baffle it, stagger it, or what, to accomplish the best results without back pressure: A. Any form of exhaust chamber in which the force of tific reason for the noise at the end of an exhaust pipe of a gasoline engine? A, The noise of an exhaust is caused by its impact against the outer air. 9. Is there anything gained in radiating surface by having properting ribs on gasoline engine cylinders? A. Auything that expands the air surface contact with the cylin der is a gain to air cooled cylinders. The ribs accomplish the desired extension of air-cooling

(9450) W. A. K. asks: What books for instruction would you recommend to one who understands only the radiations of electrical science and wishes to perfect himself in the art? A. The books required for the study of electricity depend entirely upon how you would study. If you would become an educated electrical engineer go to Columbia impossible, you may be able to take a correspondence course at some of the correspondence schools. (The International Schools, at Scranton, Penn., are very large and can furnish you a good opportunity if you are determined to do good work.) It is hardly possible by study by oneself to become an electrician. Contact with machinery, instruments, and men doing the actual work are necessary. There is so much which is not in any book which must be known. You say you wish to "perfect yourself in the art." If that has its usual meaning that you wish simply to learn how to do electrical work, the best way to learn that is to obtain a position in an electrical shop and learn the art of making the apparatus: or in a construction company and bearn the art of installing machinery, the line, eter; or in a station and journ how to operate There are many those of learning troop which you must choose one, seconding to your profile development. Prof. Wangle, in his means, and possibilities, of which you do not new book on this subject, gives instructions means, and possibilities, of which you do not give us may helications. Lastly, if what you wish to learn is electrical science, you can then begin with books and study either with or without a teacher, though for better with a teacher. You might start with "Swope's Elementary Lessons," price \$2,00, go on into "Hawkins and Wallis' Dynamo," price \$3,00; take next "Thompson's Dynamo Electric Marhinery," price \$7.50, and bils other books; follow with "Chocker's Electric Lighting," 2 vols., price 86,00; after this might come the transmission of power, electric railways, etc. There are books enough to last for nearly years of sindy for the man studiously inclined.

(9451) C. H. McC. says: Can you tell me where I can find a description of the apparmous used by Telsa to generale the high tension currents with which he was experimenting a few years ago? I believe he called his machine an "oscillator." If there are any SUPPLEMENTS describing these experiment please let me know the numbers. A. We have published a description of the high frequency coit in our Supelement No. 1087, which are will send for ten cents. The United States Electrical Supply Company, Mt. Vernon, N. Y., NOTES ON ELECTRIC RAILWAY ECONOMICS make the apparatus, both for generating the electricity and for the experiments, thus furnishing a complete outfit which can be relied upon to do the work. These outfits are very highly spoken of.

(9452) O. H. says: Will you kindly inform me what is the best protection against lightning for telephones, viz.: to protect the ringer, coil, and building? Would you advise "dead ends" or ground connection when the 'phone is disconnected from the main wire? protection? A. Lightning arresters, which will be furnished by the telephone company, are the best protection for telephones from lightning. There can be no such thing as "absolute protection" from lightning. Reasonable protection is all that can be had. The usual lightning investor works through α grounded wire to the earth. We know of nothing bet-Comparatively few instruments are new burned out by lightning.

(9453) H. M. says: You will very greatly oblige me by kindly answering the following questions concerning "The Tesla Thomson High Frequency Coil" as described tion coils, even when insulated with oil. 2. the records of practice are essential to use of the high fension trans, have! Will single are ordinarily insulated with (il. Double cot- under normal conditions and indicase the over in the middle layers of the coil and multiply rincard judgment of the designer are required. Tear's volume. We have but ever ion to use ing by the total number of torus. A table for The work has been prepared with the coopera his reference books more or less from early

per pound for any size of whe. 4. Will the ters trent of shrinkage and pressure joints, sulation? A. It is not probable that the coll and pin joints. All formulæ and figures necthe exhaust is divided and gradually expanded will stand the strain except by oil insulation, essays for an adequate treasment of the subwill deaden the sound. 8. What is the scien- Even then the insulation may be punctured frequently, but as soon as the oil closes in again the insulation is restored.

NEW BOOKS, ETC.

THE PLANETARY SYSTEM. A Study of Its Structure and Growth. By Frank Bursley Taylor. Fort Wayne, Indi-ana: Frank Bursley Taylor; London: C. D. Cazenove & Son, 1993. 12mo.; pp. 278; illustrated. Price \$1.50.

Our author first challenges Newton's theory of the moon's stability, on the ground that, if correct, it should serve as a basis for generalization, and should yield a law for the stabitity of inner satellites. This it has failed to do. The author then advances a new theory of stability which, he etaims, does yield such University and take the course. If that is a general law. The application of this decory accounts for the origin of the asteroids, the separation of the planets into two groups with the asteroids between, the position of the superior planets next outside of the asteroids the greater masses of the superior planets, and the origin of Saturn's rings. The new hypothesis also leads to interesting explana tions of various other tacts and phenomena, such as the retrograde satellite systems of Uranus and Neptune, the inclination of the moon's plane to the earth's equator, etc.

