

of the most important,—the *Galvanometer*, an instrument which, by enabling the philosopher to detect and to measure extremely minute electrodynamic actions, gave an impulse to the subject similar to that which it received from the invention of the Leyden Phial, or the Voltaic Pile. The strength of the voltaic current was measured, in this instrument, by the deflection produced in a compass-needle; and its sensibility was multiplied by making the wire pass repeatedly above and below the needle. Schweigger, of Halle, was one of the first devisers of this apparatus.

The substitution of electro-magnets, that is, of spiral tubes composed of voltaic wires, for common magnets, gave rise to a variety of curious apparatus and speculations, some of which I shall hereafter mention.

[2nd Ed.] [When a voltaic apparatus is in action, there may be conceived to be a current of electricity running through its various elements, as stated in the text. The force of this current in various parts of the circuit has been made the subject of mathematical investigation by M. Ohm.¹ The problem is in every respect similar to that of the flow of heat through a body, and taken generally, leads to complex calculations of the same kind. But Dr. Ohm, by limiting the problem in the first place by conditions which the usual nature and form of voltaic apparatus suggest, has been able to give great simplicity to his reasonings. These conditions are, the linear form of the conductors (wires) and the steadiness of the electric state. For this part of the problem Dr. Ohm's reasonings are as simple and as demonstrative as the elementary propositions of Mechanics. The formulæ for the electric force of a voltaic current to which he is led have been experimentally verified by others, especially Fechner,² Gauss,³ Lenz, Jacobi, Poggendorf, and Pouillet.

Among ourselves, Mr. Wheatstone has confirmed and applied the views of M. Ohm, in a Memoir⁴ *On New Instruments and Processes for determining the Constants of a Voltaic Circuit*. He there remarks that the clear ideas of electromotive forces and resistances, substituted by Ohm for the vague notions of quantity and intensity which have long been prevalent, give satisfactory explanations of the most important difficulties, and express the laws of a vast number of phenomena

¹ *Die Galvanische Kette Mathematisch bearbeitet von Dr. G. S. Ohm*, Berlin, 1827.

² *Mass-bestimmungen über die Galvanische Kette*. Leipzig, 1831.

³ *Results of the Magnetic Association*. ⁴ *Phil. Trans.* 1843. Pt. 11.