ous wood is of the big tree, Sequoia gigantea (0.2882); and that the lightest wood of all is of a fig in Florida, Ficus aurea (0.2616).

Upon part iii., 'The forests of the United States in their economic aspects,' which concludes the volume, and which the fine colored maps graphically illustrate, Professor Sargent has bestowed great pains, and to much purpose. The statistics of the lumber industry for the census year, the table of forest-fires during that year, the map showing the proportion of woodland within the settled area burned over in that year, and the map showing the character of the fuel used in different parts of the settled portion of the country, are most interesting and instructive. Not less so are the detailed and fully illustrated summaries of the present condition and character of the woodlands of every state and territory.

The principles of forest preservation, the needs of the country in this respect, and its importance in certain districts, also the special need, as well as great difficulty, of guarding against forest-fires, are touched upon as occasion serves. If the country suffers hereafter, it will not be from the lack of good advice. Possibly the forest report for the eleventh census may show that it has not all been wasted. If the forest agent for 1890 brings out a more valuable report than that of 1880, it will in a measure be due to the advantages furnished by the work of his predecessor.

SCHELLEN'S DYNAMO-ELECTRIC MACHINES.

THIS is a translation from the third German edition, with large additions and notes relating to American machines by Mr. Keith. In the first two editions of the original the work appeared in one volume; but in the third the author thought it desirable to divide it into two, and in this the translators have followed him. The first volume only is now published, and is principally devoted to methods and machines for producing electric currents.

It is not easy to keep pace with the production of dynamo-electric literature at present, and one cannot avoid the conclusion that much of it might be suppressed without really serious loss. Books on dynamo-electric machinery may be prepared for the general intelligent public, for the so-called 'practical' electrician, or for the student of electrical engineering. Dr. Schellen's book is not likely to satisfy the demands of either of these classes.

About a hundred pages bear the general title of 'Preliminary physics.' Forty of these are occupied by the development of the fundamental idea of the production of electricity by induction, which is accomplished in a manner not differing greatly from that of other similar treatises. The remainder contains the consideration of methods of electric measurements and measuring instruments. Including as it does dynamometric, photometric, and electric measurement proper, this comes near being the most unsatisfactory portion of the book. The great importance of thoroughly understanding this part of the subject is strongly emphasized; but the reader will seek in vain for its satisfactory elucidation. The study of dynamometers is by far the best of this part; and the translators have shown wisdom in inserting full descriptions of the Kent dynamometer prepared by Dr. Henry Morton, and of the Brackett dynamometer prepared by Professor Brackett, its inventor. Under electric measurement little is to be found, aside from the description of a few of the coarser devices for determining electromotive force and current strength, and there is really nothing concerning methods of measurement. Although the book is of very recent date, the units of measure are not defined in accordance with the agreement of the international electrical congress; and, in the discussion of photometric standards, no mention whatever is made of that adopted by that body. 'Intensity' for current, or current strength, and 'tension' for electromotive force, are found, unfortunately, throughout the work.

The bulk of the volume is devoted to descriptions of magneto and dynamo electric machines in great variety. These are generally given in considerable detail, accompanied by diagrams and plates. Many of the descriptions are very satisfactory, although most of them have appeared already in similar publications.

The concluding chapter contains a brief discussion of the theory of dynamo-electric machines, and a classification of dynamos. The discussion of the theory would be greatly improved by expansion, and the classification of dynamos would be more useful to the reader if introduced before the description of machines. An appendix contains a number of tables of considerable practical value, and an attempt to define the 'absolute, or C. G. S. system of units of measure.' In a previous chapter the necessity of being thoroughly fa-

Magneto and dynamo electric machines. By Dr. H. SCHELLEN. Vol. i. Translated from the third German edition by N. S. Keith and Percy Neymann. New York, *Van Nostrand*, 1884. 518 p. 8°.

miliar with these units is affirmed; but in these two pages a clear understanding of them is made well-nigh impossible. A single illustration will serve to show the character of many of these definitions.

