this kind of agency, action and reaction are equal and opposite. It appeared to follow almost irresistibly from these considerations, that magnetism might be made to produce electricity, as electricity could be made to imitate all the effects of magnetism. Yet for a long time the attempts to obtain such a result were fruitless. Faraday, in 1825, endeavored to make the conducting-wire of the voltaic circuit excite electricity in a neighboring wire by induction, as the conductor charged with common electricity would have done, but he obtained no such effect. If this attempt had succeeded, the magnet, which, for all such purposes, is an assemblage of voltaic circuits, might also have been made to excite electricity. About the same time, an experiment was made in France by M. Arago, which really involved the effect thus sought; though this effect was not extricated from the complex phenomenon, till Faraday began his splendid career of discovery on this subject in 1832. Arago's observation was, that the rapid revolution of a conducting-plate in the neighborhood of a magnet, gave rise to a force acting on the magnet. In England, Messrs. Barlow and Christie, Herschel and Babbage, repeated and tried to analyse this experiment; but referring the forces only to conditions of space and time, and overlooking the real cause, the electrical currents produced by the motion, these philosophers were altogether unsuccessful in their labors. In 1831, Faraday again sought for electro-dynamical induction, and after some futile trials, at last found it in a form different from that in which he had looked for it. It was then seen, that at the precise time of making or breaking the contact which closed the galvanic circuit, a momentary effect was induced in a neighboring wire, but disappeared instantly.[1] Once in possession of this fact, Mr. Faraday ran rapidly up the ladder of discovery, to the general point of view.—Instead of suddenly making or breaking the contact of the inducing circuit, a similar effect was produced by removing the inducible wire nearer to or further from the circuit;[2]—the effects were increased by the proximity of soft iron;[3]—when the soft iron was affected by an ordinary magnet instead of the voltaic wire, the same effect still recurred;[4]—and thus it appeared, that by making and breaking magnetic contact, a momentary electric current was produced. It was produced also by moving the magnet;[5]—or by moving the wire with reference to the magnet.[6] Finally, it was found that the earth might supply the place of a magnet

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[1] *Phil. Trans.* 1832, p. 127, First Series, Art. 10. [2] Art. 18. [3] Art. 28.
[4] Art. 37. [5] Art. 39. [6] Art. 53.