

tor. 2. In what is the Edison socket considered a better set than the T. H. socket? A. We cannot say that we think one of these sockets is better than the other. Both have their friends. One uses a screw, the other holds the lamp by springs. 3. How is it that lightning goes from earth to cloud, as well as from cloud to earth? Electricity does not flow from negative to positive, and the earth being considered as negative, how does the lightning go from earth to cloud? A. We have many times stated in these columns that the direction of the flow of electricity is entirely conventional. We agree to the ordinary flow from what we call positive to what we call negative. An alternating current is considered to flow both ways alternately. The fact is that lightning frequently surges to and fro between the cloud and the earth a dozen times or more in what we call a flash, and it is all over in a very small fraction of a second, so that no one can say that he saw it go either way. It is as easy to see the flash go up as it is to see it come down. 4. A short time ago I was in a telegraph office, and there was a thunder storm going on around us; every lightning stroke would cause the telegraph instrument to tick, as if the key has been opened and closed. Why should the lightning affect the instrument in such a way? A. Induction charges a telegraph line when a lightning storm is near, and the current sparks across the instruments and the lightning arresters with the snapping sound which you heard. It is a common occurrence. 5. What kind of a conductor of electricity does liquid air make? A. Liquid air is an insulator, just as gaseous air is. It is not a conductor of electricity at all.

(9085) G. A. S. asks: In order to settle a controversy, will you kindly give a solution of the following problem in the next issue of your paper: A claims that if a gun be fired from the rear of a rapidly moving train, at a given point, in the opposite direction, and the velocity of the bullet is exactly the same as that of the train, when the train has traveled one mile distant from the point of discharge, the bullet will be one mile from the train, or at the point of discharge. B claims that the bullet will be beyond the point of discharge, when the train has traveled the distance of one mile. Who is correct? A. For a full answer to your inquiry regarding a gun discharged from a train in the direction opposite to the motion of the train, see the SCIENTIFIC AMERICAN, Vol. 88, No. 19, Query 8997. A is right.

(9086) A. M. W. says: In your paper of June 6, Notes and Queries, 9036, in regard to clear glass assuming a violet color: A number of years ago I resided in various mining towns of Colorado, and often found pieces of glass of an amethyst color. On one occasion I found a broken table goblet, but the portion that lay upon the ground was not as perfectly colored as other parts. I do not remember ever finding any of this colored glass only on very dry, rocky slopes and where it was exposed to direct hot sun rays. Occasionally I would find a piece that was blotched as though rain drops had dried so quickly that the outer edges of the spots had a seared appearance, but it was color only and a little darker on these edges. At that time my impression was that it was necessary for the glass to be in a very dry, rocky place, fully exposed to the sun, and after little showers and spattering drops from surrounding rocks, in drying quickly from the hot sun that it caused some chemical action that formed the coloring.

(9087) J. H. writes: Will you please inform me who manufactures the gas ignition pellet for sale? Also what the ingredients are, and in what proportion they are mixed, and how fastened to the mantles which render them self-igniting mantles? A. There is only one substance within our knowledge which can be heated by a stream of gas striking it, so that it will ignite the gas. That substance is spongy platinum. It is used in the Döbereiner lamp, where a stream of hydrogen impinges on a platinum sponge. Platinum in this form is capable of absorbing 800 times its volume of oxygen, which does not enter into combination with it, but is simply condensed into its pores, and is available for combination with other bodies.

(9088) C. M. Z. asks: Please tell me what is the voltage of a good dry cell 1 1/2 x 4 inches. Will a battery of this size light a small lamp of 2 c. p. and 4 1/2 or 5 1/2 volts? Is one battery 8 inches long and 1 1/2 inches diameter as good as two batteries 1 1/2 x 4 inches long? A. The voltage of a dry cell is about 1.5 volt. To light a lamp of 5 1/2 volts will require four cells in series. The size of a cell does not affect the voltage. This is determined by the materials employed. The size of a cell determines the current it will give and the time it will last.

NEW BOOKS, ETC.

THE LOCOMOTIVE. New Series. Vol. 23. Hartford, Conn. 1902. 8vo. Pp. 191. Price \$1.

Through the courtesy of J. M. Allen, A.M., M.E., the editor of the Locomotive, we received the last volume. This interesting publication is issued by the Hartford Steam Boiler Inspection and Insurance Company, and deals with matters germane to steam boilers, power, etc., but occasionally there are published excellent

scientific articles on various subjects. The periodical is well illustrated by half-tone and line drawings. Among the features of the Locomotive is a list of boiler explosions with details.

