

better than some used only six months. Taking up general principles another speaker mentioned the stresses to which axles are subjected. Alternating stresses, even within the elastic limit, will eventually lead to "detailed cracks." These may start after the axle has been in use for some time. In heat-treated parts, hair-line cracks are often developed by the heat treatment. These may be too small for detection by the microscope. By supporting the axle on its journals and dropping a weight of perhaps 1000 lb. on the center from a height of a foot or two defects can be made visible. Mr. Rockwell stated that it is difficult to classify the many causes of axle failure. Usually the axle breaks against the gear, and in one case an axle broke at the center of a solid gear.

The last topic of discussion was the jitney bus. W. A. Heindle said that in Chester, where there are seventy-six or more jitneys, the experience is serious. In one case a truck used during most of the day for ice delivery takes thirty to forty men to and from work. Jitney riding is a popular diversion. The traffic is controlled by saloonkeepers, aldermen and others with political influence. President Tingley gave data as to the effect of the jitney upon railway revenues in a number of Western cities. He demonstrated the congestion which would result if the people depended entirely upon the jitney, reminding the audience of the slogan, "Who pays the bills the jitney kills?"

Another speaker considered "jitneyitis" a disease not yet correctly diagnosed. An important question for the railways is this: "Is the jitney bus a true step in the solution of the transportation problem?" If it is, the railways must take a different attitude from that of the past. The immediate problem is one of regulation in two parts: liability and taxation.

Indemnity to cover jitney liability involves an attorney's task to determine the form of bond, and it is a serious question as to how the insurance companies are to take care of it. The electric railways are paying about 10 per cent of their gross income for the privilege of doing business, about \$20 per seat. At the same rate a five-passenger car should pay \$100 per annum.

Mr. Rockwell said that he does not fear the jitney as public sentiment is turning against them and it is almost a disgrace to be seen in one. The experience of the Fifth Avenue bus line in New York City shows that bus service at a 5-cent fare is impracticable. The jitney need not be feared unless it steals its right-of-way. The jitney is a common carrier and must be compelled to obey the laws relating to such.

R. P. Stevens, president Mahoning & Shenango Railway & Light Company, stated that the jitney is a menace to the street railway. The direct or indirect interest of alderman in the bus business, in his territory, made it difficult to get suitable legislation. Vigorous advertising resulted in the passing of a satisfactory ordinance. He thought it might be well for the railways to go into the jitney business. His company met the situation by doubling up service during rush hours and decreasing it at other times, with the result that aldermen were impressed with the fact that the jitney does curtail electric railway receipts.

The first of a series of educational addresses which are to be delivered to employees of the Louisville Railway Company was made before an audience of 500 employees in the chapel of the company at the central offices by H. C. DeCamp, representative of the Westinghouse Electric Company. Mr. DeCamp spoke on modern electrical apparatus and on advanced methods for insurance of safety, speaking to two different groups of operatives. The night men heard the lecture in the morning and the day men attended in the evening.

Heavy Electric Traction Discussion

At Chicago Meeting New Features of St. Paul Electric Locomotives Were Described

Three interesting addresses on the mechanical and electrical characteristics of the modern electric locomotive were presented at a meeting of the Chicago section of the American Society of Mechanical Engineers on May 14. A. F. Batchelder, chief engineer locomotive department, General Electric Company, presented a number of views; Dr. W. F. M. Goss, past-president of the society and chief engineer of the committee investigating smoke abatement and electrification of Chicago railway terminals, contributed a paper which dwelt on the significance of mechanical engineering in the designs of electric locomotives, and A. H. Armstrong, General Electric Company, discussed the electrical engineering problems of locomotive designs and the reason for the present methods of rating them.

Mr. Armstrong said that at first continuous rating of motors on street and interurban cars was unimportant because of light loads and frequent stops. On the other hand steam road electrification and heavy freight haulage on some of the electric lines had made the continuous rating of motors of vital importance. He then referred to the recent order from the Chicago, Milwaukee & St. Paul Railroad and said that the locomotives for this line would have an output of 3200 hp and a tractive effort of 72,000 lb. at 15¾ m.p.h. This surpassed the best modern steam locomotive. Mr. Armstrong also stated that the "bogie" guiding trucks were introduced because the Chicago, Milwaukee & St. Paul locomotives were designed for both passenger and freight service. All parts of the passenger and freight locomotives are identical except the gear ratio. This should result in reducing the cost of locomotive maintenance to a minimum. These locomotives are also arranged so that they may be split at the articulated joint, and it is possible, Mr. Armstrong remarked, that the halves will be used in switching service.

Mr. Armstrong then took up the advantages of electric braking by stating that his company anticipated that a very considerable proportion of all of the energy taken from the line on the up-grade would be returned to it on the down-grade. The benefit of electric braking, however, was not obtained so much in the power returned to the line as in more efficient braking. Electric braking eliminated the danger incidental to automatic air braking because car wheels were not heated and brakeshoes were not broken. Regarding the efficiency of modern electric locomotives, Mr. Armstrong stated that the New York Central locomotives were from 93 per cent to 94 per cent efficient. This was high because there were no losses in transmission through gears. The Chicago, Milwaukee & St. Paul could not use the gearless type of locomotives, however, because of the heavy grades. This would reduce their efficiency to approximately 84 per cent.

Regarding progress on this electrification, Mr. Armstrong said that the overhead on the first engine division of 113 miles between Three Forks and Deerlodge was complete and that on the second engine division was well under way. He also stated that twin-conductor trolley wires suspended from alternate hangers would be used on this electrification to eliminate the detrimental effect of sparking at the hangers. In this connection a new type of current collector is being designed for these locomotives and will include a rocker arm with two contact pans. The combination of this current collector and the twin conductors will, it is believed, eliminate all difficulties experienced in collecting current.