

couple them several times each day. This method of operation is still pursued, and at present the motor cars are laid up during the greater part of the twenty-four hours. Upon the arrival of the next hundred trailers, however, it will be necessary for us to uncouple the trains in order to have the use of the motors during the day.

The first, and probably the greatest, advantage in operating trailers is in the cost of equipment. It will readily be seen that the elimination of motors and other electrical equipment from the car greatly reduces the cost of the equipment necessary to move rush-hour traffic, and the investment in idle equipment is smaller in proportion.

A second advantage is the carrying capacity of the trailer. In our case it is about twice that of the motor car. Seating seventy-two, while the motor seats but thirty-eight, the arrangement of seats noted earlier in this paper gives the trailer a standing area even larger in proportion than the similar area in the motor car. Thus, while the seating capacity of one of our trains is 110 passengers, we have carried over 350 passengers on a rush-hour trip, and it is not unusual to find 200 passengers on one trailer.

Another advantage is the reduction in operating costs made possible. The heavy extra loads just mentioned require the addition of only one man to a crew to handle, the trailer being in charge of one conductor and the train manned by the regular crew.

All the cars on the system of the Cleveland Railway are equipped with fare-boxes, and most of them are operated on the pay-enter plan. When the trailers were adopted it was intended to operate them also as pay-enter cars, but on account of the single-entrance and no-platform features it was found that loading took too much time and the method was changed so as to utilize the rear half of the trail car as a loading platform. Passengers boarding the trailer pay their fare as they go past the fare-box to the front end of the car, or if they go to the rear of the car, they do not pay their fare until leaving the car. In this manner about half of each load pays fare on the pay-enter plan and the other half on the pay-leave plan. This method has proved very satisfactory, and little confusion resulted from the change in method, even when first put into effect.

We did experience a great deal of trouble for a time on account of the slowness of trains in getting over the line when mixed with single cars. It developed, however, that the slowness of operation was due rather to the inexperience of the platform men than to the number of passengers carried on the trains, and, after six months' operation, we find that the amount of time necessary to operate a train over a given line is but little more than the amount required for a single car on the same line. The difference is so small in comparison to the amount of money saved in equipment and in the number of trainmen worked as to be negligible. In making up our schedules we arrange all runs so that both motormen and conductors can act as conductors on trailers during the rush hours. This, of course, requires fewer men to operate our schedules with any given number of cars than would be required if each car must be operated by two men. We find, also, that our runs can be arranged to better advantage by this method.

The train signal system between conductors and motormen is giving us some little trouble, trains being delayed for signals and slow in getting away from stops. Under our rules, even though a motorman receives his bell signal from the conductor, he should not start his car until he receives the signal light in the vestibule, indicating that all doors on the train are closed. Our present equipment being overtaxed in the rush hours, it often happens that passengers, attempting to crowd their way into cars already filled, stand in the doorways and prevent doors from closing. The conductor, busy at the fare-box, is unable to get to the door to get the passengers off the step. So it has been necessary

to station inspectors at some points to clear the steps so that doors may be closed and the train properly started. We believe that this trouble would entirely disappear if we were operating sufficient cars to take care of the traffic and to prevent passengers from gathering in such large numbers.

The distribution of equipment, ever important, is especially vital to the success of trailer operation. We have not yet been able to work this out to the best advantage because of the mixing of single cars with trains, already referred to, but are hopeful that with the second hundred trailers a better adjustment can be made.

Little trouble has been given us at switches on account of operating trailers. Some motormen in their endeavor to keep their trains on time accelerate their motors too quickly when passing over switches, not waiting until the rear truck of the trailer has cleared the switch before they attain the maximum speed of their motors.

The operation of trailers in connection with peak-load city service depends entirely upon the peculiar local condition of the particular city service to which the trailer is to be adapted, and I have thought best to give you merely our experience without attempting the broad application of that experience. But I would say this much—as a personal opinion—I feel that the trail car is suitable only for peak loads, and they must be real peaks. A four-minute headway is the minimum which I consider warrants trailer operation.

AMERICAN SOCIETY OF CIVIL ENGINEERS' CONVENTION AT OTTAWA.

Preliminary arrangements have been made for the forty-fifth annual convention of the American Society of Civil Engineers at Ottawa, Ont., June 17th to 20th, 1913. Charles H. Rust, city engineer of Victoria, B.C., is chairman of the Committee of Arrangements of the Board of Direction. Charles Warren Hunt, secretary of the American Society of Civil Engineers, and Henry W. Hodge are the other members of this committee.

The following are members of the local committee:—

Charles H. Keefer, chairman; S. J. Chapleau, C. R. F. Coutlee, A. A. Dufresne, G. H. Duggan, Sir Sandford Fleming, H. Holgate, J. A. Jamieson, Phelps Johnson, T. C. Keefer, C. H. Mitchell, W. F. Tye, G. W. Volckman.

Most of the members who expect to attend the convention will be in Ottawa by Tuesday morning, June 17th, and in the afternoon will be tendered a reception by the Ottawa city officials. In the evening there will be an informal reception, with dancing, so that members of the party can become acquainted. At ten o'clock Wednesday morning, June 18th, the president will deliver the annual address, at the termination of which the business meeting will convene.

The local committee is arranging for various meetings and excursions. It is expected that there will be two evening lantern slide lectures, descriptive of engineering work in Canada; several excursions to points of local interest; a garden party; golfing at the Royal Ottawa Golf Club links, etc. A reception will be tendered by the Canadian Society of Civil Engineers to the visiting members of the American Society.

The entire programme is subject to change, excepting the time for the president's address and the business meeting. The headquarters of the convention will be the Chateau Laurier.

The expenditure on the harbor and railways in the South African Union for the ensuing year is estimated at £13,774,550, which is an increase of nearly £300,000 on the previous year. This is exclusive of capital expenditure in respect of the construction of new railways.