

in logical order he has crystallized upon this framework the ideas that seemed most prolific and desirable.

The author has made a novel and daring departure for the usual methods of treating the theoretical study of the phenomena of the science. He borrows from "Mechanics" and "Thermodynamics" certain well-proven principles and theorems, and about these groups all the important and prolific theories of electricity. While these principles, as ordinarily evolved, are sufficient to meet the problems of physics, it is necessary to surround them by so many restrictions, conditions and hypotheses to meet the complex cases offered by electric theories, that the undertaking is a serious one.

The writer has therefore chosen a new course, and instead of first showing, as would logically be necessary, the manner in which these principles may be used to classify the theories to be studied, he shows the bond as the study proceeds.

The definitions given are original and clear without being lengthy. The nomenclature adopted is supported by good reasons, and is not to suit the author's convenience or fancy. The mathematical methods are satisfactory, complete and logical.

The treatment of metallic conductors, both homogeneous and heterogeneous, with the application of the laws of the thermodynamics to these conductors, is very complete, and undoubtedly the most extensive and thorough up to date.

The chapters upon electrolytes are rather brief, although they cover many useful propositions relating to open and closed circuit batteries both polarizable and non-polarizable. If one considers, however, to what extent they would lead were the same methods employed as for metallic conductors, this is not surprising.

No attempt is made to introduce any of the usual matter relating to the measurement of current strength, etc., nor anything regarding the instruments used. The work is not, in fact, calculated for the use of the practical or experimental electrical engineer as a manual, but rather as a treatise which shall show the bonds uniting the various electrical theories, and the scope and extent of these theories. C. J. R.

A Manual of Mining. By M. C. Ihlseng, C.E., E.M., Ph.D. Pp. 428. 8vo. Cloth, \$4. New York: John Wiley & Sons.

This is, we believe, the first work of the kind published in this country, and as the literature of mining in the English language is singularly scant, it makes a most welcome addition.

As a text-book on the art of mining it does not compare favorably with the German works of Serlo, Köhler, or even with the French of Callon.

The author has unfortunately attempted to cover too much in a small volume, and as a consequence many of the most important parts of his subject are treated in a superficial manner; indeed, this is so far true that unless the reader has had some experience in mining, the book would not be entirely intelligible. The book is unevenly written, some of the chapters

being better than others. Those on ventilation, it should be said, are particularly good. The author states in the preface "the work is designed as an elementary treatise for the use of those desiring a reference book." The book does not conform to this description, for the reader is met at every turn with terms and expressions which would require considerable previous knowledge of mining on his part to be intelligible.

On the whole the book is a good one. It contains much valuable practical information and, therefore, forms a valuable contribution to the literature of the subject. It is to be regretted that it is not better written; the author's style is often involved, rendering his meaning obscure; his English lacks clearness, and the interjection of the slang of the mining districts of our far West, cannot be considered as good form in a work of this character.

F. L. G.

PHOTOGRAPHIC NOVELTIES.

[Abstract of remarks of Mr. John Carbutt, made at the stated meeting of the Institute, Feb. 17, 1892.]

Mr. John Carbutt exhibited several large and beautiful photographs of scenery on the Pennsylvania Railroad, taken on his celluloid orthochromatic films, and spoke of the advance in use of that material, as follows:

Mr. President and Members:

It will be remembered by members of the Institute that some four years since I read a paper on celluloid as the new substitute for glass in photography, and that, although the sheets of celluloid measured 20 x 48 inches, the largest negative made at that time was 8 x 10 inches. Since that time the use of that material both by amateur and professional photographers has greatly increased, as also the size of negatives made, especially by the professional photographers, notably Mr. W. H. Rau, of this city, who, during the past summer, has made negatives of views on the line of the Pennsylvania Railroad of the size 18 x 22 inches, used flat in the regular plate-holder, and 18 x 48 inches used in the panoramic camera, but bent to a half-circle, as shown by the sketch on the blackboard.

Here is one of the flexible holders carrying the 18 x 48 celluloid film, which as you see can be bent to a half-circle, which form it occupies when attached to the camera, the back of which forms a half-circle, the front being flat and flexible, allowing the lens to be rotated from side to side while making the exposure. The lens used has a focus of fifteen inches, and the negative includes an angle of 165°; whereas if it was possible for a lens of fifteen inches focus to cover a flat surface of forty-eight inches, the angle would only be 110°.

The photographs here for your examination fully illustrate how perfectly the celluloid answers the purpose to hold the sensitive film, doing away with both weight and risk of breakage to which glass is subject. One of our leading amateurs, Dr. Chas. L. Mitchell, made over 500 8 x 10 nega-