generally water-power, chiefly because power is such a big factor in the process. One grinder, having a capacity of, say, 5 tons of dry pulp per day (by "dry pulp" is meant pulp that has been dried out after grinding) would require about 300-horse power to operate it. A complete mill having a daily capacity of 25 tons of dry pulp would be considered a very moderate mill in Canada, and would require 2,000- to 2,500-horse power. It is commonly figured that it takes about 100-horse power for each ton of ground pulp produced per day of twenty-four hours. This would be sufficient to drive all the gear that is comprised in a complete outfit.

The logs to be pulped are all floatable, and are usually brought to the mills by water, being "driven" or rafted from the streams which are invariably available to the forests. They are collected in the log-pond, which in some instances also forms the mill-dam, from which the water for power purposes is taken.

From the log-pond the logs are conveyed into the mill by an ordinary "haul-up" or "bull-chain." This consists of an endless chain, having spikes at intervals projecting upwards, which traverses in one direction an inclined trough leading from the pond to the mill. The logs are thus drawn up the trough, partly resting on the chain. They are then usually cut into 16 in. or 24 in. lengths by means of a circular saw, being fed endwise automatically by live rollers.

From the "crosscut" the billets are conveyed to the barker. This consists of a cast-iron disc about 5 ft. or 6 ft. in diameter, with about six knives bolted to it in such a manner that the edges project from the face of the disc about $\frac{1}{2}$ in. They are set in radial lines, and are a few inches longer than the billet to be operated upon. The billet is placed horizontally on a rest in front of the revolving disc, and each knife as it passes takes off a strip of bark the full length of the billet. By revolving the wood slowly the whole of the bark, knots, and bad places in the wood are completely removed. The chips and bark pass through the disc and are thrown by fans attached to the disc through the outlet, and piped away as refuse. It is necessary to clean the wood as above, to insure a saleable quality of pulp. It is this part of the process that calls for straight timber, and in this respect the coniferous trees are *par excellence*—lending themselves as they do so readily to mechanical manipulation. Where wood larger than, say, 12 in. diameter is used it is split, after barking, by a power splitter.

Now for the "grinders." These are very strongly built. The framing is of cast-ironi, the shaft of steel 7 in. or 8 in. diameter, upon which is fixed a grindstone, held in place by screwed flanges. If 16 in. wood is to be ground, the stone would be about 18 in. wide, and, say, 54 in. diameter, and for 24 in. wood a 26 in. stone would be used. Generally Scotch stone is used. Each grinder has three hydraulic cylinders and three pockets for wood placed in an inverted position above the stone, the centre set being vertical and the others at angles of 45°. The size of these cylinders is such as to suit the pressure of water used, and is figured on a basis of 100 lb. pressure per square inch on a 10-in.-diameter cylinder. The wood is placed in the pockets flatwise, with the grain across the direction in which the stone revolves, and the application of the hydraulic pressure forces the wood against the stone. Water is constantly applied, and the stone runs about 200 revolutions per minute. The quality of the pulp is influenced a good deal by the speed of the stone, the pressure applied, and the sharpness or texture of the stone. If the stone runs too fast, there is, besides the danger of its bursting, a greater tendency to heat and gloss it, thus affecting its cutting. With a slower speed a longer fibre is produced.

After being roughly screened to remove chips and splinters, the pulp is pumped into the "screen-tank." The screen-plates are about 12 in. by 36 in., made of brass, with slits $\frac{10}{1000}$ in. or $\frac{12}{1000}$ in. wide. A rubber diaphragm is placed under each two plates, and is operated by a cam, which on its upward throw agitates the mixture and blows the slits clear, and on its downward throw draws the finer particles through the screen. The stuff is then pumped to the "wet machine," and is discharged into a tank in which revolves horizontally the "cylinder mould." This is made of brass, to prevent its rusting and so discolouring the pulp. It is usually 30 in. or 36 in. diameter, and 72 in. long, covered with two fine brass cloths, the outer covering having sixty meshes to the inch. As the water is pumped from the inside of this cylinder a film of pulp adheres to the outside, to be taken off by an endless felt band, which comes into contact with it on the upper or unimmersed part of the cylinder. The felt is carried through press-rolls, and the pulp, now in a condition containing 60 per cent. of water, is collected on a wooden roller in successive layers until it attains a thickness of about $\frac{1}{2}$ in. The operator then makes a cut lengthwise of the roll, and the wad thus formed is delivered at the next revolution on to the table. It is then baled for delivery to the paper-mills.

The buyer usually specifies that the pulp shall be not more than 40 per cent. dry—*i.e.*, 40 per cent. pulp and 60 per cent. water. This is to facilitate working up into a liquid state again preparatory to making paper. The pulp is, however, paid for as dry, and tests are made of each consignment to determine the quantity of water. If upon testing it proves drier than specified, a re-draw is made on the supplier to cover extra cost in working up. The fact that the supplier pays freight per 100 lb. explains the need for such stipulations.

In Canada it is usually estimated that the cost of a first-class mill with brick or stone buildings, slate roof, and iron interior will be about £1,000 per ton per day capacity. Cheaper mills can be built to cost not more than £200 to £300 per ton-day.

In the "sulphite" or "chemical" process, the wood, instead of being ground, is reduced to chips, and then placed in large tanks or digestors, and treated chemically. In most other respects the process is similar to that already described. It is, however, much more costly, and the plant is more expensive.

The quantity of wood to produce 1 ton of pulp is about 1 cord for mechanical pulp, and 2 cords for chemical pulp. The relative values are about 1 to 4 or 5. The mechanical process produces pulp of a sufficiently fine quality for newspaper and a good deal of similar work. The chemical pulp is used for better-class work and to mix with mechanical pulp for the medium qualities of paper.