"*The unit of tension* is that tension (potential difference) between two points which requires the expenditure of one unit of force (1 dyne) to move 1 coulomb from one point to the other by overcoming the electrical repulsion $\left(\text{Dim. } C^{\frac{3}{2}}G^{\frac{1}{2}}S^{-2}\right)$.

"*Technical unit*, 1 volt $= 10^8$ (C. G. S.) units."

BARNARD'S PYRAMID OF GIZEH.

Dr. Barnard tells us that Mr. Flinders Petrie, after having published a book in 1874 to give 'irrefragable proof' of the supernatural metrology of the Great pyramid, in 1880 printed another in which he recants all that doctrine. This surprising instance teaches us that it is possible for a man to hold the views of John Taylor and Piazzi Smyth, and yet be capable of using his mind sanely upon the subject. But Mr. Petrie had shown himself by his 'Inductive metrology' to be an adept in the logic of induction; and surely one would expect the study of logic, if it be of any use at all, to save a man from such follies as this metrological theory of the pyramid.

The main fallacy of the advocates of it is one which has been pointed out in C. S. Peirce's 'Theory of probable inference' as a violation of the inductive rule that the characters for which a lot is sampled ought to be predesignate; that is, settled upon before the examination of the sample. Given a collection of numerical data, it is always possible, by twisting them about, to find some recondite and curious relationship between them; for the possibilities of such relationships are endless. Mr. Pliny Earle Chase has convinced the world of that, if of nothing else.

Another thing which the pyramid-bitten seem to overlook, is that an hypothesis antecedently likely does not mean one which they are antecedently inclined to like, but one which belongs to a class of explanations among which the balance of positive evidence tends to show that the true theory is to be looked for.

Dr. Barnard treats the subject with a great deal of pertinent wit; he has drawn from the stores of his learning for interesting information on every page; and, what is best, he has estimated the strength of each argument with unerring good sense. Perhaps he is a little too indulgent to the idea that the vertical height of the pyramid was intended to bear the same ratio to the perimeter of the base that the radius of a circle bears to its diameter. Fourteen centuries after the building of the Great pyramid under King Apophis of the seventeenth dynasty (Joseph's Pharaoh, as it is said), was written the mathematical treatise of Ahmes, which has been preserved to us. This work virtually assumes

$$\pi = (\tfrac{4}{3})^4 = 3.16,$$

and there is no good reason for supposing that the pyramid-builder knew better. On the contrary, Sir Henry James's idea is probably correct, that the rule for the slope was, that at the corners the rise should be nine on a base of ten.

The supposition that the inclination of the entrance-passage was connected with a pole-star, derives, it would appear, its chief strength from its forming a part of Mr. Procter's ingenious theory of the orientation of the pyramid, which certainly has much to recommend it; yet the accuracy of orientation may be merely accidental, like that of the District of Columbia.

The imaginary metrological system of the Great pyramid of Gizeh. By F. A. P. Barnard. New York, *Wiley*, 1884. 5+106 p. 8°.

NOTES AND NEWS.

Mr. H. H. Warner of Rochester, N.Y., offers two prizes for the year 1885. First, two hundred dollars for each and every discovery of a new comet made from Feb. 1, 1885, to Feb. 1, 1886, subject to the following conditions: 1. It must be discovered in the United States, Canada, Mexico, West Indies, South America, Great Britain, or the Australian continent and islands, either by the naked eye or telescope, and it must be unexpected, except as to the comet of 1815, which is expected to re-appear this year or next; 2. The discoverer must send a prepaid telegram immediately to Dr. Lewis Swift, director, Warner observatory, Rochester, N.Y., giving the time of the discovery, the position and direction of motion, with sufficient exactness, if possible, to enable at least one other observer to find it; 3. This intelligence must *not be communicated to any other party or parties*, either by letter, telegraph, or otherwise, until such time as a telegraphic acknowledgment has been received by the discoverer from Dr. Swift (great care should be observed regarding this condition, as it is essential to the proper transmission of the discovery, with the name of the discoverer, to the various parts of the world, which will be immediately made by Dr. Swift). Discoverers in Great Britain, the Australian continent and islands, West Indies, and South America, are absolved from the restriction in conditions 2 and 3. Second, a prize of two hundred dollars in gold to