

circuits the motors upon one another in reverse, and results in one taking up the function of a generator and driving the other in the opposite direction. All these three electric emergency brakes tend to bring up the motors suddenly and skid the wheels. They are uncertain in action, and destructive to the equipment, and should only be brought into use when all other methods available for stopping the car have failed.

Brakes in use at Auckland.

The brakes on the cars of the Auckland tramway system are the hand-applied wheel-brake, which is used for all service stops, and the Spencer track-brake, which is applied as a steadying brake when descending gradients. Motormen are also instructed in the use of No. 2 and No. 3 electric emergency brakes.

Two cars, Nos. 75 and 48, have been equipped with pneumatic wheel-brakes. These cars have been in service for about twelve months.

Brakes in use at other centres.

On the Wellington and on the Dunedin systems the cars are fitted with the hand-applied wheel-brake, and the Newell electro-magnetic combined track and wheel brake.

On the Christchurch tramways the hand-applied wheel-brake and the pneumatic wheel-brake are installed upon all the electric cars, and the second and third electric emergency brakes are available.

PROCEEDINGS AT AUCKLAND.

The Commissioners held their first sitting at Auckland on the 18th April, 1910, when it was stated on behalf of the Auckland Tramway Company that the company was prepared to equip the whole of its rolling-stock with pneumatic wheel-brakes, in addition to the existing hand and track brakes, but objected to the adoption of an electro-magnetic track and wheel brake recommended by a previous Commission, on the grounds that this brake was unsuitable for use in hilly districts, and also that its application would necessitate the complete reconstruction of the running and electric gear of the cars. Evidence was led to support these contentions.

The representative of the Auckland Tramways Employees' Union produced evidence with a view of showing that the pneumatic wheel-brake was reliable at all speeds and under all conditions, whilst the electro-magnetic brake was liable to failure, especially at high velocities.

Evidence was also led to the effect that the existing hand-brake equipment was insufficient, and entailed very severe stress on the motormen.

The Commissioners investigated the condition and working of the existing brake gear, and carried out tests of the pneumatic wheel-brake equipment of car No. 75.

Car fails to stop.

As a preliminary, this car was taken over the most severe gradients on the system, and stops attempted on College Hill (grade, 1 in 11·74) and Parnell Rise (grade, 1 in 8·77), but it was found that, whilst stops could just be made on College Hill with either track or air brake, on Parnell Rise neither of the brakes could arrest the car, although the rail was in good condition.

Car weighed.

In order that the mass dealt with might be accurately known, the Commissioners had decided not to accept manufacturers' weights, but to accurately weigh all cars experimented on; and on car No. 75 being placed on the scales it was found to weigh no less than 52 per cent. in excess of the previously stated weight.

Auckland cars underbraked.

Further, it was found that with the hardest possible application it was not possible to carry more than 26 per cent. of the weight of the loaded car upon the slippers of the track-brake. The combined errors of underestimation of the weight of the cars, and overestimation of the mechanical advantage of the brake gear (the efficiency of which, according to the drawings supplied, had been taken at unity),