

material forced into its pores. The effect is first to coagulate the albuminous matter in the wood, and thus retard its putrefaction; and secondly, to protect the fibre of the wood from air and moisture. The bituminous substance introduced into the pores, binds the fibres together, so that a piece of pine or fir is not only rendered more durable, but acquires great additional strength, and is proof against the attacks of insects, alternations of temperature, and exposure to wet and dry, and permits iron bolts or nails to remain in its substance for any length of time, unaffected by rust. For railway sleepers, Mr. Bethell's process is considered invaluable, as it enables the common woods to be used for the purpose, and gives them a durability which defies the ordinary attacks of atmospheric influences, extended over a very long period of time. The tanks which are used for this purpose on the Bristol and Exeter Railway, can prepare 20 loads of wood per day by this process.

Other substances besides pyrolignite of iron may be successfully used for coagulating the albumen, such as chloride of zinc, which was extensively employed by Burnet some years since, and is used, to a considerable extent, in the United States, for preserving cordage made from unrotted hemp. Chloride of zinc is extremely soluble, and may be used in a state of great dilution. It is now considered better than corrosive sublimate—the material employed by Mr. Kyan—from whose name the process, termed Kyanizing, derived its appellation.

Perhaps, the cheapest and the best mode of preserving wood in Canada will be found to be the following:—Let the timbers be placed in a drying chamber for a few hours, where they would be exposed to a temperature of about 200 degrees, so as to drive out all moisture, and by heat coagulate the albuminous substance, which is so productive of decay. Immediately upon being taken out of the drying chamber, they should be thrown into a tank containing crude petroleum. As the wood cools the air in the pores will contract, and the petroleum occupy the place it filled. Such is the extraordinary attraction shown by this substance for dry surfaces, that by the process, called capillary attraction, it would gradually find its way into the interior of the largest masses of timber, and effectually coat the walls of the cells and interstitial spaces. During the lapse of time, the petroleum would absorb oxygen, and become inspissated, and finally converted into a bituminous substance, which would effectually shield the wood from destruction by the ordinary processes of decay. The process commends itself on account of its cheapness. A drying chamber

might easily be constructed of sheet iron, properly strengthened, and petroleum is more abundant and accessible, and enduring than any other preservative which can be named.

Immediately after the pieces of timber have been taken out of the petroleum vat they should be sprinkled with wood ashes, in order that a coating of this substance may adhere to the surface, and carbonate of potash be absorbed to a small depth. The object of this is to render the surface incombustible, as it is well known that wood soaked in crude petroleum alone would become eminently combustible. Dusting with wood ashes until quite dry will destroy this property to a great extent.

The quantity of sap in a tree during different periods of the year was well shewn by Duhamel more than a century since.

It was found that pieces of oak of equal size cut from trees of the same diameter growing in similar soil, weighed as follows:—

340 lbs. in	.....	December.
340	"	January.
328	"	February.
331	"	March.
311	"	April.
319	"	May.
297	"	June.
297	"	July.
314	"	August.
306	"	September.
328	"	October.
331	"	November.

From which it appears that the quantity of sap in the oak is greatest in the winter months of December and January, and least in the summer months. Recent experiments upon other trees show that, generally, wood contains the greatest amount of moisture in winter and the least in summer.

Hard woods, by drying, lose about one-third of their weight; light woods from one-third to one-half, according to the nature of the soil on which they grow. Air dried wood loses about 20 per cent of its weight.

The condition of wood is greatly dependant upon the time when it is felled. The results of a series of experiments made in Germany show that December cut wood allows no water to pass through it longitudinally; January wood passed in forty-eight hours a few drops; February wood let two quarts of water through its interstitial spaces in 48 hours; March wood permitted the same to filter through in two hours and a half. Hence the reason why barrels made from wood cut in March and April are so leaky.

It has been remarked with reference to the principal cause of fermentation in wood—"always the forerunner of decay in timber—is the presence of