

the mill, and they are also glad to extend a friendly hand for a good hearty square shake to any one whom they think deserves it.

#### THE WOOD CUTTER.

The visitor will be first taken to the place where the wood is cut up preparatory to being boiled into pulp, and here is found a wheel about six feet in diameter, containing a knife set across half its diameter, revolving at a high rate of speed. A partition stands close on one side of the wheel, and in the partition, in front of the spot past which the knife in the wheel revolves, is a spout of two feet in length. The man in charge of this machine takes a log of wood, about twelve feet in length and from six to twelve inches diameter, and stands it on its end in this spout, which brings the end of the log of wood against the side of the wheel at an angle of about forty-five degrees. He now presses on the log, and, at every revolution of the wheel, the knife takes a clean, smooth scarf off the end, the chip being about three-eighths of an inch in thickness, and preserving the same all the way diagonally across the end of the log. This machine is capable of cutting up three-quarters of a cord of wood in an hour. A fan is run on the cutting side of the wheel and serves the purpose of keeping the wheel clear of chips, which are blown to one side as fast as made. The chips are then shoveled into sacks which are loaded on an elevator, by which they are conveyed to the top of the pulp mill. The wood used is spruce, as clear of knots as possible, which is cut in about twelve feet lengths and piled in the neighborhood of the mills to dry and season. For the finer qualities of paper it is necessary the wood should be almost entirely free from knots, as it is found impossible to get rid of them, by the use of chemicals or any other process, once they get cut up and mixed in the pulp. These knots are generally the cause of the black spots so frequently seen in common paper, such, for instance, as is used in the manufacture of the commonest paper bags.

#### THE PULP BOILERS.

On ascending to the upper story of this building the upper end of the pulp boilers, three in number, are found. These boilers stand perpendicularly, the top ends of them being a little above the floor, and made so they can be removed quite easily. The ends taken off, they are nearly filled with the chips and a quantity of caustic soda added, when the ends are securely replaced, and the boiling process begins, which is to rid the wood of resin and all other foreign substances. The boiling takes from three to four hours when the pulp (for it has assumed the appearance of pulp now, although it is of a very dark brown color and looks anything but clean), together with the liquor, is forced by a high pressure of steam into a very large horizontal boiler called a receiving tank, where the pulp receives a partial washing and the liquor is drained from it, the latter being pumped to the retort house for evaporation, in order to recover the soda ash which is used over again in the pulp boilers.

#### THE WASHING AND BLEACHING ENGINES.

The pulp is now taken from the large horizontal boiler, and, with the aid of large square tubs on wheels, moved to the washing and bleaching engine, where it receives another washing, and is bleached by means of chloride of lime and some other chemicals. From here it is drawn off to the pulp drainers and bleaching tank, a large horizontal revolving boiler, where it is thoroughly bleached before being sent up to the beating engines.

#### THE BEATING ENGINES.

These curious machines are four in number and are very similar in operation and construction to the washing and bleaching engine. They must receive the pulp from the bleaching tank, and, as their name implies, beat and thoroughly mix the wood pulp and rag stock, which is now added. Here it receives its final washing, and the coloring and sizing is added, for the pulp by this time has reached a snowy whiteness, which color is generally softened by the addition of a little blue. The beating and the bleaching engines are very much alike in construction, and perhaps a description of them, as the visitor sees them at work, may not prove uninteresting to some. A large oval tub or tank, about four feet high and about six feet by ten or twelve feet in diameter, sits on the floor. Across the top of the short diameter of this tub, runs a shaft carrying a skeleton wheel called a washer-drum, about three feet in diameter and about two feet face, divided off into compartments in the interior and covered with a thin, close, wire sieve-cloth. This wheel is half immersed in the pulp and water, and takes the dirty water out of the tank while fresh and clean is pouring in from a large iron pipe at the rear. On the shaft mentioned above is a small gear wheel, which gears into a larger one on a second shaft immediately below the wire gauze-covered wheel described above. On this second shaft is set wooden pins, a foot or so in length and at intervals of perhaps six inches. This constitutes, so far as a casual observer can see, the beating part of the machine.

#### THE PULP.

The pulp has now gone through all the preparatory processes of preparing it for the paper-making machine proper. From the beating engines it goes to the stock chest, from whence it is pumped up to the paper-making machine as needed. When it does come up to this machine, it looks very thin—like very thin starch water—and one, looking at it, would hardly suppose it contained enough material to form even the very thinnest sheet of tissue paper. But, nevertheless, it soon begins to take shape as a sheet of paper as it passes into the hungry maw of the paper machine.

#### THE PAPER MACHINE.

A particular description of this machine will not be attempted, suffice it to say, it is a 5½-inch Fourdrinier machine. The stock, in a fluid state, is pumped up to the paper machine, and is made to flow in an even, broad stream upon a very fine wire sieve, which catches any dirt or lumps that may have escaped the previous process, after which it falls on a wide endless wire-cloth belt which has a rapid lateral and slowly revolving motion, which allows the water to run through but retains on its surface a deposit of pulp. This revolving wire cloth carries the deposit on its surface through a succession of rollers, and every foot it travels, the pulp becomes drier. After it has travelled the distance of about five feet it is strong enough to be taken from the wire cloth by a roller carrying an endless revolving woolen or felt blanket, which blanket in turn carries the paper (for it now looks like water-soaked paper) to a roller which gives it a final squeeze, to take out the surplus water, when it is immediately conducted to a number of large hot revolving cylinders, heated by steam, from whence it passes to the stacks of callender rolls, where it receives the finishing touches, so far as the surface is concerned. From these rolls it passes to a revolving wooden shaft on