of train, a trainman may go over the running board if necessary to get on top of the train to extinguish fire or pass signals. If anything should develop on the engine requiring getting out on the running board to fix it, and such work cannot be deferred, the train must stop between stations to permit it to be done.

THURSDAY MORNING SESSION

October 6, 1932

Power Apparatus in Maintenance of Way Work

By LEM ADAMS

Engineer, Maintenance of Way, Union Pacific System

The speaker said in part: The maintenance of way employees on any railroad are constantly beset with hazards of accidents. When the motor car is set on the track for the day's work there is a potential hazard of being struck by a train, an automobile at a grade crossing, or another track car. Hence we surround them with innumerable rules and regulations to safeguard their movements.

Men in this branch of railroad service must constantly be on the alert to protect themselves. Their tools are watched closely for the smallest defect that might result in injury from particles of flying steel, and the very best steels and heat treating methods are used to provide tools that will be as nearly fool-proof as possible.

Yet with all these precautions, we still have accidents. Perhaps a rail is struck with a spike maul when a spike is not properly hit, or a sledge hammer fails when striking a track chisel in cutting a rail, and we have a cut or eye injury from flying steel, or an adze strikes a knot in a cross-tie when adzing for gauge and a foot is cut. Or perhaps a bar slips, or the trip gives way when operating a ratchet jack for spotting track, and we have a broken arm or other serious injury. These things are especially prevalent when large groups of men are working in a rail renewal or ballasting gang.

With such a picture before us, we maintainence of way men have for years been thinking in terms of machinery to do the more arduous and dangerous operations. Then, too, we were thinking in terms of efficiency, for safety and efficiency usually go hand in hand.

(The speaker then showed a score or more of lantern slides illustrating various types of power equipment employed in maintenance of way work.)

This set of equipment is one of our best safety agents. However, all power operated tools are unfortunately not the safest to use, although they are great labor savers. Some tools in this class are the power saw, the sandblast for cleaning surfaces preparatory to repainting, the power drill for either rail or bridge work, and many others—but efficiency and accuracy of work demand their use, and with proper care on the part of the operators they can be handled safely.

Planning for Safety in Track Construction

By FRANK R. BRADFORD

Director of Safety & Fire Prevention, Boston & Main Railroad

The speaker said in part: My object in being here is to show you a picture illustrating one of the modern methods of main line rail renewal. The operation, which is notable in many respects, is the outcome of the idea that the old established methods of rail renewal were no longer justified from the standpoint of economy, advantage of the operating department, or safety to the maintenance of men.

In the year 1924, there were approximately 26 reportable injuries per million man-hours in our maintenance of way department, and succeeding years showed an almost constant increase, reaching the peak of nearly 34 per million man-hours in the year 1928. Toward the end of that peak year we set up the proposition that safety, efficiency and economy were interdependent and especially that safety was the end product or the result of the correct performance of the job. The foreman being the keyman in this correct performance, the need of re-instructing him in his responsibilities immediately became apparent. This was done through the medium of so-called foremen's meetings conducted at first monthly or bi-monthly, but now quarterly or somewhat less often, with the division engineer or the district track supervisor presiding.

At these meetings all phases of maintenance of way work are freely discussed, with particular stress on the correct way to do the individual job. Safety, as such, is seldom mentioned at these meetings, but we carry on a running record of every personal injury accident that occurs in a department without regard to the extent of injury, classified by the work being performed, the material being handled or worked and the tools or appliances being used, which is the basis of discussion tending to indicate the result of all methods and to develop better and safer workmanship as well as more efficient tools, equipment and operation.

These foremen's meetings are working toward the standardization of practices and procedure which not only is producing many beneficial results in efficiency and economy, but have reduced the frequency of all personal injury accidents nearly 90 per cent in the last three years. The I. C. C. casualty rate in the engineering department has dropped from 33.69 to 2.45 casualties per million man-hours in the same period.

Rail removal on the Boston & Maine involves the laying of rails 39 feet in length, weighing 130 pounds to the yard, each rail totaling 1,690 pounds: fully plated track, which means two canted tie plates per tie, each plate weighing 15½ pounds and measuring 8 x 12 inches; 9 rail anchors per rail, and rail joints weighing 145 pounds each, with four bolts per joint. With an average force of 133 men actually engaged in the laying, the average number of rails laid per day during twelve working days was 583, equivalent to approximately 22,700 lineal feet. *On the basis of 8½ hours of working time, this was quivalent to laying a* rail approximately every 53 seconds. The best single day's performance was 734 rails laid in 9½ hours of actual working time, which is equivalent to a rail approximately every 44 seconds.

From the safety standpoint, a record was set up which will be difficult to surpass. During the entire job there was no reportable accident, no lost-time accident, and only two very trivial injuries.

Whenever a special job of any considerable magnitude such as this one is to be done, it has become the regular practice to call a special meeting of the foremen and supervisors who are to carry out the work. The whole program as set up by the engineer's chart is outlined: the various parts of the work are assigned to specific foremen and crews and each particular assignment is thoroughly discussed as to necessary equipment, methods, allocation of men, inherent hazards, special precautions; in fact, everything is gone over that experience on previous work of a similar nature has taught.

Following the meeting, each foreman, and usually his supervisor as well, inspects all tools and appliances that are to be used on the job to make certain that they are in perfect order, and talks over with his men the particular part of the project they are to undertake. Though the men have perhaps never before used the machines that perform the special class of work to which they are assigned, these discussions, followed by the work itself, soon make them specialists on their part of the job.

In all these preliminary discussions, it would be difficult to separate or identify