only, the speed is kept down to about three miles an hour. The principal movement being only from stack to stack, no higher speed could be used to advantage.

The kind of power to be used in these movable plants is often a somewhat troublesome problem. Electric drive is by far the most reliable and satisfactory if it is available. In yards using electric switching locomotives and strung with trolley wires the application of electric power is easy, but where this is not to be had resort must be made to some other source of power, usually a self-contained gasoline engine of about 60 H. P. installed in the car with the machine. This gives satisfactory results, but requires more careful management than would be necessary with an electric motor.

The track arrangement in a yard already laid out is, perhaps, the most important factor in determining the comparative merits of the stationary and car mounting. The usual system, a three-rail track between the tie piles, would make it necessary for the trams to follow directly behind the machine car, a position which is not convenient for loading by the machine conveyor, as a right-angled change of direction must be made by the ties in their progress from the machine to the tram. At the Somerville plant the Santa Fe people have a temporary track 60 to 90 feet long which is placed between the tie pile and the three-rail track, and upon this the machine car is placed. One rail length after the other is moved forward and laid ahead of the car. This leaves the tram track clear, and trams can be brought up to the side of the machine car, allowing the conveyor to discharge the machined ties directly into them. On the feeding side the ties are thrown down from the top of the piles and placed directly on the in-feed conveyor, so that one handling is saved by the movable machine arrangement. This, however, is offset by the time lost in changing the position of the car. As an average it is probable that about one-third more ties can be put through the stationary machine in a day than through the movable plant.

The subject assigned to me by your program committee included the cost of installation of machines for adzing and boring ties, but this is a difficult thing to cover without definite specifications. It is more an engineering problem than a manufacturing one, as the conditions are not the same in any two cases. The cost of the machine itself may vary as much as $1,500.00, depending upon what is wanted in the number of boring spindles, the length of conveyors, and whether or not the machine is to be provided with cut-off saws, branding device, dumping hoist and other special features. The cost of the power plant may also vary between wide limits. A steam engine or boiler, or a gasoline engine, costing much more than an electric motor. The building may be sufficient to protect the machine only, or may be large enough to cover both tracks and give protection to the tie feeders and loaders. One machine in the South is placed upon a foundation of heavy creosoted timbers laid on top of the ground and is covered by an open shed. Another on the Pacific Coast is placed on the end of a dock of piling, eighteen feet above the ground, into which the piles are driven. It is all a question of the governing local conditions, and how much money the purchaser is willing to spend. Some plants have been installed complete for $10,000.00, and the cost of others has run as high as $15,000.00, but in the long run the most thorough work is the cheapest, the saving in operation and maintenance paying large interest on the additional cost.

Does adzing and boring pay? It is believed that the increase in life that may be expected from ties adzed and bored before treatment will not be less than one-third, but to be conservative we will consider that it is only 15 per cent., or say 21 months of added service. In the case of a railroad using 1,000,000 ties a year, costing when treated, delivered and put in track 85 cents each, the total saving in tie renewals will amount to something over $100,000.00 a year. In comparison with the cost of equipment, is this not worth while?

THE PRELIMINARY TREATMENT OF TIMBER TO INSURE A MORE EVEN AND SATISFACTORY IMPREGNATION WITH CREOSOTE,

By David Allerton.

I will premise by stating that my title does not exactly state what I have in mind. I cudgelled my brains, but could not arrive at anything better in the limited time at my command, which is only a few hours. I must also say that what I may suggest does not conflict with any existing method or process. It was brought forcibly to my attention last spring, although it has long been a subject of study with me—that is, to find a method by which the great disparity often noticed, and in fact usually observed, of the great difference in the receptivity of various ties or timbers in a given charge. Mr. Goltra, in his work, has shown graphically the various degrees of absorption in a charge of ties as usually treated; of course, there will always, under any condition, be a considerable variation in a charge of carefully selected and sound ties and the same where structural timbers are treated, but is there not possible some method of preliminary treatment by which, without impairing the strength of the wood, the structure of the ties or timbers can be rendered more homogenous, so that with a given amount of oil the penetration will be more uniform? I assume that wood of the same species or variety, where the difference in penetration is marked, often as we have all observed in different parts of the same piece, that portion or piece which takes the oil readily would not be changed in its quality of absorption, but that the more difficult structure could be rendered more susceptible to impregnation, assuming, for instance, in the case of ties with a given quantity of oil—say the usual amount; 2½ or 3 gallons per tie—much more even penetration.

Of course, heat is a necessity in any mode of procedure, and the proper temperature and regulation will undoubtedly be the most important factor in solving this problem, as it is well known that to get good results from hot oil with cold wood is impossible (bear in mind I am not speaking of soft pine or other soft woods that take treatment under any conditions). But here arises another question. Suppose oil is dropped on the cold wood at a temperature of 190°F. and the heat in the cylinder again raised to 180°, how far into that wood is the temperature 180 degrees. That, of course, depends on the diameter of the pieces. With large dimension timbers it is a very little ways, unless a long time has been consumed, and even then the centre of the wood is very much cooler than the outside. This is one reason why large timbers such as 12 inch by 12 inch, or 12 inch by 14 inch, are very hard to treat. Taking this into consideration, I think the next most important factor will be air in conjunction with the heat in current, or compressed moist or dry, and perhaps attenuated by more or less vacua, as the situation will be found to demand, and in all probability the process will be varied somewhat for different species.

I assume that all will agree that the better seasoned the great majority of wood is the easier and more satisfactorily it can be treated, therefore I also assume that a preliminary treatment can be found, and very likely some of you have discovered the means by which, with the necessary adjuncts to the treating cylinder, or in accessory and less expensive cylinders, by use of which valuable time can be saved and the wood can be prepared to accomplish the best results.