

foundest and most sagacious philosophers, and perpetually verified and illustrated, by unforeseen discoveries in unguessed forms, through the labors of the most skilful experimenters.

Magneto-electric Machines.

The discovery that a voltaic wire moved in presence of a magnet, has a current generated in it, was employed as the ground of the construction of machines to produce electrical effects. In Saxton's machine two coils of wire including a core of soft iron revolved opposite to the ends of a horseshoe magnet, and thus, as the two coils came opposite to the N. and S., and to the S. and N. poles of the magnet, currents were generated alternately in the wires in opposite directions. But by arranging the connexions of the ends of the wires, the successive currents might be made to pass in corresponding directions. The alternations or successions of currents in such machines are governed by a contrivance which alternately interrupts and permits the action; this contrivance has been called a *rheotome*. Clarke gave a new form to a machine of the same nature as Saxton's. But the like effect may be produced by using an electro-magnet instead of a common magnet. When this is done, a current is produced which by induction produces a current in another wire, and the action is alternately excited and interrupted. When the inducing current is interrupted, a momentary current *in an opposite direction* is produced in the induced wire; and when this current stops, it produces in the inducing wire a current *in the original direction*, which may be adjusted so as to reinforce the resumed action of the original current. This was pointed out by M. De la Rive in 1843.¹⁴ Machines have been constructed on such principles by him and others. Of such machines the most powerful hitherto known is that constructed by M. Ruhmkorff. The effects of this instrument are exceedingly energetic.

Applications of Electrodynamical Discoveries.

The great series of discoveries of which I have had to speak have been applied in many important ways to the uses of life. The *Electric Telegraph* is one of the most remarkable of these. By wires extended to the most distant places, the electric current is transmitted

¹⁴ *Traité de l'Elect.* i. 391.