Preparation of Wood at Pulp-mill.

At the Ladysmith pulp-mill the tawa and insignis-pine logs, in 12 ft. lengths, were moved by conveyer from the piles in the wood-yard to the wood-room, where they were cut into 2 ft. bolts by a regular carriage type of slasher-saw. These 2 ft. lengths then passed by conveyer to a log-splitter, which reduced the bolts to a size—about 10 in. by 10 in. in cross-section—which would allow them to be handled in the barking-drums, the chipper, and grinders.

As already indicated, the tawa was almost entirely free from bark, and after sorting for discoloured heart, and, where necessary, hand cleaning, was conveyed direct either to the chipper or to the grinder-room. After chipping, the tawa was screened and passed to the chip-bins, located, as usual, over the sulphite digesters. The wood was sawn, split, and barked without difficulty, but the sorting for and disposal of discoloured heart will prove a real obstacle where large quantities of mature logs are dealt with. The chipper also handled tawa with ease, but a deposit of "gum"—probably some heartwood product—was noticeable on the chipper-knives, which would probably require more frequent sharpening than is usual when spruce is chipped.

In the case of insignis pine it was necessary to pass the whole of the wood through a continuous type of barking-drum before passing to the chipper. The split bolts are fed automatically into one end of the rotating drum, where they are tumbled about and automatically discharged at the other end. The tumbling rubs off the bark, which passes out through narrow slots between the structural sections of which the drum is built. In this installation the drum was run "dry" that is, without using water to loosen up the bark. Excellent results were secured, the insignis pine showing less "brooming" or fraying of the ends than was usual with the spruce and hemlock regularly employed in the mill. The removal of bark, even from knotty bolts, was remarkably good, and the proportion sent back for rebarking and hand cleaning was small. The wood split fairly easily, but the so-called "carrotty" fracture of the wood was very noticeable at this stage of the operations. The chipper yielded a high grade of uniform chip, quite up to, if not above, the usual grade of commercial chip.

GROUNDWOOD PULPING STUDIES.*

The Groundwood Process.

One of the most commonly used methods of reducing wood to pulp is by grinding. Usually this is accomplished by pressing short logs of wood, from which the bark has been removed, against a rapidly revolving grindstone. The axis of the log is placed parallel to the axis of the stone, which is kept cooled, and the pulp removed by a shower of water sprayed continuously on the stone-face. The product is variously termed "wood-pulp," "groundwood," or "mechanical pulp," and finds extensive use in newsprint paper, cheap catalogue and book papers, and boards.

Obviously, the production of pulp by this means is cheaply done. The principal items of cost are power used in grinding and the wood. The product, however, is of a somewhat unstable character. Containing all the wood substance, it is subject to rapid deterioration, and particularly to discoloration. It is thus limited to papers designed for temporary use or for filling in with more durable fibres. Groundwood fibres, however, possess certain qualities of opacity and stiffness which are often valuable, and the use of the pulp for these reasons is extensive. The greater tonnages go into newspapers and boards. Ordinary newsprint "furnishes" contain from 60 to 85 per cent. of groundwood, the amount being only limited by the strength requirements of the sheet, which are met by certain admixtures of sulphite fibre.

Factors affecting the Quality and Production of Groundwood.

Detailed discussions of the factors affecting the quality and production of groundwood pulp have been published by Thickens†‡§, and McNaughton†‖. They will be only briefly mentioned here.

The most important factor affecting quality is the wood itself. Long-fibre wood, properly ground, will produce long-fibred pulp. The colour of the wood, whether natural or stained by decay, and the pitch or resin content are also important. Spruce is the most valued softwood for the manufacture of groundwood, because of its long fibre, low content of pitch, and light colour. The density of the wood determines the yield of pulp per cord, and therefore influences production. Green wood yields a longer-fibred pulp with a lower power-consumption than seasoned wood.

Next to the wood in importance is the quality of the pulp-stone, and the proper stone may be selected to produce the grade of pulp desired. In use, the surface of the stone is dressed with a certain pattern by means of a cylindrical bush-roll, termed a "burr." The purpose of burring is to present new sharp particles of grit to the wood, and to provide grooves to carry the fibres away. Grinder-men have certain preferences in regard to the various types of burrs, but experiments†§‖ have shown the particular pattern used is not very important, provided the grit is exposed to the same degree with each. A stone deeply grooved parallel to the axis, by what is called a straight-cut burr, will produce coarse fibres and a large quantity of screenings. Decreasing the depth of cut and increasing the number

* The wood-grinding studies reported here were made under the supervision of Mr. E. R. Schafer.

† Thickens, J. H., and McNaughton, G. C. "Groundwood Pulp." U.S. Department of Agriculture Bulletin No. 343. April, 1916.

‡ Thickens, J. H. "Experiments with Jack-pine and Hemlock for Mechanical Pulp." U.S. Department of Agriculture Bulletin, Forest Products Laboratory Series. June, 1912.

§ Thickens, J. H. "The Grinding of Spruce for Mechanical Pulp." U.S. Department of Agriculture, Forest Service Bulletin No. 127, Forest Products Laboratory Series. June, 1913.

‖ McNaughton, G. C. "Factors in the Quality of Groundwood." Paper. 3rd October, 1917.