ELEMENTS OF STEAM ENGINEERING. By H. W. Spangler, Arthur M. Greene, Jr., and S. M. Marshall, B. S. in E. E. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. 1903. 8vo. Pp. v, 275; 273 figures. Price \$3.

This book is intended to bring before the beginner examples of the various forms of steam apparatus used in modern steam power plants; to explain simply and briefly the construction, use and reasons for using these various parts of machines, and to give a working vocabulary in this branch of engineering. Although the book is primarily prepared for first year students in engineering schools, it will probably be of use to the general reader and to many of the young men in manual training schools and institutes.

HEREDITY AND SOCIAL PROGRESS. By Simon N. Patten. New York: The Macmillan Company. London: Macmillan & Co., Ltd. 1903. 12mo. Pp. vii, 214. Price \$1.35.

Prof. Patten has presented here what may well be considered a thorough and clear discussion of a subject which, thanks to Herbert Spencer, has become of constantly increasing importance within recent years.

PROBLEMS IN ASTROPHYSICS. By Agnes M. Clerke. Containing 81 illustrations. London: Adam & Charles Black. 1903. Pp. xvi., 567. Price \$6.

The present work deserves more than usual attention by reason of the scholarly standing of its author as a writer on astronomical subjects. The book which lies before us is characterized by the same excellence which it was our privilege to note in the author's recently published "History of Astronomy During the Nineteenth Century." It is the purpose of the present work not so much to instruct as to suggest. The volume represents a kind of reconnaissance, and embodies the information collected by astrophysical scouts and skirmishers regarding the practical lines of advance and accessible points of attack. The book is divided into two parts, the first of which discusses solar physics, and the second, problems in sidereal physics.

LEAD AND ITS COMPOUNDS. By Thomas Lambert. Illustrated by 40 plans and diagrams. London: Scott, Greenwood & Co. New York: D. Van Nostrand Company. 1902. Pp. xiv, 228. 8vo. Price \$3.50.

The author shows in this volume the great strides which have been made in the metallurgy of lead and zinc. He has incorporated the latest applications of electrical science, not only in cleaning the ores, but also in their after-treatment. The work contains a description of the pigments of both metals, their mixture and properties. The value of the book is enhanced by a chapter devoted to the assaying and analysis of lead and zinc ores, and the quantitative test of paints and oils.

SIDEROLGY. THE SCIENCE OF IRON. By Hanns Freiherr v. Jüptner. Translated from the German by Charles Salter. The Constitution of Iron Alloys and Slags. With 11 plates and 10 illustrations. London: Scott, Greenwood & Co. New York: D. Van Nostrand Company. 1902. 8vo. Pp. viii, 344. Price \$5.

This book may be regarded as a compilation of our present knowledge of iron as it is to be found in the widely-scattered literature on the subject. The work furthermore gives to the student an account of the researches which have been already carried out and explains to the consumer of iron and steel the connection between the various properties of iron and steel, their constituents, and the methods of working the raw material. The work is divided into three portions, the first of which, after describing the theory of solution deals with the microscopical and chemical constituents of iron and slags. The second part treats of the connection between the chemical composition, the working, the microscopical structure, and properties of iron and steel. The third part deals with the reaction between the metal, slags, and other reagents.

THE ART OF ENGRAVING. A Practical Treatise on the Engraver's Art. With Special Reference to Letter and Monogram Engraving. Specially Compiled as a Text-Book for Students and Reference Book and Guide for Engravers. With 200 original illustrations. Philadelphia, Pa.: Keystone Publishing Co. 1903. 8vo. Pp. 199. Price \$1.50.

This seems to be a thoroughly practical book of utility to the skilled engraver as well as to the learner.

THE NEW INTERNATIONAL ENCYCLOPEDIA. Editors Daniel Coit Gilman, LL.D., Harry Thurston Peck, Ph.D., L. H. D., and Frank Moore Colby, M. A. Volume VII. New York: Dodd, Mead & Co. 1903. 8vo. Pp. 888.

