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SCIENTIFIC AMERICAN SUPPLEMENT

No. 788.

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THE HUDSON RIVER ICE HARVEST.

So far as thickness of ice is concerned, the crop this year is satisfactory; but the heavy snows that have occurred, accompanied by rain, have formed a thick and tenacious crust upon the surface of the ice, which it is difficult to remove; and the labor involved in the removal forms a serious item in the expense of harvesting.

The entire failure last year of the Hudson ice crop, and the slim supply of the previous year, had the effect to develop and establish in this city quite a number of mechanical ice works. These were able to supply the finest grades of ice to customers at prices but little in excess of those charged for natural ice. The artificial ice when properly made is superior to the native article. In the first place, the water for the artificial product is carefully filtered, and then the freezing is so arranged that clear, transparent, dense ice is produced, which looks better, in fact, is better—as it lasts longer—than the natural ice, the latter having more air locked in it than the artificial.

Again, many establishments which formerly made use of the cheaper grades, such as snow ice, for cooling purposes, having been for two seasons subjected to high prices, have put into use the mechanical refrigerating machines, by which storage cellars and chambers are kept sufficiently cool without the use of ice.

These circumstances have combined to diminish the demand for the natural ice and to render it necessary for the ice men to use more care than ever before to select, prepare and store the clearest and best ice, but at increased expense, as above indicated. The progress of inventive genius is well illustrated in the advances made in the artificial production of ice—advances which promise soon to supersede and beat the severest efforts of Dame Nature.

WOODEN RAILWAY TIES.

The Forestry Division of the United States Agricultural Department has recently made a thorough investigation as to the consumption of timber for railroad ties and the effect of such consumption upon the forestry interests of the country. The investigation included a discussion of the various methods in use for the preservation of tie timber as well as an exhaustive statement of the progress which has been made in substituting metal for ties of wood.

The results of this investigation are most interesting and valuable, as every phase of the subject has been fully covered. The consumption of timber for railroad uses is placed at twenty per cent of the total supply, and B. E. Fernow, chief of the Forestry Division, who superintended the gathering of the statistics, says that the tie timber is now largely composed of the thrifty young growth, the promise of the future, and thus the amount of timber produced to the acre is greatly reduced. The most durable and valuable timbers only are desired, and by subjecting forests to the thinning out process necessary to find desirable tie timber, they deteriorate. Mr. Fernow instances the case of Kentucky forests, where oak represents forty per cent of the natural growth after it has been culled—mostly for railroad purposes—the new growth contains not more than five per cent of this most valuable timber.

The destructive effects upon the forests of the present demand for tie timber is shown by the fact that this material is now largely cut from trees that will make only one tie, or, at least, only one tie from a cut.

The annual consumption of railroad ties is placed at 73,000,000, which requires 365,000,000 cu. ft. of raw material. Mr. Fernow states that the opinion generally held by railway managers that young wood is more desirable because it is young is erroneous. "On the contrary," he says, "young wood, which contains a large amount of albuminates, the food of the fungi, is more apt to decay, other things being equal. Sound, mature, well grown trees yield more durable timber than very young or very old trees."

It has been found that hewn ties will last from one to three years longer than sawn, and the explanation is given that the sawn face is more or less rough and collects the water and thus gives opportunity for fungus growth, while the smoother face of the hewn tie sheds the water. The life of tie timber, which is a most important factor in considering the relative advantages of wood and metal, is affected by the breaking of the wood fiber by the flange of the rail and by the spikes.

Another cause of the shortening of the life of the tie is rot or decay, due to a fungus growth. These elements of destruction are accelerated or retarded by the condition of the road bed. When the New York and New Haven Railroad a few years ago adopted stone ballast for their track, it was supposed that the life of the chestnut ties, which are used, would be greatly extended. It has been found, however, that with the high rate of speed of trains and weight of engines the ties don't last more than five years, the cutting of the rail on the upper and the stone on the lower side wearing them out rapidly. Ties are less liable to rot on stone ballasted roads, but even the oak ties which the Erie road uses are worn out on the heavily used portions of the road before they rot.

