

The use of the cedar tie has varied greatly from year to year. In 1908, 1909, and 1910, cedar ties headed the list, although the numbers purchased showed decreases each year. In 1911 cedar ties formed only 10 per cent. of the total and fell back to fourth place on the list. In 1912 the use of this material increased by some 1,898,710 ties, and this wood moved up to second place on the list, forming 15.6 per cent. of the total.

Douglas fir has steadily increased in use since 1909, when data concerning its use were first obtained. Oak and the other five hardwoods—chestnut, beech, maple, birch, and elm—have also increased remarkably. There seems to be a tendency on the part of the management of older-established steam railways to reduce the use of soft, light material for cross-ties, especially where fast trains and heavy rolling stock are used. Some of the eastern roads have ceased to purchase cedar, pine, hemlock, and tamarack ties and use only the hardwoods. The use of imported hard pine has increased with the hardwoods, and that wood was used in making 3.1 per cent. of the ties purchased in 1912. Western larch formed 5.6 per cent. of the total number, over a million ties of this wood having been purchased.

The average value of ties, at the point of purchase, increased from 39 to 44 cents in 1912. Increases are noted in the case of jack pine, cedar, hemlock, tamarack, Eastern spruce, chestnut, beech, maple, white pine, birch, red pine, and elm. The increases in the values of beech, maple and birch were probably due to the fact that ties of these three materials were treated chemically in considerable numbers to prevent decay, and their cost materially increased on this account. The decreases were in the values of Douglas fir, oak, hard pine, and Western cedar. Western larch ties were purchased at the same price as in 1911.

The values in all cases, being based on the cost at the point of purchase, can never be considered to represent exactly the relative values of the different kinds of wood for cross-ties. So many variable factors enter into this cost that only in those cases where ties of a certain kind of wood are used in large numbers can the values be said to indicate the intrinsic value of the material.

Steam railways in 1912 reported the purchase of 20,825,209 ties, this number forming 97.7 per cent. of the total for all Canada. The total is an increase of 7,025,227 ties, or an increase of 50.9 per cent. over 1911.

Steam railways paid an average price of 44 cents for their ties as compared to 50 cents paid by the electric lines. The steam railways paid less for every kind of wood used by both classes, with the exception of Eastern spruce. These companies are usually closer to the source of supply, buy in greater quantities, and have better facilities for transporting their tie material than have the electric roads. The steam railways used all the ties purchased in Canada in 1912 of the following kinds of wood: Western larch, chestnut, beech, maple, birch, red pine, and balsam fir.

It is interesting to note the increased use of hardwoods by steam railway companies. In 1911, woods such as oak, chestnut, beech, maple, birch, elm, and black ash together formed only 1.8 per cent. of the ties purchased. In 1912 this percentage increased to 6.7 per cent. through increased purchases of 1,148,578 hardwood ties.

Electric railways in Canada reported having purchased 483,362 cross-ties in 1912. This is a decrease of 18 per cent. from 1911, and, where the purchases of these railways in 1911 amounted to over four per cent. of the total, they formed less than three per cent. in 1912. As

stated previously, the values of ties of every kind of wood used by both classes of roads were greater in the case of steam railways, with the single exception of Eastern spruce.

The greater part of the material used by these companies was of the softer, lighter woods. Coniferous woods formed together 99.4 per cent. of the total. The only hardwoods used were oak and elm and these together formed only 0.6 per cent. of the total. Imported hard pine, however, is used to a slight extent, and this material is, in reality, much harder than many of the native so-called hardwoods.

Decreases in the number of ties purchased by electric railways are noticeable in the case of cedar, Douglas fir, oak, and white pine; and these woods together form the bulk of the material used. Increases are seen in the use of hemlock, tamarack, jack pine, and Eastern spruce.

Ties of Western cedar, Western spruce, hard pine, and elm were reported for the first time in 1912. The use of red pine, and chestnut was not reported by electric roads in 1911. These companies used all the Western spruce ties reported in 1912.

Preservative Treatment.—Many Canadian railway companies are now beginning to realize the value of preserving at least a part of their tie material from decay and insect injury. The practice of chemical treatment of railway ties has been carried on by railways in the United States for some years with apparently satisfactory results.

The practice in Canada is just beginning, but is increasing rapidly with the increasing cost of tie material and the constantly decreasing supply. In 1910 practically no treated ties were used by Canadian railways. In 1911 some 206,209 ties received chemical treatment before being placed in the roadbed. This number, while forming only 1.4 per cent. of the total number of ties used, was, nevertheless, an indication of the increase in this particular form of conservation. In 1912 a total of 1,818,189 ties were chemically treated. This number forms 8.5 per cent. of the total number of ties purchased. Steam railways used 1,798,189 of these treated ties and electric roads used 20,000.

The treated ties were mostly hardwoods, as it has been found more economical to treat the heavier, stronger woods than those which are liable to fail from mechanical wear before they have time to decay. The greatest actual saving by preservative treatment is found in the use of the so-called "inferior woods," provided that these are properly protected from mechanical wear. Until the price of the durable woods becomes excessive, the railway companies will not resort to expensive treatment of inferior woods on account of this cost of protecting them from mechanical wear.

SERIOUS RIVER POLLUTION IN SCOTLAND.

During the recent drought the necessity of purifying some of the rivers in the Border district of Scotland was very obvious. In one short stretch of the River Ettrick, extending for about a quarter of a mile opposite the burgh of Selkirk, five spinning mills, four dyeworks and seven tweed-weaving factories were discharging waste liquids into the river or into a mill lade which in turn discharged into the river; while the burgh gas works stand on the edge of the mill lade. The river being very low these polluting materials were not carried away as is usually the case, and the result was an accumulation of the waste matters from all the works and the poisoning of large numbers of fish.