

MATTHEW CABLE SWORN.

Examined by Mr. O'Shea: I am Electrical Assistant Engineer to the Wellington Corporation Tramways, and am an Associate of the Electrical Engineers' Institute. I have had eighteen and a half years' engineering experience. I entered Siemens's over eleven years ago, and was there two and a half years. I have had opportunities of inquiring into the working of the London and other large tramway systems, and have made it my business to make myself familiar with them. I am familiar with the working of the London County, Manchester, Bury, Glasgow, Dundee, and other systems. The Glasgow Corporation, London County, London United, and Manchester systems use magnetic brakes, though there are a few air brakes in Manchester. In the *Light Railway and Tramway Journal* of June, 1909, there is a statement that Mr. Fell, Electrical Engineer to the London County Council, has ordered a further 200 brakes. The magnetic is a service brake in London and Manchester, and on steep grades. In London the hand-brake is only used as an emergency. In the *Light Railways Report* (page 829) there is a summary of the advantages and disadvantages of the magnetic brake. An ordinarily careful man can make himself sufficiently skilful to apply the magnetic brake efficiently. There is a slight tendency to skid, but any kind of brake will skid the wheels. There is a corresponding advantage, that it is not dependent on the current. It is independent of the controller. The mechanism can only be adjusted by skilled labour, and there is a slight tendency to increased temperature; but this has never been increased to such an extent as to render the motor inefficient. I have never known a case where the brake has become ineffective owing to heat if the motorman uses the brake with care. At page 830 of the *Light Railways Report* it is stated that the magnetic brake is suitable where a high-speed is required and where there are frequent stops. It is also stated there that a retardation of 9 ft. per second per second can be obtained. In some instances the earning-capacity of the line will not warrant the expense of putting in the magnetic brake. My opinion of the magnetic brake is that for the conditions existing in Wellington it is the most suitable type of brake obtainable on the market, and that it is the most powerful brake. I have known of alleged failures and also of failures owing to slight defects taking place. During the last three years there have been only about four failures, and these were due to other causes than a defective brake. I know of several cases where good stops have been made by the magnetic brake and serious accidents averted, and it is necessary to have a powerful brake like this in Wellington. My opinion of the magnetic brake on the Brooklyn line is that it meets all the requirements for coasting down, as it is possible to pull the car up at the second notch. The Brooklyn accident was investigated by experts from the Corporation Tramways and the Public Works Department, and the conclusion they came to in respect of that accident was that they considered the magnetic brake was in good order, all the undergear having been dismantled. In my opinion the cause of the accident was that the motorman overran the points on a loop, and, finding another car on the line, reversed the controller and allowed the other car to pass, his own car then running down by gravity. Owing to the motorman's failure to put the controller back again, when the brake was applied it was found that it was useless. As to the collision in Cuba Street, Mr. Buckley and Mr. Holmes held an inquiry into that, and they both reported that the brakes were in perfect order after the accident. The hand-brake was in exceptionally good order. This is also my opinion, as I was present when the car reached the shed, and I ascertained that there was no interference with the mechanism of the brake. With reference to the accident at Swinton, referred to in Auckland, I was residing there at the time, and am well acquainted with the facts. The car was a new one, and was sent out before the brakes were properly adjusted. It was afterwards found that the braking-gear did not make a proper connection with the wheels, and the evidence clearly points to the fact that it was simply due to the mechanical portion of the brake, and that the traffic manager was aware that the car was not in perfect order. Our practice of inspection and examination in Wellington is sufficient to prevent any such accident occurring, where every night the cars are cleaned and the controllers and equipment examined. If any complaint is made about a car it is taken to the shed and examined carefully in every part. Accidents which have occurred in Wellington have not been due to the failure of the magnetic brake, except the Brooklyn accident, which I understand was due to improper handling of the controller. Originally the magnetic brake was installed in the United States, but it was discarded in favour of the air brake, and, as Mr. Fell has pointed out, the Americans have never tried the latest type of magnetic brake, which is far in advance of the old type. The magnetic brake can be applied to trailers, but it is not satisfactory, the air brake being especially suitable for this purpose. There are eighty-one cars in Wellington, but no trailers. According to our regulations, motormen are allowed to use the magnetic as a service brake as well as an emergency brake. The advantage of this is that the man using it for service stops knows exactly what to do in case of emergency. There have been allegations that the magnetic brake is largely a failure, and goes out of operation suddenly; but there have been no serious breakdowns of the magnetic beyond those mentioned. As to the heating of motors and its effect generally on the braking system, some cars which have been running on steep gradients come back to the shed in practically no warmer condition than a car running on the flat, as some motormen study the cars and others abuse them. We have no instance of the brake becoming defective through such ill-usage. I consider that, under the circumstances in which the Wellington tramways are run, and taking the speeds and narrow streets into consideration, this city has a low rate of accidents. The most serious accidents are due to people falling off or stepping on the car when in motion. The magnetic brake can be safely applied up to twenty-five miles an hour on the flat independently of a hand-brake, this having been done by me with a speed-indicator. My car was in good condition, and the commutators were clean. Mr. Kneeshaw's statement of Mr. Brain's article is generally commendatory of the magnetic brake. The effect of putting another additional brake into our system would probably confuse the motor-