The following table shows the age of ties of different kinds of wood, and was made up from reports received from 283 railroad companies:

Kind.	Range.	Average.
Conifers:		
Redwood	8-15	11-12
Bald cypress	4-12	8-10
Red cedar	....	10
Tamarack	4-12	7- 8
White cedar	4-10	7
Pine, long leaf	5-10	6- 7
Pine, red and white	4- 8	6
Pine, bull (California)	6- 9	6- 7
Pine, bull (Colorado)	3- 6	5
Hemlock	2- 8	4- 6
Spruce	3- 7	5
Broad-leaved trees:		
White oaks	3-12	7- 8
Chestnut	4-12	7- 8
Honey locust	....	10
Coffee tree	7-10	....
Cherry, black walnut, locust, sassafras	6-10	7
Mulberry	5- 6	6
*Mesquite	....	....
Elm	4- 9	6- 7
Black oaks	2- 7	4- 5
Ash, beech, maple	2- 7	4

* The life of mesquite, if sound, is claimed to be interminable.

"The common spike, now almost exclusively in use," says Mr. Fernow, "must be considered the poorest and most unsatisfactory part of our railroad construction. Not only is a large part of the reduction in the life of railroad ties to be charged to these imperfect fastenings, but they are probably responsible for more damage to rails and rolling stock and for more accidents than is generally recognized. An improvement, therefore, in rail fastenings is decidedly needed."

It has been found that by the use of bed plates the life of ties can be greatly extended, as they give a more even distribution of rail pressure over a greater area of the tie, thus retarding the destruction of the tie by cutting, preventing the lateral bending of spikes or screws, and thereby loosening the rail. Mr. Fernow commends the bed plate designed by Mr. Post, the engineer of the Netherlands railroad.

While the attention of railroad managers has been directed to preventing the rapid destruction of the tie by mechanical processes, they have also adopted means to preserve it against rot. In France not a tie is put down without its being first subjected to a preserving process. The same practice prevails in Europe generally, though little use has so far been made of the process in this country.

As the rapid destruction of our forests is clearly shown in this report, as it has been elsewhere, the adoption of the best method of treating railroad building material so that the utmost service can be obtained from it becomes a vitally important factor in the question of forest preservation. Most of the processes now in use for preserving wood are based upon the idea of eliminating the sap of the wood, and substituting in part, at least, an antiseptic which is to keep out moisture and to make the germination of fungi impossible. The vulcanizing process has been in use on the elevated railroad lines in New York City for the past six years, and Col. Hain, the manager, says that yellow pine timber thus treated after six years shows no rot and hardly any wear by cutting, whereas untreated timber rapidly decayed. The vulcanizing process consists in subjecting unseasoned wood to dry air heated to from 400 to 600 deg. F., under pressure of 100 to 175 pounds per square inch, heat and pressure being regulated according to the nature of the timber and the result to be obtained.

Heavy oil of tar, commonly called creosote, and also the chloride of zinc are used for preserving timber. The latter process is called burnettizing, and it is claimed that by its use the life of a hemlock tie, which ordinarily is three years, can be extended to sixteen years.

Barometric Plants.

The *Petit Traité de Meteorologie Agricole,* by Mr. Cana, contains a list of prognostics *apropos* of the aspect that certain plants present according to the state of the atmosphere. The following are a few examples: If the head of the gith (*Nigalla sativa*) droops, it will be warm; if the head of the same plant stands upright, it will be cool; if the stalks of clover and other leguminous plants stand upright, there will be rain; if the leaf of the wood sorrel turns up, it is a sign of a storm; if the leaf of the whitlow grass slowly bends up, there will be a storm; if the flower of the convolvulus closes, it will rain; if the flower of the pimpernel closes, it will rain; if the flower of the hibiscus closes, it will rain; if the flower of the sorrel opens, it will be fine weather; if the flower of the same plant closes, it will rain; if the flowers of the carline thistle close, there will be a storm; if the flower of the lettuce expands, it will rain; if the flower of the small bindweed closes, look out for rain; if the flower of the pitcher plant turns upside down, it will rain; but, if it stands erect, it will be fine weather; if the flower of the cinque foil expands, there will be rain; but, if it closes, the weather will be fair; if the flowers of the African marigold close, it will rain; if the scales of the teasel became close pressed against each other, it will rain.