This new volume of the International Encyclopedia takes us from "Ethics" to "Fuller-Maitland." Following the plan which we adopt-

ed in reviewing the volumes previously issued, we have confined our attention only to the scientific portions. The article "Evolution" is a most excellent review of the development of Herbert Spencer's theory from the modern, scientific standpoint. A good bibliography is appended to the article. The discussion of "Explosives" may well be considered the best to be found in any of the cyclopedias. Treating as it does of the latest brown and smokeless powder, the article may be considered perhaps the most modern on the subject to be found in any reference book. The article on "Fire Engines" presents all that is worth knowing of modern American fire engines. It is well illustrated by excellent pictures of a chemical fire engine, a hand chemical fire engine, and an American model of 1902. We are glad to note that the subject of modern steel-frame buildings is adequately treated in the article on "Fireproof Construction." For the purpose of illustration, the "Flatiron" building in course of construction has been selected; a better selection could hardly have been made, for the picture illustrates the modern method of constructing the interior steel work first, and then of applying the outer masonry in sections. The scientific biographies are well written. That on Faraday, although brief, is quite adequate. The biography of Benjamin Franklin should have discussed more fully Franklin's scientific achievements. Of the scientific articles in this volume, perhaps the most technical and the most thorough in treatment is the one on "Freezing Point." The discussion of fuel is also good.

TASCHENBUCH DER KRIEGSFLOTTEN. IV. Jahrgang. 1903. Mit teilweiser Benutzung amtlichen Materials. Herausgegeben von B. Weyer, Kapitänleutnant a. D. Mit 277 Schiffsbildern und Skizzen. München: Verlag von J. F. Lehman. 1903. 16mo. Pp. 321. Price \$1.

Capt. Weyer's book comes to us this year in a form that is even better than that of the work which he published last year. The information which he gives is fully as trustworthy as that which is contained in some of the more pretentious naval annuals. His tables, so far as we have been able to discover, seem accurate and comprehensive. The publishers are to be congratulated on the manner in which they have issued this work. The printing and the character of the illustrations are much better than those of the previous volumes.

THE STORY OF THE TRAPPER. By A. C. Laut. Illustrated by Arthur Heming and others. New York: D. Appleton & Co. 1902. Pp. xi, 284. Price \$1.25.

In the "Story of the Trapper" is presented a vivid picture of an adventurous figure painted with a singleness of purpose and a distinctness impossible of realization in the large and detailed histories of the American fur trade and the Hudson's Bay and Northwest Companies, or the various special journals and narratives. The author's wilderness lore and knowledge of the life, added to an acquaintance with its literature, has borne fruit in the personification of the western and northern trappers who live in these pages.

THE GREAT SIBERIAN RAILWAY FROM ST. PETERSBURG TO PEKIN. By Michael Myers Shoemaker. New York and London: G. P. Putnam's Sons. 1903. 12mo. Pp. viii, 243. Price \$2.

In these pages will be found a record of a journey over the Siberian Railway from St. Petersburg to Pekin, with a detour to Corea. The author bases his statistical information on the work published by the Minister of Ways and Means of Communication, "A Guide to the Great Siberian Railway."

THE ANALYSIS OF OILS AND ALLIED SUBSTANCES. By A. C. Wright. New York: D. Van Nostrand Company. London: Crosby, Lockwood & Son. 1903. 8vo. Pp. xi, 241. Price \$3.50.

The author tells us that this brief account of the methods used in the analysis of oils, fats, and waxes has been written with the definite aim of presenting the subject in a form suited to the needs of the student and beginner, and that it includes all recent developments likely to be found of value in practical work. In accordance with this purpose, the chemistry of the various processes is explained in some detail, and methods which have been recently proposed are fully explained. An estimate has been made to indicate the extent to which reliance may be placed upon methods for detecting adulteration. Stock comparisons for estimating each constant have also been selected.

PHYSICO-CHEMICAL TABLES FOR THE USE OF ANALYSTS, PHYSICISTS, CHEMICAL MANUFACTURERS, AND SCIENTIFIC CHEMISTS. In two volumes, each complete in itself. By John Castell-Evans, F.I.C., F.C.S. Vol. I. Chemical Engineering and Physical Chemistry. London: Charles Griffin & Co., Ltd. Philadelphia: J. B. Lippincott Company. 1902. 8vo. Pp. xxxii, 548.

Mr. Castell-Evans has reason to be proud of his work. He has been a most painstaking compiler, so painstaking, indeed, that his work must at times have seemed little short of scientific drudgery. His task must have involved years of labor. The work has been designed to

be of use to all engaged in any branch of chemistry and metallurgy. The volumes will be the means of saving a great deal of time that can be more profitably and pleasantly employed in true scientific work.

