at high altitudes, it would appear that these two conditions are mainly responsible for the defects of the rimu.

In working a milling-bush the first thing after the selection of a suitable site for the milling-plant is the selection of tram-routes that entail as little expense as possible for formation, yet at the same time tap localities where the trees are most plentiful, and give good grades for hauling. At the terminus of the tram-line it is usual in easy country to have a small stationary engine, which, by means of a long steel-wire rope, hauls the logs down rough tracks to the trucks that are waiting to run them down to the mill-yard. From the yard the logs are hauled by machinery on to a platform, and then jacked on to a large travelling bench which conveys them to the breaking-down saw; the flitches are then slid to smaller saws which cut them into studs, weatherboards, flooring-boards, &c.; these small timbers are then stacked in the yards according to their quality—heart, O.B. or seconds—to be in readiness for the orders of city timber-merchants.

There does not appear to be any season recognised in New Zealand for the felling of trees for milling. When business is good men are kept cutting, and when business is dull the mill works half-time. Some authorities assert that it is this indiscriminate cutting of trees that gives some of our timbers bad reputations. For example I have heard one of the most experienced architects in New Zealand say that when kahikatea (white-pine) is cut in winter, before the sap rises, the timber is as durable as red-pine. However this may be, it is well known that in older countries the trees are always cut when the sap is down.

The yield of timber per acre, of course, differs largely in different localities. In the forest recently opened up by the North Island Main Trunk Railway the yield is as high as 40,000 ft. (superficial) to the acre. The average of the milling-bushes at present being worked in this district would probably be about 25,000 sup. feet. As a rule it does not pay here to work a bush that gives under 10,000 feet to the acre.

The felling of the trees is done by axe and saw: a "scarf" is cut with the axe on the side facing the direction in which the tree is wanted to fall; then a long two-handed saw is brought into operation on the opposite side, and, to guard against the tree balancing over to the reverse direction to that required, the saw-cut is made about 2 in. higher up than the "scarf." Two men will cut down an average tree (2 ft. 9 in. in diameter) in about thirty minutes. Very great care and skill are required in felling trees for milling, as, if they fall over logs or stumps, their barrels are liable to be shattered and rendered worthless. The felled trees are then sawn into suitable lengths (from 14 ft. to 15 ft. being generally required) and then hauled out either by bullocks or by steel-wire rope and steam log-hauler to the bush skids, where they are jacked on to the trucks and hauled either by a team of heavy draught horses or steam locomotive along the bush tram to the mill.