

were successfully transmitted without exhaustion of the miniature battery, which on the contrary seemed perfectly to maintain its character equally with the old and more cumbrous battery. The writer predicts a new revolution in regard to telegraphs and batteries—that they will soon become more simple and easy to understand, and not only become familiar as household words, but familiar and useful as household servants.

To make the ordinary system of magnetic telegraphs more intelligible to the general reader, we are enabled by the aid of diagrams and the information conveyed by a little work issued by Mr. Davis, manufacturer of telegraphic instruments at Boston, to furnish something more than is generally known of their style and the *modus operandi* of the instruments employed.

A few ascertained facts at the outset are requisite to be borne in mind, as serving to give laws to the subject.

The electric current in passing naturally round the Earth pursues a course from east to west, and seeks always an equilibrium in its distribution through matter. If there is an excess in one place it seeks to transfer itself to another where there is less or a deficiency. In artificial appliances its production is twofold—one part of the apparatus used becoming always *positive* while another becomes *negative*, in other words there is a *disturbance of equilibrium* as the first condition of electrical excitement.*

Glass and other substances called *insulators* bar its progress. Copper or iron wire and other like substances are termed *conductors*. A current will pass from a positively excited body to a negatively excited body by means of any conductor which may be interposed between the two.

The current excited by the immersion of zinc and copper plates suitably arranged, in an acid solution, will traverse a metallic conductor of any length, disposed so as to connect the plates, rather than pass an intervening space of the smallest extent through a *nonconducting fluid or solid*; but where an alternative of conductors is presented the current passes by the shortest route to the earth or otherwise most directly to complete the circuit.

The current from a galvanic battery is conducted by the whole mass of the wire employed, and not on the surface alone as in free electricity. The time occupied by its passage along the wire is wholly imperceptible, and would require less than two seconds to circumvent the globe.

When a bar of soft iron is wrapped around by a coil of insulated wire,† it

* In the ordinary galvanic battery, for example, the wire in connection with the zinc or other metal most readily acted upon by the acidulated liquid employed, is denominated the *negative* pole; and that connected with the platina or least soluble metal—the *positive* pole.

† Insulated wire is prepared by covering with silk or cotton thread wound continuously about it so as to insulate the metallic surface. This method of covering and insulating the wire is rendered necessary, to prevent any lateral passage of the current. A coil of wire so disposed is termed a *helix*—a pair of these are consequently *helices*. When a helix is composed of several layers of wire, each successive turn enclosing the previous one—its power is thereby increased.