

*ELECTRICITY TREATED EXPERIMENTALLY*  
*Electricity Treated Experimentally.* By Linæus Cum-  
 ming, M.A. (London: Rivingtons, 1886.)

THOSE who are acquainted with Mr. Cumming's "Introduction to the Theory of Electricity" will welcome most heartily a new and excellent little work from his pen. The book before us is on "Electricity Treated Experimentally"; and it is highly to be commended. It is admirably clear and concise, and at the same time the information is full and is well arranged; while the multitude of excellent illustrations and the open double-leaded type make the little book very pleasant and satisfactory reading.

The portions devoted to magnetic and electric measurements, both electro-static and electro-kinetic, are, as we should expect from the author, clear and full; while the descriptions of the various measuring instruments are very satisfactory. An excellent account is also given of Faraday's experimental investigations in electro-statics and electro-magnetism, and of those of Ampère in electro-dynamics.

The least satisfactory portion of the book is the chapter headed "Current Induction." This chapter, even making all allowances for its necessary brevity, requires very considerable improvement and amendment. The descriptions given of dynamo-electric machines are very far from adequate, even to the extent of making little or no distinction between a magneto-electric machine and a so-called "dynamo." Under the heading "Siemens Dynamo" there is a description and diagram of the old Siemens shuttle-wound armature; and Fig. 218, which is a diagram of a Gramme magneto, shows the soft iron of the armature cut away almost to nothing to make space for the armature. The information given with respect to the incandescent lamps and incandescent lighting also requires improvement to make it suitable for the present day; and the description of the telephone and of experiments to illustrate the action of it are not satisfactory. Some of these instruments it is perhaps unnecessary to treat of in a book of this class; but if they are dealt with at all the treatment must be correct and not too meagre.

One or two other minor matters we cannot avoid mentioning. The first is the naming of the magnetic poles. It is greatly to be desired that strong efforts should be made by all teachers to get rid of the English "north" and "south." Most writers of importance are doing this now; either by adopting "blue" and "red" for *true* north and *true* south respectively, or else by using in full the designations "true north" and "true south." However this may be, the practice of marking the ends of a magnet + and - seems to us thoroughly objectionable.

Next we would call the author's attention to the fact that the rule which he has called Oersted's rule for finding the direction in which a magnet turns under the influence of a current is commonly, and we believe rightly, called Ampère's rule. But it would be of very great advantage if Ampère's rule were improved out of existence, and some such rule substituted as that "terrestrial currents *supposed* to correspond with terrestrial magnetism follow the sun." When the unfortunate student imagines

himself lying on his face, or (?) back, with a current entering by his feet, or (?) head, and stretches out his right hand, or (?) left, to show the direction of the deflection of the magnet, the probabilities against his coming at the end of his imagining to a correct conclusion are considerable. It seems strange that such a rule should have held its place from Ampère's time till now.

Lastly, we miss the name of Cavendish and his proof (by means of the experiments of Faraday so well described) of the electro-static law of the inverse square of the distance. It is impossible, by means of the torsion-balance, to give anything but a rough proof of this great law. But Cavendish established mathematically that no other law than that of the inverse square of the distance will account for the whole electric charge being found on the outside of a closed conductor; while the experiments of Faraday established to minute accuracy this celebrated law of electric distribution. In searching for the name of Cavendish, too, an alphabetical index would have been of much assistance. It is sad for a reviewer to take up a book without an index! No book, unless it be a novel, should be without one. For small books it is easily made; for large books it is essential.

With these criticisms we must take our leave of Mr. Cumming's book; but we cannot do so without remarking once more that it is one of the pleasantest and most thorough little books on electricity and magnetism with which we are acquainted.

J. T. B.

#### OUR BOOK SHELF

*Constructive Geometry of Plane Curves.* With Numerous Examples. By T. H. Eagles, M.A. Pp. xx., 374. (London: Macmillan and Co., 1885.)

THIS book differs considerably from previous treatises on practical geometry. The author has made a serious attempt to improve the instruction usually given in his subject, and the result is that we have a text-book which will lend itself to class-teaching of a thorough and searching character.

Hitherto much time has been spent on constructions which furnish no mental discipline. In this treatise the proofs of the methods used are given or indicated in every case.

A valuable collection of examples is supplied at the end of each chapter. If a numerical result is involved, the answer is usually appended, and hints are given towards the solution of the more difficult examples.

Two-thirds of the book is devoted to conic sections, and herein we find methods of drawing these curves under almost any conceivable conditions; there are also chapters on reciprocal polars and the anharmonic properties of conics which will give the draughtsman some indication of the power of modern geometry and of its usefulness in practical application.

After a chapter on conics as derived from plane sections of a cone, we have about 100 pages devoted to various other curves which are of interest in mechanics or physics. Compared with the exhaustive treatment of the conic sections, the account of several of these curves is somewhat scanty.

We should like to see more space given to equipotential curves, for instance, and to have further exemplification of the methods of construction adopted by Rankine and Maxwell.

The book closes with an interesting chapter on the graphical solution of quadratic equations and certain trigonometrical equations.