Continental philosophers, following Coulomb, tried to put into mathematical language the action at measurable distances of magnetic masses and elements of electrical circuits,[1] Faraday fastened upon the peculiar lines in which iron filings arranged themselves in the neighbour-

by a kind of intuition with instinctive certainty. I would not depreciate Faraday's contemporaries because they did not see this. I know myself too well how often I sat hopeless, gazing at one of his descriptions of lines of force with their numbers and tension, or looking for the meaning of statements where the galvanic current is regarded as an axis of force and much the like" (p. 277). Rosenberger tells us that it may be in part attributed to the displeasure and annoyance with which foreign philosophers received Faraday's theoretical views, that Poggendorff, who printed Faraday's earlier memoirs *in extenso* in his 'Annalen,' only give a short abstract of the later series. See Rosenberger, 'Die moderne Entwickelung der elektrischen Principien,' Leipzig, 1898, p. 105.

[1] These researches, of which the fourth chapter of this work gave some account, and which culminated in Weber's well-known law of electrodynamic action of electrical particles at a distance, absorbed almost exclusively the attention of natural philosophers abroad. Mathematicians of the highest rank, such as Laplace, Gauss, and Riemann, worked at the subject. It is, however, interesting to note that Gauss, with that remarkable instinct for physical adaptation of mathematical ideas which characterised also the magnetic researches which he carried on between 1830 and 1840, refrained from the development of a mathematical theory of electrodynamic action for reasons which he later explained to Weber. When the latter prepared for publication that elaborate series of exact measurements which, irrespective of the theory attached to them, formed the foundation of modern electrical science and of the correlation of the phenomena of magnetism, of electricity at rest and in motion, of induction and of diamagnetism, Gauss wrote as follows under date 19th March 1845: "The subject belongs to those investigations which occupied me very extensively about ten years ago (especially 1834-36). . . . Perhaps I may be able to think myself again into these matters, which have now become so foreign to me. . . . I should no doubt have long ago published my researches; but at the time when I broke them off, that was wanting which I then considered to be the very keystone—nil actum reputans si quid superesset agendum—namely, the deduction of the additional forces (which have to be added on to the mutual action of particles of electricity at rest, if they are in relative motion) from action, not instantaneous, but (like that of light) propagated in time. With this I could not succeed at the moment, but so far as I can remember I left the subject not entirely without hope that this might later be possible; yet, if I remember aright, with the subjective conviction that it would previously be necessary to form for oneself a workable representation (*eine construirbare Vorstellung*) of the manner in which the propagation takes place" (Gauss, 'Werke,' vol. v. p. 627, &c.)