

could possibly be formed into a product which could be used for printing the daily news or for wrapping a parcel. Yet such is the perfection of the paper machine and the skill of the paper maker that this wonderful result can be accomplished with individual fibres averaging only an eighth of an inch, or less, in length.

In the most modern mills, where the production is kept high and manufacturing costs low, the pulps are simply run from the "slush" storage, in the proper proportions, into large mixing tanks, from which it goes to the paper machines. Many mills still use the original mixer, the beater, and necessarily so where the pulp is handled in laps. In the beater the fibres are brushed and rubbed between a revolving roll and a stationary plate, a process which, besides mixing the fibres, improves their papermaking quality.

The mixed pulps or "stuff" is run into storage tanks, called stuff chests, in the machine room and pumped to a regulator which allows just the right amount to flow continually to the paper machine, the excess going back to the chest. Before the "stuff" reaches the machine it is again strained or "screened," to make sure the fibres are of uniform size, and extra water is added to get the proper inter-weaving of the fibres as the sheet of paper is formed.

A glance now at the picture of a paper machine will give the reader an idea of the nature of the apparatus and the order of events. The machine used for making newsprint, book, wrapping and writing papers is called the Fourdrinier, from the name of the two brothers who bought up and developed the original patent of Louis Robert, whose invention dates from 1799, only 120 years ago. In that time wonderful improvements have been made, modern machines making a sheet of paper 15 feet wide at the rate of 650 feet or more per minute. Some machines run more than 800 per minute, and the paper is carried automatically from one end to the other.

The wire part of the paper machine is the most important and the wire cloth is the most expensive item of supply, costing as much as \$800 of \$900 for 160" machines, and lasting from three days to three weeks.

As the stuff flows out on the endless wire it contains about one part of fibre and 200 parts of water. It flows out on the moving wire at nearly the same rate as the latter travels. No sooner does the fluid spread out on the wire than the water starts to go through. Before this has

proceeded very far, however, the fibres, in settling, have had a chance to inter-weave. The fabric is not of uniform strength in both directions, because the fibres have a tendency to lie in the direction the stream is flowing, therefore the paper is weaker across the machine than parallel to the direction of flow. Hence the paper tears more easily one way than the other. In slower running machines it is possible to make a paper of nearly the same strength in both directions.

Due to the speed of the machine and the limited length of the wire, only a portion of the water can drain through. An additional amount is drawn out by suction, applied through suction boxes with perforated tops, over which the wire travels. Before leaving the wire the paper passes between a pair of rollers, called "couch rolls," which press the fibres together and squeeze out more water. In some machines, a suction roll is used at this point. It is this roll or the lower one of the pair, which drives the wire.

The paper is now made, so far as the inter-weaving of the fibres is concerned, and it contains about 90 per cent. of moisture. In order to improve the firmness, texture and to remove more water, the sheet is passed through several pairs of "press" rolls, carried by fine woollen belts.

Most of the water is removed by evaporation, the paper passing over steam-heated drums called "dryers." This, of course, is expensive, so as much water as possible is removed by mechanical means, although the best than can be accomplished is to

deliver a sheet about 35% dry to the dryers. As the finished paper will contain from seven to ten per cent. of moisture, nearly two tons of water must be evaporated.

#### Smoothing the Surface.

The finishing, or smoothing of the surface, is done by the part of the machine called the calender, a stack of nine to thirteen special steel rolls. The friction and weight of the rolls on the paper as it winds down through the stack really "irons" out the roughness, presses down the frizzy fibres and gives a surface flat enough to take the ink properly from type and cuts in the press room. The endless sheet is then wound on reels and from these, in turn, is passed through a set of rotary shears that divide it into strips of the proper width, and these strips are wound on cores in rolls of the correct width and diameter, for the newspaper presses. Any breaks are carefully joined and a "flag" or signal is placed in the roll at that point to warn the pressman of some defect in the roll. Wrapping the roll is comparatively simple, yet this and the loading into the cars must be conscientiously and carefully done if the paper is to arrive in good condition.

Some newspapers require paper in sheets. To accommodate them the mill must have another department, where the paper from the rolls is passed through a cutter, whose revolving knife cuts the strip into pieces the desired length. The sheets are then counted by reams and packed in bundles.

For special effects an extra high finish is sometimes required. To get this the strips are passed through the super-calender, a calender stack made up of alternate rolls of steel and compressed paper or cotton. A very high luster can thus be obtained, the paper often going through several times. The product is called "super-news" and is largely used for pictorial sections of the paper.

When it is necessary to produce a special color or some other effect requiring a fundamental treatment of the stock, the necessary materials, color, sizing, clay, etc., are added in the mixer or the beater.

For other grades of paper, the operation of paper machine is practically the same as described, but such papers usually require special additional processes for the preparation of the raw material and the finishing of the paper. The selection of stock is of greatest importance, and more care is required at most points in the process.

#### THE CAMPERS INDICTED!

How many forest fires are started by campers?

Recently the Chief Forester of British Columbia made the following statement:-

"The fire losses of the Season 1922, so far as concerns the destruction of timber, amounts to 730 million feet valued at one-and-a-half million dollars, while other forms of property destroyed including farm buildings, logging equipment, etc., amounted to \$693,916. Out of a total of 2,591 fires, the greatest single cause of starting such fires is that listed as Campers and Travellers, who were known to be responsible for 625 or 24.2 per cent. There is little doubt that a number of the fires which started from 'unknown causes' amounting to 536 can be attributed to campers and travellers; so that it is fairly safe to say that 25 per cent. of all the fires caused in British Columbia last year were caused by the carelessness of people who should have the greatest interest in keeping the forests green."