

*The model paper-making machine photographed in 1920 at the Crawley laboratory*

## First Steps in Western Australia

The first practical steps towards Australia's paper manufacturing industry—currently worth nearly \$200 million in annual sales — were taken in Western Australia in 1920 by the Forest Products Laboratory of the Commonwealth Institute of Science and Industry (later to become C.S.I.R.O.).

The smallest model paper making machine of its kind in the world was purchased and donated by Western Australia's four major newspapers of the day and set up to complete the Bureau's paper making laboratory at Crawley.

The newspapers were The Daily News Ltd., The West Australian Newspaper Co. Ltd., Sunday Times Newspaper Co. Ltd., and Kalgoorlie Miner Ltd.

Several of the State Governments subsidised the work which examined at length the paper making qualities of several of the most likely timbers from various states.

A 4-in. wide roll of paper containing 75 per cent karri fibre was produced by the 10-ft. model in one of the experimental runs.

Raw material—mainly crown-wood was cut into discs about 1 in. thick and then split into chips about 2 in. long and  $\frac{1}{8}$  in. thick which were fed into a digester and boiled for several hours under pressure in a caustic solution. After washing, the resulting soft, fibrous chips were beaten in another machine, bleached and mixed with size and a little white

china clay. This white pulp was then diluted to a 1 per cent concentration in water and fed into the miniature machine.

An exact replica of the larger Fourdrinier paper making machines, the model was built by Marshall & Co., London.

"The machine is the most interesting part of the plant," according to Mr. I. H. Boas, B.Sc., former Officer-in-charge of the laboratory, whose comments appear in Bulletin No. 2 of the Forests Department of Western Australia, 1921.

"On to one end pours a milky-looking liquid and from the other emerges the continuous roll of paper," he said.

After passing through various devices to feed it evenly, the pulp ran on to a copper wire gauze conveyor belt which, in addition to its forward movement, had a sideward reciprocating motion.

Much of the water filtered through the gauze at this stage of production and caused the tiny fibres to build up into a close network. The paper began to gain sufficient strength to support its own weight after passing

through suction boxes (suction being provided by two small pumps) and then squeezing rollers which greatly reduced the water content.

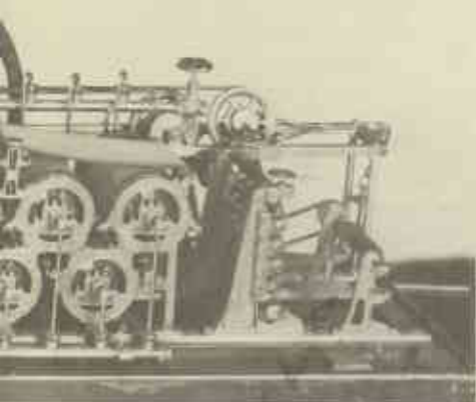
At this stage the paper leapt a gap and was taken up by a felt conveyor to again go through two squeezing processes.

The next set of cylinders was steam heated and dried out the paper as it passed over and under them in series. Finally, the 4 in. wide paper web was passed through a bank of miniature calender rollers to give a smoother surface.

Mr. Boas said some of the hardwoods tested yield a high percentage of good quality pulp which is readily bleached and which felts on the machine to a good quality paper.

The impetus for this forest products research was given by a steep rise in paper prices after the First World War, and world-wide concern at the diminishing natural forest resources of species (softwoods) considered suitable for pulping.

Mr. Boas conducted the initial experiments with hardwoods to test their suitability in 1919. He had



read adverse reports from an American expert, Mr. H. E. Surface, who said—after testing Tasmanian species—that eucalypts were no good for papermaking.

Instead of conducting experiments along the accepted lines of current pulping practice, Boas examined the woods for cellulose content. This is how he stumbled upon the key to making paper from eucalypts. Mature karri contained almost double the cellulose that Surface obtained as pulp from mature Tasmanian eucalypts, using the then current soda cooking technique, which dissolved a considerable part of the cellulose in the fibre, weakening the pulp.

The logical step was to lower the concentrations of soda and to use heat exchangers instead of direct heat. Soon other papermakers realised that external heating of liquors was much better than direct heat, and it became general practice in the industry.

These initial steps in Western Australia were terminated with the shipping of the equipment to Victoria in 1922.