The true retardation is from this moment greater than that calculated from either observation.

It may readily be computed; but since the distance travelled from the point of observation of danger is an essential factor in the estimation of an emergency stop, and the promptness of action of the brake is involved, all retardations have been calculated from the length of stop alone.

The retardations effected have been stated in feet per second^2. This method renders stops made on different grades directly comparable, and the corresponding length of stop on the level can be calculated therefrom. A table (Appendix I, Table I) is provided to facilitate such conversion.

Tests at Auckland.

In all, eighty-five stops were made, with the following results:—

(a.) *With the Mechanical Track-brake alone.*

Three stops down Parnell Rise (grade, 1 in 8·77), with a mean total retardation of 4·49 feet per second^2. (Appendix I, Table 2.)

Six stops on College Hill (grade, 1 in 11·74), with a mean total retardation of 3·79 feet per second^2. (Appendix I, Table 3.)

Five stops down Wellesley Street East (grade, 1 in 14·19), with a mean total retardation of 3·80 feet per second^2. (Appendix I, Table 4.)

(b.) *With the Pneumatic Wheel-brake alone.*

Ten stops down Parnell Rise (grade, 1 in 8·77), with a mean total retardation of 4·82 feet per second^2. (Appendix I, Table 5.)

Eight stops down College Hill (grade, 1 in 11·74), with a mean total retardation of 4·31 feet per second^2. (Appendix I, Table 6.)

Seven stops down Wellesley Street East (grade 1 in 14·19), with a mean total retardation of 4·27 feet per second^2. (Appendix I, Table 7.)

Six stops various gradients; mean total retardation, 3·85 feet per second^2. (Appendix I, Table 8.)

(c.) *With Hand Wheel-brake and Mechanical Track-brake.*

Five stops were made down Wellesley Street East (grade, 1 in 14·19), with a mean total retardation of 3·06 feet per second^2. (Appendix I, Table 9.)

(d.) *With Pneumatic Wheel-brake and Mechanical Track-brake.*

Seven stops down Parnell Rise (grade, 1 in 8·77), with a mean total retardation of 6·14 feet per second^2. (Appendix I, Table 10.)

Ten stops were made down College Hill (grade, 1 in 11·74), with a mean total retardation of 5·53 feet per second^2. (Appendix I, Table 11.)

Fourteen stops down Wellesley Street East (grade, 1 in 14·19), with a mean total retardation of 5·42 feet per second^2. (Appendix I, Tables 12 and 13.)

Experiments at Wellington.

The experiments at Wellington were confined to testing the behaviour of the magnetic brake when "coasting," and making stops from the higher velocities.

The behaviour of the brake when "coasting" on the Brooklyn grade (1 in 12), and when making stops from speeds below eighteen miles per hour, was satisfactory, and the stops were exceedingly good; but above the speed of nineteen miles per hour the current flashed round the commutators, inducing skidding and lurching, with uncertain stops. The commutators were found on inspection at the conclusion of the run to be badly burnt at the edges.

Tests at Christchurch.

Pneumatic brake.

At Christchurch eighteen emergency stops were made with the pneumatic wheel-brake fitted on car No. 9. The grade was practically level, being 1 in 2,200 down. The rail was muddy. The mean total retardation obtained was 3·96 ft. per second^2. (Appendix I, Table 14.)