Telegraphing Without Wires

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Courtesy Lindsay Publications

Lindsay didn't happen to mention whether he was related to the subject of this report! —mfe

The Dundee Advertiser of September 6 has the following: At the British Association meetings at Southampton, Mr. W. H. Preece, electrician at the General Post Office, adverted, in a paper on "Telephones," to an experiment he had made of telegraphing from the mainland to the Isle of Wight without employing a cable across the intervening space of water. This he accomplished by utilizing the property of electricity named induction. The efficiency of the telephone is frequently interfered with by currents of electricity being "induced" in the telephone wire by the electricity in telegraph wires, and Mr. Preece conceived the idea that as induction takes place sometimes in wires which are several miles apart, use might be made of this property to dispense with wires in certain cases. The purpose of wires is to carry the electric current, but if the current were ready to travel of its own accord without wires the saving in maintaining telegraphic communications would he very great.

This idea, however, is not a novel one. At the meeting of the British Association, held in Aberdeen, in 1859, the late Mr. J. B. Lindsay, of Dundee, read a paper, in which he described experiments almost as extensive and precisely the same in their method as that explained by Mr. Preece at Southampton the other day. In the days when our achievements with electricity are deemed so considerable, the humbler efforts of Mr. Lindsay are apt to be forgotten. There is no doubt, however, that he foresaw much that has only been accomplished within the last few years. His inventive faculty was keen, and he possessed the energy and perseverance, though unfortunately not always the resources, to work out his inventions. His studious disposition was remarkable, and if his talents had been developed in a sphere more suitable for them than the banks of the Tay, his name might have become famous in the annals of science.

In a letter published by him in 1845 he suggested the possibility of laying an electric cable across the Atlantic, a dozen years before the project was seriously entertained. Afterward he developed a scheme for telegraphing across oceans without cables. He lectured at Glasgow, in 1853, on his theory of forming an electric communication between Great Britain and other countries without the employment of submarine wires, and the cost of such communication to America he calculated to be £60,000. A patent for his scheme was taken out in 1854, and several experiments were made by him at different places. The following paragraph appeared in the Dundee Advertiser of May 20, 1859:

"Electric Telegraphing Across the Tay without Wires. —*We have received the following note from Mr. J. B. Lindsay, reporting progress with his experiments. The results, it will be seen, are highly encouraging: 'Yesterday (May 17) I telegraphed successfully across the Tay, opposite to Glencarse, where it is about half a mile broad. The action on the needle was strong, and the same battery power would cross, I think, at Broughty Ferry.'"*

The dock authorities at Liverpool invited him to exhibit his invention on the Mersey, but owing to his apparatus having been deranged, his experiment in England was not successful. This caused skepticism as to the merits of the discovery, and he made renewed tests with it on an extended scale on the Tay. These fully realized his expectations. The Dundee Advertiser of July 10, 1860, contained a letter to the editor, in which Mr. Lindsay wrote:

"During last week I was engaged in making a telegraphic experiment across the Tay below the Earn, at a place where the river is more than a mile broad. The experiment was successful, and the needle was strongly moved, but, as I had no person with me capable of sending or reading a message, it was not attempted."

Meanwhile he had exhibited his scheme to the savants of the British Association at the meeting in Aberdeen in 1859. Experiments were made with it across the river Dee, and he read a paper describing its theory to the Mathematical Section, in the debate on which Lord Rosse, chairman of the section, and other leading scientists took part. Before quoting the condensed report of this paper, it may be well to quote the passage in Mr. Preece's paper on "Telephones," read at Southampton last week, in which he adverts to an experiment exactly on the lines of Mr. Lindsay's scheme:

"Mr. Preece had recently tried an extremely interesting experiment between this place (Southampton) and the Isle of Wight—namely,

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to communicate across seas and channels without the aid of wires at all. Large metal plates were immersed in the sea at opposite ends of the Solent—namely, at Portsmouth and Ryde, six miles apart, and at Hurst Castle and Sconce Point, one mile apart. The Portsmouth and Hurst Castle plates were connected by a wire passing through Southampton, and the Ryde and Sconce Point plates by a wire through Newport; the circuit was completed by the sea, and signals were passed easily so as to read by the Morse system, but speech was not practical with the telephone."

The following is the report of the paper on "Telegraphing without Wires," read by Mr. J. B. Lindsay to the Mathematical Section of the British Association, at its meeting in Aberdeen, in September, 1859, which appeared in the Dundee Advertiser. After relating various minor experiments, lie proceeded to describe his process, saying:

"Recently he had made additional experiments, and succeeded in crossing the Tay where it was three-quarters of a mile broad. His method had always been to immerse two plates or sheets of metal on the one side, and connect them by a wire passing through a coil to move a needle, and to have on the other side two sheets similarly connected, and nearly opposite the two former. Experiments had shown that only a fractional part of the electricity generated goes across, and that the quantity that thus goes across can be increased in four ways: First, by an increased battery power; second, by increasing the surface of the immersed sheet; third, by increasing the coil that moves the receiving needle; and fourth, by increasing the lateral distance. In cases where lateral distance could be got he recommended increasing it, as by that means a smaller battery was requisite. In telegraphing by this method to Ireland or France, abundance of lateral distance could be got, but for America the lateral distance in Britain was much less than the distance across. In the greater part of his experiments the distance at the side had been double the distance across; but in the experiments in the Tay the lateral distance was the smaller, being only about half a mile, while the distance across was three-quarters of a mile. Of the four elements above mentioned, he thought that if any one were doubled the quantity of electricity that crossed would also be doubled; and if all the elements were doubled the quantity transmitted would he eight times as great. In the experiment across the Tay the battery was of four square feet of zinc, the immersed sheets contained about ninety square feet, the weight of the copper coil was about six pounds; the lateral distance was less than the transverse distance, but if it had been a mile, and the distance across also a mile, the signal would no doubt have been equally distinct. Should the above law (when the lateral distance is equal to the transverse) be found correct, the undermentioned table might then be formed.

"But supposing the lateral distance to be only half the transverse, then the distance crossed might be 16,000 miles, and if it was only a fourth, then there would be 8,000 miles, and thus a greater distance than the breadth of the Atlantic. Further experiments were, however, necessary to determine the law. Since last experiment he had increased the coil, and thought there was power to come two miles. According to this calculation, he thought a battery of 130 square feet, immersed sheets of 3,000 square feet, a coil of 200 pounds weight were sufficient to cross the Atlantic with the lateral distance that could be obtained in Great Britain."

Zinc for Battery.	Immersed Sheets.	Coil.	Distance Crossed.
4 sq. ft.	90 sq. ft.	6 lb.	1 mile.
8 "	180 "	12 "	8 "
16 "	360 "	24 "	64 "
32 "	720 "	48 "	512 "
64 "	1,440 "	96 "	4,096 "
128 "	2,880 "	192 "	32,768 "

Table 1.

If Mr. Lindsay's hopes are to be realized, some great discovery yet remains to be made, for, by the laying of the Atlantic telegraph cables, we know that the electric current, transmitted across the wide expanse of the Atlantic, must be of extraordinary power to be apparent on the other side, even with a cable to lead it. Without a cable it would be hopeless to expect to find it, although the best apparatus were employed. Telegraphic instruments are greatly improved since Mr. Lindsay worked with them, and as regards batteries and coils he would find available for his purpose all that he could wish. No currents, however, are in use which would induce another current 2,000 or 3,000 miles away. Still it is within possibility that such may be found, and to a Dundonian must be ascribed the honor of having first conceived the scheme of transoceanic telegraph communication without the aid of cables.