

The ties are subjected to vacuum in a cylinder and then the creosote is injected under a heavy pressure. The quantity of creosote used varies according to the density of the wood. For oak sleepers 14 lb. to 15 lb. of creosote per sleeper is used, while in the case of beech it is possible to inject from 45 lb. to 50 lb. per sleeper.

Naphthaline is considered beneficial, some of it being added to all creosote which lacks the standard proportion. A considerable discussion arose as to what proportion of naphthaline should be used. The practice of the Paris-Lyons and Mediterranean Railway Company was generally approved.

The Dutch Railways have used the zinc treatment for fifteen years, and have got a life of fifteen years for beech sleepers.

QUESTIONS OF MECHANICAL WEAR.

On the Paris-Lyons and Mediterranean Railway of France bed-plates give very satisfactory results, and reduce the wear of sleepers to a minimum.

The practice of the Great Western Railway of England is to bed the chairs and bolt them to the sleepers at the workshops prior to distribution to the platelayers or surfacemen. It is contended that this system is the best in use, as the large bearing-surface of the chair exceeds that given by the bed-plates; the latter are, of course, not useable on double-faced or a bull-head rail. In America bed-plates are largely used, especially at joints and for soft timbers. Experiments are being made with hardwood shims, pieces of hardwood taking the place of bed-plates. After several months' trial they have been reported on favourably; their general adoption is, however, highly improbable.

In Russia sand ballast only is used; in consequence of which the wear caused by the friction between the rail and sleeper is very destructive. The timber used is soft.

Conclusions of Congress.

1. The pickling of sleepers in order to lengthen their lives is to be generally recommended. The selection of the antiseptic and the method of performing the pickling operations depend on individual conditions.
2. Creosote seems to be the best preservative of sleepers. It has been successfully tried for a longer time than any other antiseptic, and the results have proved that a creosoted sleeper will last in main-line service many times as long as an untreated sleeper.
3. Either hard or soft woods may be used, the selection depending on local conditions.
4. Specifications must be exact, and great care should be exercised by the inspector before accepting sleepers for treatment. When accepted the sleepers should be piled at least 6 in. above the ground in open stacks in such a manner as to allow free access of air and light. The grounds surrounding the piles of sleepers should be kept clean and free from decaying matter.
5. The uncovering of sleepers by removing the ballast from the top surface does not appear to diminish the life of the wood even for untreated timber, and it has the advantage of enabling the track inspector to discover at once any defects in the track-fastenings, &c., and to apply a remedy. In some special cases, and especially in warm climates, it may be desirable to cover the timber with ballast.
6. It is of importance to combine rigid inspection in accepting sleepers with great care in the selection of ballast. The latter must be permeable, must be capable of being well packed and the packing well maintained, and give good adhesion between the sleeper and its seat. As far as this is concerned, the measures which are best for the preservation of the wood are also best for the stiffness of the track.
7. In order to prevent deterioration of the ballast, and at the same time help to preserve the sleepers, the careful drainage of the roadbed cannot be too carefully insisted upon, in order to insure that water may run off properly.
8. To prevent mechanical wear of the rails upon the sleepers it is of the utmost importance to fasten the rail to the sleeper in such a way as to prevent as much as possible all vertical, lateral, and horizontal movement between the two. The old American method of using spikes only will not suffice. Lag screws seem to be necessary to obtain satisfactory results.
9. It is only by keeping careful and accurate records of the numbers of sleepers treated, the manner in which they were treated, and where and when they were placed in the track, together with a record of when they were taken out of the track, that it is possible to determine whether any one particular treatment is giving satisfaction and is a good investment. Every railway management using treated sleepers is urged to have them all marked, preferably with dating-nails; and a careful system of records should be instituted at the earliest possible time.

Note.

No comparison can be made between the United States (including Canada) and the English systems for the reason that in the case of the former chairs are not used, and in the case of English lines they are used almost exclusively, the conditions being totally different. The American practice, especially on the best lines, conforms more closely to the New Zealand style. Hardwood sleepers, if procurable at a reasonable cost, are beyond doubt the most economical and satisfactory, failing which soft-wood creosoted sleepers make a very good substitute, but they are not so economical or suitable for use on curves or bridges.

Creosoting as done in New Zealand has given highly satisfactory results, and the methods employed are quite up to date. The chief drawback to creosoting in New Zealand is the cost of creosote, and it is highly desirable that its manufacture in New Zealand should be undertaken.

In view of Congress conclusion No. 2, which states that creosote seems to be the best preservative &c., it is satisfactory to know that it is the antiseptic which is exclusively used in New Zealand. The practice in New Zealand also accords with Congress conclusion No. 9.