

# Electric Railways

## Engineers See End of Steam Railways — Electrification of the Mountain Division of the Chicago, Milwaukee & St. Paul Railway Proves the Great Advantage of Electric Power

By A. J. Marshall

Considerable interest has been evidenced recently in the highly successful experiment of the Chicago, Milwaukee & St. Paul Railway in the substitution of electric locomotives for the familiar steam type. Four months of experimenting in the operation of these powerful electric locomotives over one of the most difficult stretches of the Rocky Mountains, has convinced doubting engineers that electricity as a motive force must supersede steam wherever water power is available for generating current at a low cost.

The great experiment was begun on December 9th last, when the fast continental train, the Olympian, was taken from Butte, Mont., to Piedmont. A month later the steam freight locomotives were entirely removed from the electrified division. The mileage of the electric trains for 24 hours is 200 as against 114 by steam engines, and 24 heavy locomotives have been released by the substitution of nine electric locomotives, the work being cheaper and more efficiently performed.

The electric equipment on the St. Paul had a very severe test during the past winter, which, because of the deep snow and extreme cold, was one of the worst in the history of Montana. Electric operation during this period was conspicuous for reliability and freedom from trouble. Two advantages of the new system became especially prominent. One was the superiority of an electric locomotive over steam in very cold weather, as it operates better at low temperature than it does in warm weather. The other was the saving accomplished by electric braking on the steep grades.

The St. Paul is the first road to introduce electric braking with the direct current locomotive, and it has shown great operating benefit. When the motors are driven mechanically, as when a heavy train pushes the locomotive down grade they act as a brake and convert this power into electricity, which becomes available through the trolley system for the up-grade haul.

Aside from the economies resulting from electric braking, which are a possible saving of 50 per cent. of the total power demand, the elimination of the brake shoe and wheel wear, and the easier operation on the track, particularly when rounding curves, the greatest advantage resulting from the use of electric brakes lies in the elimination of the difficulty attending the use of air brakes in holding back long, heavy trains when descending mountain grades. The electric brakes entirely relieve the air brakes except for the stopping of trains, or for emergency use. They provide a duplicate braking system, each one capable of holding a train on a down grade. Under air braking, even on a 2 per cent. grade, it frequently happens that brake shoes become red hot and wheel rims greatly overheated, as practically all of the potential energy stored in the train at the top of the

mountain grade must be dissipated as heat in the brake shoes and wheels during the descent.

Gradually but surely electricity is superseding other forms of power, and it is likely that the day will come when electricity will be universally employed to the exclusion of all other forms of energy. Electricity has made good wherever it has been properly employed, and each day sees it making new and permanent conquests.

The characteristics of the electric automobile are not dissimilar to those of the electric features of the familiar street car or the more recent electrically operated railroad train, for the electric vehicle employs substantially the same equipment, only on a smaller scale, thus sharing in the high degree of perfection that electrical apparatus has acquired through study, research, and scientific standardization. It is interesting to realize when reading of the epoch-making accomplishments of the St. Paul's electrification that, the modern electric passenger and commercial vehicle possess all the virtues now so generally recognized by engineers in their study of the new electric railway. Furthermore, the electric vehicle, in a non-spectacular and unassuming way, has been gradually but surely gaining recognition by meritorious performance in all classes of city and suburban transportation. The low cost of current which is constantly decreasing with increasing demand, together with the electric's long life and the infrequency of repairs, places the electric vehicle in the front ranks of modern economic conveyors of passengers and merchandise.

## Safety First in Winnipeg—A Letter Which Indicates How the Street Railway Company and the Schools Co-operate

Dr. D. McIntyre, Superintendent of Schools, Winnipeg:

Dear Sir,—Winnipeg Electric Railway Co. is endeavoring to prevent accidents to the general public and its own employees, and a strong "Safety First" committee, composed of men who have been 10 years or more in the company's service, has been formed. These men are pledged to do everything in their power to prevent accidents.

In this connection we wish to solicit your co-operation and the co-operation of your staff of school teachers in an endeavor to prevent accidents to children in this city. Where the teachers in other cities have taken this matter up splendid results have been obtained and in some places I am told accidents to children are almost entirely unknown.

Almost daily our motormen and conductors are obliged to warn school children not to play around street cars and not to hang on to the cars.

We enclose a sheet giving particulars of three instances where children were injured on our system, and would greatly appreciate it if you would take the matter up with the teachers and impress upon them the fact that it is in their power to greatly assist us in our endeavor to prevent accidents of this character. We would like them to point out to the children in their charge the fact that accidents to small boys and girls are nearly always caused by these small children trying to imitate the larger ones, and would like them