the holes to receive them should be countersunk. Many construct them with the blade full length of the plank. A platform of inch-boards held together by three cleats should be placed on the bars between the slabs.

The successful operation of a drag involves two principles which, when thoroughly understood and intelligently applied, makes road maintenance with this implement very simple. The first concerns the length and position of the hitch, while the second deals with the position of the driver on the drag. Each influences the other to a large extent, and a successful use of the drag is dependent upon an understanding of both of them. The distance from the drag at which the team is hitched affects the depth of the cutting. If your roadway is very badly rutted and full of holes it may be well to use the drag when the ground is slushy. Clay, when mixed with water and thoroughly worked, becomes remarkably tough and impervious to water. If compacted in this condition it becomes remarkably hard.

Another valuable result of dragging is the reduction of dust. If the surface is smoothed after each rain and the road dries hard and even, no edges are exposed to crushing, and the only dust which forms is that due to actual wear of the road surface. Conditions are so varied in different localities that it is quite impossible to lay down a general rule for the number of treatments needed to keep a road in good condition. For instance, a tough clay will resist the action of traffic for a longer period than a loam. Certain sections of a roadway will require more attention than others, because of steep grades or flat grades. The best guide for meeting these conditions is the knowledge and experience gained while dragging the roadway. There is one condition in which special treatment should be given—grades with persistent dragging becomes too high in the centre. To correct this it may be advisable to drag the earth away from the centre occasionally. Some of the advantages to be gained from the persistent use of the road drag are as follows: The maintenance of serviceable earth roads free from ruts and obtaining these conditions with expenditure of very little money, in comparison with money and labor required for other methods, and the reduction of mud in wet weather and of dust in dry weather. No municipality should be without a number of drags, so that they may be applied to their work on the roads whenever they are needed. It requires a little study of the nature of the ground and a little experience to determine the best time to use a drag after a rain storm. The shoulders along the side of the road should not be permitted to project above the general surface of the road, for they will prevent the water getting into the side drain, so that they should be cut down and made to conform to the road surface.

The berms, if any, between the grade and side ditches, should be kept smooth and free from weeds, brush or litter of any kind, so as not to interrupt the flow of water in the side ditches, water being the great enemy and destroyer of the earth road and good drainage the only remedy for it; that is to see that all water escapes from the foundation of the road through side ditches, culverts and outlets.

The split-log drag has come to stay; it will come more quickly if the men who actually work on the roads will investigate the claims of the split-log drags, and use them instead of graders for the maintenance of our roads. They will find that the drag and two horses will do more work, better work and so much cheaper work than the grader with four to eight horses and two to four men.

AIR SEASONING OF RAILWAY CROSS TIES.*

By A. H. Noyes.

THE successful handling of softwoods, particularly beech and gum, is a matter that is worthy of serious consideration. The ever-increasing shortage of oak timber of all species makes the adoption of softwoods a necessity, but the character of softwood timber requires careful handling to insure the delivery of sound timber to the treating plant, and thereby a serviceable tie to the consuming road.

Throughout the central section of the United States, and more particularly that part known as a tie-producing region, there is probably a larger acreage of beech and gum than any other tie material, pine excepted; beech being common in most of the bottoms and gum in the low lands, Missouri and Arkansas having thousands of acres of gum that will eventually come in for tie purposes.

Owing to the structure of the timber, beech ties are nearly always sawed, beech timber being too hard to hew, and on seasoning, get rough or scaly. On the other hand, gum timber hews easily and makes a smooth, pretty tie.

When gum or beech ties are produced tributary to a railroad, it is advisable that they be shipped into the treating plant as promptly as possible, after being made, and seasoned at the plant in preference to seasoning on the line of the road, as, in this event, the ties can be stacked for seasoning under more satisfactory conditions, and can be loaded for treatment at the proper time; in fact, the entire process kept under more complete supervision and control, than under other conditions and in this manner avoid the possibility of damaged timber reaching the treating plant.

It is an accepted fact that all ties, softwood ties especially, should be carefully piled, never on the ground, but on sound stringers, and either with spacing strips between layers, or that they be piled so that the faces do not have full bearing against each other, as experience has shown that ties piled close soon show damage.

Experience on river territories shows that it is not safe to buy softwood ties while the sap is up, no matter how carefully the ties are piled for proper seasoning, as transportation during the summer is not to be counted on with any amount of security and ties are liable to be damaged before they are loaded for shipment. Besides this, softwood ties piled on river landings are, in some cases, in deep shade, or, where in the open, are frequently surrounded with a rank growth of weeds, that tends to hold the moisture, creating conditions favorable to rapid damage. For this reason, the practice of buying softwood ties at small landings should be avoided, and ties should be hauled to only such landings, where they are handled in large quantities; where the timber will be exposed to sunlight and free air currents; where landings are free from weed growths and where shipments can be made by date rather than by appearance of the timber.

That softwood must and will be used for ties is positive, as the supply of oak is diminishing in quantity and accessibility. That beech and gum make a good tie, when properly handled and properly treated, is an accepted fact and with an available supply of softwood timber in easy reach of transportation, it is desirable that the question be given serious consideration and the methods and means

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