principle, one which allows us to deal with the grand total or outcome—mathematically called the integral—of physical processes and changes without necessarily possessing a detailed knowledge of the minute elements or factors—mathematically called differentials—out of which they are compounded. Inasmuch as what we actually observe are always integral effects—*i.e.*, summations or aggregates of great numbers of individual and unobservable processes — this line of reasoning is not infrequently very useful, and has been in many cases applied to arrive at important conclusions. In fact, it is the analogue in science of the method according to which practical men very often succeed in carrying on extensive business transactions, of which they possess a merely external though accurate knowledge; or of the balance-sheet of an industrial undertaking which exhibits and guarantees the correct result, though only the profit and loss account and the ledgers would show how this result has been arrived at.

33. Faraday.

Faraday had taught us how to look upon any given portion of space in which electric, magnetic, chemical, and thermal changes were going on as a connected system, which he termed the electro-magnetic field. He and others—notably Oersted, Ohm, Weber, Lenz, and Joule—had shown how the different occurrences in such a system could be reduced to a common measure, and how they were observably connected. Maxwell brought all these phenomena together under the term "energy of the electro-magnetic field," and set himself to study the possible forms and changes of this quantity under the law of the conservation of energy—*i.e.*, as the preser-