ANALYSES OF PIG IRON. Vol. II. Collected and published by Seymour R. Church. San Francisco. Pp. 197. Price \$5.

The contents of this volume are in no sense a repetition of Vol. I, but are made up entirely of new and additional analyses, data and leading articles. The analyses published in this volume, as well as in the first, are taken directly from reports furnished by the respective furnaces or their agents. These reports are to be kept on file for the inspection and convenience of subscribers. The book presents authoritative analyses which should be of great service to the ironmonger. The publisher is to be congratulated upon the very handsome manner in which he has issued this book. Its full leather binding, heavy coated paper, fine printing and admirable illustrations are not often found in technical works.

STEAM POWER PLANTS: THEIR DESIGN AND CONSTRUCTION. By Henry C. Meyer, Jr., M.E. New York: McGraw Publishing Co. 1903. Pp. 159.

Mr. Meyer has presented us with a very carefully prepared work on a subject with which many engineers are familiar, but of which they by no means know all that they ought to know. The most noteworthy features of the book are sixteen folding plates of ground plans, sectional elevations, and the like. These will be of especial service to the power engineer.

CONDUCTORS FOR ELECTRICAL DISTRIBUTION, THEIR MATERIALS AND MANUFACTURE, THE CALCULATION OF CIRCUITS, POLE-LINE CONSTRUCTION, UNDERGROUND WORKING AND OTHER USES. By F. A. C. Perrine, A.M., D.Sc. New York: D. Van Nostrand Company. London: Crosby, Lockwood & Son. 1903. 8vo. Pp. vii, 287. Price \$3.50.

Dr. Perrine's experience as a manufacturer of insulated wires and cables, as a consulting engineer on their installation, and as a teacher of electrical engineering at Leland Stanford, Jr., University, renders him peculiarly well fitted to prepare a book on electrical conductors. The fourteen chapters of which this work is comprised discuss inductive materials, alloyed conductors, the manufacture of wire, wire finishing, wire insulation, cables and their use, classification of cables, calculation of circuits, Kelvin's law of economy in conductors, multiple arc distribution, alternating current calculation, overhead lines, pole line, line insulators, and underground conductors.

WALLPAPERS AND WALL COVERINGS. A Practical Handbook for Decorators, Paperhangers, Architects, Builders, and House-owners. With many Half-Tone and other Illustrations Showing the Latest Designs. By Arthur Seymour Jennings. New York: William T. Comstock. 1903. 8vo. Pp. 161. Price \$2.

The present work may be regarded as an enlarged republication of "Practical Paper Hanging," brought out by the author several years ago. The volume covers the field more fully than the previous work and is furthermore more elaborately illustrated with half-tones of the latest designs of a large number of manufacturers in America, England, and France. Among the chapters which deserve special mention are those on the "Selection of Wall Papers," and "Different Varieties of Wall Papers and their Characteristics." Rules are given showing how difficult or unusual obstacles should be met.

RAILROAD CONSTRUCTION. THEORY AND PRACTICE. A Text-Book for the use of Students in Colleges and Technical Schools. By Walter Loring Webb, C. E. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. 1903. 16mo. Pp. xvii, 675. 232 figures. Price \$5.

Since the issue of the first edition the author has conferred with many noted educators in civil engineering. As a result, it was decided to recast the whole work and to reduce the size of the book from octavo to pocketbook dimensions. The original text has been almost doubled by the addition of several chapters on structures, train resistance, rolling stock, etc., and also several chapters giving the fundamental principles of the economies of railroad location. The author's primary aim has been to produce a textbook for students.

DESCRIPTIVE GEOMETRY. With Numerous Problems and Practical Applications. By William S. Hall, C.E., E.M., M.S. With a 4to Atlas of 18 Plates. New York: D. Van Nostrand Company. 8vo. Pp. iv, 76.

Textbooks of descriptive geometry, with very few exceptions, deal only with first angle projection, but in the best recent practice in mechanical drawing the third angle is used. Moreover, the third angle is commonly employed in perspective. In this book all four angles are used. The problems therefore become general and a large variety of constructions can be introduced under each problem. By inserting the problems for construction in a separate volume and by having several modifications under each problem, work can be read-

