

the same as one of double the area, offered the same resistance as one wire one mile long. With regard to induction, the results of experiments tried by the Author and Mr. C. John Varley, showed that with flat plates it followed the same law as conduction, decreasing in regular proportions, as the insulating medium was increased; that was to say, if the inductive force through one plate was twelve, through two plates it would be six, through three plates, four, and so on. In a gutta-percha covered wire, it probably did not follow precisely the same law, as when the insulating materials were increased in depth, the surface was also enlarged, which partly counteracted the effect of greater thickness. Mr. C. A. Varley had tried some experiments which went to show, that in a wire one-tenth of an inch in diameter, coated to the depth of one-tenth of an inch with gutta-percha, making a total of three-tenths, when compared with one of the same size, coated to twice that depth, the inductive force of the former was to the latter as 4 to  $3\frac{1}{4}$ , or thereabouts, and not 4 to 2; but this result was only to be considered as an approximation.

The conclusion arrived at by the projectors of the Atlantic Telegraph, that in a submarine cable a small wire conducted more rapidly than a large one, was thought to be erroneous. If a battery of six cells, with six inches of surface in each cell, was connected through a circuit of nominally no resistance, a much greater quantity of electricity would be found to pass than when connected through a long fine wire perfectly insulated. In a battery with the same number of cells, but with twice the surface, and capable, consequently, of giving out twice the quantity, through a circuit of nominally no resistance, no more, practically, would be found to be passing, the resistance of the wire measuring out the amount, something in a similar way to water flowing out of a small pipe inserted into the bottom of a cistern. The series might be added to, cell by cell, until, practically, as much was forced through, as the battery originally generated, along a circuit of nominally no resistance. After this had been arrived at, a further addition would not make any perceptible difference, as there was already power enough to force through all that the battery was capable of generating, and

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