was enlarged, for, whilst the substance increased as the square, the resistance decreasing in the same proportion, the surface on which induction depended only increased in regular proportion. Supposing four cables were employed as one conductor, although there would be only one-fourth of the resistance, signals would not pass through more quickly than through one, for the inductive surface was also increased four times; but if these cables were merged into one, whilst the inductive surface would be reduced one-half, the resistance would not be increased. It was believed, therefore, that if the diameter of a conductor was doubled, signals would pass through twice as quickly with the same depth of insulation.

The relations subsisting, telegraphically, between quantity and intensity of electric currents, demonstrated, that if the insulation was imperfect, larger dynamic quantities gave a better chance of working through. Cases had occurred where increasing the intensity of the battery had produced no perceptible advantage, whilst increasing the surface in each cell had a very decided effect. A case was instanced where, on a leaky circuit of upwards of 212 miles in length, the deflection on the galvanometer had been raised from 23° to 53°, by increasing the surface, without adding to the number of cells.

The effect of employing batteries of very high intensities for submarine wires, with a view to increased rapidity of signalling, was then considered; and it was stated that, as with high intensities there was greater energy to force through resistance, the wave of charge would arrive at its maximum more quickly than with a lower intensity, and signals would be passed through sooner. The reason why an increase in the rate with voltaic currents had not hitherto been observed, when the intensity of the battery had been increased, was explained.

The results with magnetic electric currents, would, it was thought, be more decided, for their intensity was many times as great as that of the voltaic currents which had been employed. For instance, it would take twelve hundred cells to spark through a space of air only one-hundredth of an inch; but this intensity would be a very low one for a magneto-electric current, whose intensity could be increased to almost any extent. A voltaic battery might be