Lecture 61st

Electro-Magnetic Telegraph.

March 29th

1 The great velocity of electricity early suggested the idea of its employment for the purp. of transmitting intelligence. and during the progress of the whole century the construction of a magnetic telegraph has been the great end of many inventive minds. But as has been beforesaid, an invention is never made. until in the first place. Science is fully ripe for it, and in the second until the wants of man require it. A great distinction exists between an invention. and a discovery. e.g. Franklin discovered the action of points and subsequently invented the lightning rod. Watts was both a discoverer and an inventor. An invention is the application of a scientific principle to some useful purpose. Hence the merit of the discoverer exceeds that of the inventor, yet the latter is more held up. to public admiration. When a great mind has discovered some principle in science men of inferior minds apply the principle and gain the applause. The inventor usually reaps no pecuniary benefit: some other steps upon his shoulders &c e.g. Prof. Morse.

Our land is full of inventors, but there are few who devote their attention to philosophy with a view of discovering the great principles of natural science. Franklin suggested that, if the head waters of the Susquehanna and the Ohio, were united by a wire, a stream of electricity might be sent down the Mississipi &c up to the Susquehanna. But we know that the earth is such a good conductor that this is impossible. It would take a short cut &c. An at
2 tempt was made in Germany. to construct a Galvanic Telegraph, by placing a wire upon glass and insulating it by glass tubes, and breaking the connection at one end. One end was in the ground, the other connected with the machine. By a certain regulation in regard to the sparks at the break. the alphabet was formed &c. Common electricity possesses great repulsive power. Hence it is driven down the posts when moist &c. The moist atmosphere also dissipates it. When galvanism was discovered to be less easily conducted off, recourse was had to it. and a telegraph was constructed, in which the decomposition of water was used as a signal, the number of bubbles denoted the letters &c. Dr Coxe of Philadelphia exhibited this before his class; but it was never re-
3 duced to practice. A year or two after Ersteds experiments, in 1822. Ampere in a paper presented to the French Academy suggested the construction of a telegraph by means of the deflection of galvano-

His plan was to have several galvanometers effected by galvanism. at the farther station. According as the needles were deflected singly or together they represented different letters &c.

4. Experiments were made on this proposition in 1826. by Barlow, and he found that employing a single battery, the power diminished so rapidly with the distance, that an essential difference was observable even in the space of a mile. He thence concluded that the telegraph was impossible. These experiments cooled the ardour of the pursuit for a time.

5. The next experiments upon the subject, were made by myself in 1830. in Albany and from them I inferred the practicability of a telegraph, and have been in the habit of informing my classes &c. (1) I found that by using a compound battery, power could be sent to any distance, almost without sensible diminution. (2) A horse shoe was magnetized at the distance of one fifth of a mile. (3) To produce the maximum effect, the magnet must be surrounded by one long wire. My paper was published in Silliman's Journal, and afterwards republished in England. It gave rise to new experiments, and the result has been the discovery of Wheatstone in England. Steinheil in Germany. and Morse in America of practical and useful machines. In Steinheil two galvanometers are used, each needle armed with a pointer at right angles to its length. As the currents pass around them in different directions, only one will mark the paper rolling before it. unless the current be suddenly changed. He also used bells for interpreting in the dark. Wheatstone has obtained several patents, One is like Ampere's suggestion. Four needles are employed, and the directions in which they point, combined for letters &c. He now uses at each end a wheel marked with the alphabet. This revolves behind a disc with a hole in it, and stops when the required letter comes opposite this &c. Morse's is the simplest. He has an inverted horse shoe, and a piece of soft iron attached to a spring above. The horse shoe is rendered magnetic by the currents through the wire around it; the soft iron is drawn down, and a pointer near the end of the spring marks the paper as it is drawn off from a roller underneath &c.

Dots and lines formed by continuing the wire in the battery constitute the alphabet. An improvement of Wheatstone and adopted by Morse is the relay battery. By means of a spring. which the battery at the end moves between the poles of a horse shoe, the circuit of this relay battery does the work; only a small quantity of electricity is thus employed to move the spring $\frac{1}{100}$th of an inch &c. House of N.Y. has invented a printing telegraph. The letters are on the periphery of a wheel moved by electricity and stops, when the right letter comes round, and makes the impression upon the paper &c.