

storage-vats. This pyroligneous liquor, as it is called, is left in the vat three or four days to free it from any tar in suspension, and is then ready for further treatment. The incondensable gases pass from the tubular condenser into a gas-washer, where any residual naphtha or acid is removed by water, and are then conveyed by a pipe to the furnace, where they are utilized in the process of carbonization.

"The pyroligneous liquor, freed from tar, is pumped from the storage-tanks across the yard to a vat in the acid-room and neutralized with lime, which has been prepared in a lime-mixing tank outside. The liquor is stirred continuously by a mechanical stirrer until the mixing and neutralization are complete. Thence it is pumped into settling-tanks at the top of the building, then into sludge-tanks on the first floor, where further impurities are removed, and thence into a storage-tank in the acid-room. It is now pumped into a small 'clear-liquor' tank on the top floor, and runs thence into the iron column of the continuous apparatus, where the neutralized-acid liquor is completely separated from the naphtha. This apparatus consists of a wrought-iron base or still, containing a copper coil, surmounted by a series of cast-iron plates. The neutralized liquor is run off continuously from the still into a tank below, and while still hot is pumped into an evaporating-pan. It is there boiled down to a strength of about 10° Baumé, and when this point is reached is run into the pan of a rotary dryer. This is a large wrought-iron drum, heated internally with live steam. The drum revolves slowly in a shallow tank and picks up a coating of the neutralized liquor. The liquor is dried, as the drum revolves, to a content of about 70 per cent. of grey acetate of lime, and then removed by a series of scrapers on the other side. The acetate, which is now in a pasty condition, is spread upon a concrete drying-floor, under which pass the gases from the retort to the chimney-stack, and after being dried for several hours is filled into sacks. The acetate now contains from 84 to 85 per cent. of true acetate of lime.

"The naphtha which runs from the top of the iron still and column, after being freed from the acetate-of-lime liquor, as previously described, and also from some of the heavy oils, is passed through a copper wash-column, into which a weak solution of sulphuric acid trickles, and is here further purified. Thence it goes into a second column, where it is treated with a weak solution of caustic soda, and more oils are separated out. After passing through a small condenser the purified methyl alcohol is run into a storage-tank below, and is ready for filling into drums for despatch.

"Power is provided by a 27 ft. by 7 ft. 6 in. boiler, made by Messrs. E. Danks and Co. (Limited), of Oldbury, which supplies steam to the following machines: A 35 h.p. single-cylinder non-condensing engine, made by Messrs. Marshall, Sons, and Co. (Limited), of Gainsborough; a Worthington steam-pump for the cooling water; the fan engine; the condenser engine; the evaporating-pan; the rotary dryer; the continuous apparatus; the tar-still; the tar-condenser; and the boiler-feed pump.

"The main engine drives by shafting a dynamo, which, in addition to lighting the works, provides power for the motors used in charging and discharging the retort and cooler, and for the acid-pump, the neutralized-liquor pump, the clear-liquor pump, the evaporator pump, the lime-stirrer, and the rotary dryer."

Up to the present time the financial success of the undertaking is uncertain, but, of course, a great deal depends upon the demand for the products. Some twenty-five men are employed at the works, which, roughly, puts through 60 cords of wood per week, and extracts principally 20 barrels of tar and 200 gallons of naphtha. Timber is thus utilized up to 6 in. in thickness and cut to about 6 ft. lengths. Oak and beech are the principal timbers operated upon, and are both much superior to larch or pines for the extraction of chemicals.

Pulp-wood.

In Ottawa, under the guidance of R. G. Lewis, B.Sc.F., several hours were spent at J. R. Booth's extensive paper-pulp and saw mills in inquiring into methods of paper-pulp manufacture, and perhaps the few following notes may be interesting. The mills, which are situated on the Ottawa River, turn out about 125 tons of paper-pulp daily. Of the timbers mostly adapted for the purpose Canadian spruce heads the list, with a 90·4-per-cent. total; then Balsam fir, 8·9 per cent.; poplar, 0·5 per cent.; basswood, 0·1 per cent.; elm, 0·1 per cent. Inquiries elicited the fact that pines generally are not perfectly suitable owing to their extremely resinous nature, and larch and other hardwoods do not possess the desired texture for easy conversion. Briefly, logs 7 in. to 8 in. in diameter are cut in the forests during the winter into 14 ft. and 16 ft. lengths, but as the river usually becomes frozen a year often elapses ere they can be rafted down to the mill. By an endless gripping-chain they are lifted from the river and sawn into 2 ft. lengths. The blocks are then carried along on an elevator to the paring-machine, which quickly removes all bark and drops them into the grinding-box, where revolving stones grind the timber to fragments with the aid of water. The pulp is then carried along on rollers, pressed, and put into leather-like bundles. Some twelve hundred men are engaged at the pulp and saw mills, where *Pinus strobus* (used extensively for match-making at Eddy's adjoining famous factory), *P. Banksiana*, *P. resinosa*, and spruces are the principal woods operated with.

The establishment of a paper-pulp works is evidently a very costly undertaking, and unless tremendous supplies of suitable timbers are available the outcome would surely result in financial loss. At present only a comparatively small acreage is under the Piceas in New Zealand, nor was it intended to extend planting with any of the species. I am unaware if any tests have been made regarding the suitability of our kahikatea or other softwoods for pulping, but if not it would doubtless be desirable that a small parcel of various indigenous timbers be sent to the Canadian Forestry Department, who would have no objection in obtaining expert opinion on the matter.