

tion through wear and tear. Recent tests have shown that large ties make the most stable roadbed, and the tendency of late years has been to increase their size, as it is feared that the enormously increased weight of engines and cars now requires a stronger piece of timber under the rails than the lighter equipment of the past. The idea that economy should be practised by using fewer ties to the rail length in view of the increased rigidity of the larger rails is decidedly negatived. This would mean a decrease of the bearing surface on the ballast, which would have the very opposite effect to what is desired, as it would mean a loss of stability. The effort to manufacture more ties by cutting them of a triangular shape, is unsatisfactory for the same reason. With the larger and stiffer rail a decrease in surface, if any is made, may well be on the upper side of the tie. A form of half-round tie is, therefore, suggested, with an upper surface of eight to twelve inches. It is probable that the increased stiffness of the rail will permit of a spacing, with a tie of the form proposed, very much greater than is possible with the form usually employed.

Ties are now being cut from trees of all diameters, from 9 inches upward. The influence which the new tie form will have upon the size of trees cut for tie purposes ought to be a marked one. It certainly would discourage the cutting of pole ties to a very considerable extent. It would not pay to make a tie out of a small tree, when by leaving it for a few years two ties could be made from the same tree. In other words, the present policy of cutting trees 11 or 12 inches in diameter would be found less profitable than cutting trees 16 or 17 inches in diameter. There is probably no other branch of the lumber industry in which so many small trees are annually destroyed, and the possible growth of forests retarded to such an extent as in the manufacture of ties. The practice of sawing ties from logs is going to be more and more prevalent as the old feeling that a sawed tie is not worth having disappears. The cutting of these trees will, moreover, make possible the use of large quantities of timber which now is practically wasted, and from which the lumberman has no return. This is particularly true of tops.

The subject of track fastenings is discussed in the remainder of the bulletin, because the writer believes that only with much modified systems of fastening can ties of most of the softer woods be made to last sufficiently long to pay for chemical treatment. With the present style of spike the soft wood tie does not hold with sufficient firmness to prevent undulations and creeping of the rail, which result in a more or less rapid wearing out of the tie. In driving the spike into the softer woods the fibres are broken to an unusual extent. As a result they do not withstand the lateral pressure of the rail, and consequently the spike hole