is a careless publication. Besides numerous typographical errors, those who were unfortunate enough to purchase an early copy found two important diagrams omitted, one of which is absolutely essential to the understanding of the context.

FISKE'S ELECTRICITY.

Electricity in theory and practice; or, the elements of electrical engineering. By B. A. FISKE. New York, *Van Nostrand*, 1883. 270 p. 8°.

THAT the work of Lieut. Fiske meets in some degree a want felt by a considerable number of persons, is sufficiently shown by the fact that it has already reached a third edition; but we must nevertheless confess to a feeling of serious disappointment on reading it. The expectations raised by the title are hardly justified by the contents; since the discussions of theoretical points are very brief and unsatisfactory, while the portion treating of electrical engineering proper is somewhat ill-digested. In fact, there is a certain 'scrappiness' about the work as a whole, which is apparently due to over-haste in preparation.

The first five chapters, occupying about one-fourth of the book, are extremely elementary, and contain little that will not be found more fully stated in almost any work on electricity, while occasional loose statements also occur. Thus, in the chapter devoted to work and potential, the writer seems to overlook the exactness introduced into scientific measurements when Gauss first proposed an absolute system of mass and force measurement. Immediately after the definition of the foot-pound, we find the following statement: "This unit is, however, too large for measuring with convenience in many cases; and for this reason a much smaller one has been invented, called the 'erg.'" The only definition given of the dyne is "an extremely minute weight, being about $\frac{1}{981}$ of a gramme." Other examples are to be seen in the table on p. 214.

Such laxity of expression, although it may seem to simplify the subject, cannot fail to prove confusing as soon as the reader really begins to study the matter. Similar want of care in expression will trouble the student while reading certain parts of the chapter on the laws of currents. From the statements on p. 60, regarding the arrangement of battery-cells, the reader might erroneously infer that high internal resistance in a cell is in itself advantageous in increasing the strength of the current given by a battery.

Considering the portion of the work devoted to the applications of electricity, we find a great inequality in the space devoted to important matters. The subject of electro-metallurgy is allowed but a single page, and the extensive use of dynamo-machines in the electrical deposition of metals is not discussed at all. Of the ten pages given to storage-batteries, five are filled with a mere statement of the claims of certain recent patents, without any information regarding their value. On the other hand, neither the chemistry of the lead-battery nor the special advantages and disadvantages of the storage-battery are considered. The chapter on thermo-electric batteries contains no allusion to any form of thermo-battery whose use in the arts has been attempted; and there is not even a mention of the names of Farmer, Noë, or Clamond. Instead of this, five pages of patent claims are given, several of which are not, in fact, for thermo-electric batteries proper.

The remainder of the work deserves somewhat more praise. The chapter on electrical measurement contains a description of the earlier forms of ampère-meter and volt-meter of Deprez and Ayrton and Perry. There is no reference to Sir William Thomson's current and potential galvanometers. Under telegraphy we find the bridge duplex method described, but the differential method is not alluded to. The principles of the quadruplex, as well as those of the harmonic telegraph, are, however, explained. The chapter on the telephone is interesting. It is unfortunate that not even a passing mention is made of the Blake transmitter; while the rarely used transmitter of Edison, and his ingenious but unpractical electro-motograph receiver, are described at some length. The following chapters on electric lighting, dynamo-machines, etc., are, on the whole, the best in the book. The principle of the differential arc-lamp is explained, and brief descriptions are given of most of the leading types of dynamo-machines. The closing chapter on electric railways contains, among other matters, an account of the system of Field and Edison.

In justice to the work under review, we ought to say that many of the faults which we have criticised have their origin in the fact that our author has attempted the impossible feat of discussing the theory and practice of electrical engineering in a work of only two hundred and sixty-five pages. As a consequence, neither theory nor practice is described at sufficient length to meet the wants of the reader. Moreover, we are firmly of the opinion that any one

wishing to understand the applications of electricity must first acquire a thorough knowledge of the theory. Having secured this, he will find no trouble in reading any works devoted to the practice of electrical engineering.

AMERICAN COASTER'S NAUTICAL ALMANAC.

The American coaster's nautical almanac for the year 1884. Published by authority of the secretary of the navy. Washington, *Bureau of navigation*, 1884. 158 p. 8°.

IT has long been customary for the principal dealers in chronometers, hydrographic charts, and navigation supplies generally throughout the country, to publish annually, in cheap pamphlet form, certain of the fundamental data required in the navigation of ships, and compiled largely from the publications of the 'Nautical almanac' office. Such small prints have commonly been disposed of for a few cents per copy, or given away to masters of vessels, as the tabular data were so scattered among advertisements of the wares of these dealers as to render their distribution a matter of interest to the publishers.

The recent action of the superintendent of the 'Nautical almanac' office, in beginning the regular issue of the 'American coaster's nautical almanac,' will, it is to be hoped, put an end to this unauthorized extraction from the publications of the scientific offices of the government; for the new annual will contain, in a compact and convenient form, the ephemeral data of every sort required by navigators along the American Atlantic coast, and is issued under the official sanction of the secretary of the navy. The 'Coaster's almanac' is made up from data already in good part accessible to navigators in one form or another, but which are now, for the first time, brought together into a single small volume, obtainable with little trouble and expense.

We have first the elements pertaining to the position, motion, and apparent magnitude of the sun, together with the equation of time, — all given for Greenwich noon, as in the larger annuals of the same office. Following are the times of the moon's phases, — where, by the way, the meridian is omitted, and a doubt is likely to arise whether they may not be applicable to some meridian other than Greenwich, — underneath which we find the sidereal time of mean noon, and blank columns left for the navigator to enter with every day the necessary data regarding his chronometer, and the latitude and longitude of his vessel at noon. The next succeeding pages contain the positions of a hundred and fifty fixed stars for the beginning of the year, followed by a table for finding the latitude by an observed altitude of Polaris, and a table for converting solar into sidereal time. A matter of some account is the omission from this portion of the 'Coaster's almanac' of all data regarding the planets. A half-dozen additional pages would have sufficed to give the positions of the four bright planets ordinarily employed by navigators, with precision enough to make them quite as useful as the list of star-positions.

The astronomico-nautical data occupy nearly forty pages, or about one-fourth of the entire book. Following are twenty pages of tidal data, compiled from the complete tide-tables published by the office of the coast and geodetic survey. The approximate predicted times of high water at the principal ports on the Atlantic coast of the United States are given for every day of the year; while, for intermediate ports, tables of tidal constants are added. The times of high water are reduced to the standards of the eastern and central meridians, respectively five hours and six hours slow of Greenwich time.

We have next a very comprehensive list of more than five hundred lighthouses, lighted beacons, and floating lights, on the Atlantic and Gulf coasts of the United States, occupying thirty-five double pages, and giving the name, location, characteristic, and order of each light; also the geographical position, height above the sea-level, maximum distance at which visible, the color and peculiarity of the lighthouse or vessel, and the character of the accompanying fog-signal. This is followed by a ten-page list of lights in the West-India Islands, and on the adjacent coasts, the coast of Brazil, etc., to the Magellan Straits, similar data being likewise given for these lights. The 'Coaster's almanac' concludes with nautical directions for manoeuvring in, and avoiding the centre of, cyclones in the North Atlantic; the twenty-six articles of the revised international regulations for preventing collisions at sea; general information regarding life-saving stations, with instructions to facilitate the shipwrecked mariner in receiving the assistance of these stations; and, finally, descriptions and explanations of the signals displayed by the army signal-service as cautionary against approaching storm, severe winds, and rough weather generally.