> Systematic Pomonomy, By F. A. Waugh, Professor of Horticulture and Landscape Gardening, Massachusetts Agricultural College. New York: Orange Judd Company, 1903. 8vo.; pp. 300. Price, \$1.

The study and classification of fradia is sees only in order to make possible their mose for the systematic study and classification of our vacious fruits, which will be of value to frem growers, teachers, and all scientific in vestigators of fids subject. The book fruits Shansarvely of the newbook of describing fruits, of the perplexing system of nomenclaure, of the practical and scientific classifier ion of varieties, and of the judging and seion ritic laboratory study of all kinds of fraits The book will be toutd particularly helpful to students who wish to burn those about pounding from practical self-investigation, 1: will also be of great service to acrescrymen and fruit growers, as well as of use as a labora-ray guide and manual. Complete instructions to garding the photography of finite and the keeping of eard catalogues of the same are among the valuable Safters of the book.

DAMPESCHNELLBAHNZUG für 120 km. mittlere stündliche Geschwindigkeit (150 Km.-St. maximal). Von Dr. Ing. Heinrich Mehlis. Mit 10 Tafeln in Photolithographic. Zweite Auflage. Berlin: Verlag von Georg Siemens, 1904.

AND PRELIMINARY ENGINEERING. By W. C. Gotshall, M. Am. Soc. C. E. and Am. Inst. E. E. New York: McGraw Publishing Company, 1903. 8vo.; pp. 252. Price, \$2.

This book is the outcome of a series of lec tures which were given by the author at Lehigh University. It treats exclusively of highspeed interurban railways, taking up the sub ject at the preliminary office investigation of the probable earnings and expenses, and carrying it through track location and construct on Is the lightning arrester now in use absolute up to the completion and operation of the read. Detailed statements of costs of operation and their computation for different schedules are given, and the economics of such projects is thoroughly discussed. Full data regarding train resistance are given

HINE DESIGN. By William Ledyard Cathcart, Adjunct Professor of Me-Price \$3.

This book, which forms Part I. of the complete work, is devoted entirely to all kinds
of fastenings used in machinery. The book Thomson High Frequency Coll as described in Scientific American Scientific American Scientific No. is practical in freatment, but the theoretical 1087: 1. Should wire known as magnet wire be used on the primary? on the secondary? Side of the subject is also fully given for completeness, side only, since this side of the subject is also fully given for completeness, side only, since this side of the subject is also fully given for completeness, side only, since this side of the subject is also fully given for completeness, side only, since this side of the subject is also fully given for completeness, side only, since this side of the subject is also fully given for completeness. Both scientific analyses good What kind of insulation should the secondary cess in the design of mirelane manufactor but neither alone is trustworthy, as the former cotton covered do? A. High trequency coils predicts only those swesses which prevail ton covered wire is to be preferred to single load, the rough handling, or the sticht acricovered wire when large differences of poten , dents which the machine may used, and when tial are to be produced. 3. How many meeting which, it should not fall. Practical pounds of wire are required for each coil of data show only the proportions which conwire on the high tension transformers? structors have given in specific edges of stres How many pounds will be required for the and service, and empirical formula founded secondary of the high frequency coil? As upon them may not give the desired results, if We have not the weight of wire at hand for the inherent limitations of these formulae is the coils you intend to make. It is more come exceeded. The problem of design is one whose mon to specify the number of turns of wire 'many elements vary continually in number-You can transform turns to pounds approxi , character and magnified; and, for its selecalculating the length of one turn; tion, theoretical analysis, precedent and the

for practical engineers.

METALLURGICAL ANALYSIS AND ASSAYING. By W. A. Macleod, B.A., B.Sc., and Charles Walker, F.C.S. London: Charles Griffin & Co., Ltd.; Philadelphia: J. P. Lippincott Company, 1903. 8vo.; pp. 318. Price, \$4.

The pre-ent volume'is intended to meet the requirements of Anglo-Colonial schools of miles; and waite we always feel a bend which is intended as a textbook for specified couris hampered, still the present volume appears to be an excellent one. Typographically the work is perfect, and the diagrams are very clear. It is a book which we can recom mend to those who wish to study chemistry by

RAHWAY LEGISLATION IN THE UNITED STATES. By Balthasar Henry Meye, Ph.D. New York: The Macmillan Company, 1963. 16mo.; pp. 329. Company, 1 Price, \$1.25.

The aim of this volume is to present a condensed analysis of the private and public laws which govern vailways in the United States, and of exportanc decisions relating to intersinte commerce. The statements and comments are based upon actual analysis, and, in a large part, upon analytical tables of chartees and laws enacted in the valious States. These tables present so many (vpogenplace) difficulties, it was not thought expedient to publish them. The author is Professor of Insitutes of Commerce in the University of Wisconsia. The bus proprior and an exceedingly difficult lask, and the book should appeal to all Gibling persons.

Cassell's Popular Science. Vol. II. Edifed by Alexander S. Galt. Hlus-trated. New York: 1904. Square Svo.; pp. 556. Price, 85.

Titls second column of Cassell's Popular Science is characterized by the same treatment widen we laid occasion to note in our review of the first volume. For the most part the seinjects are confined to pure science, the reviews of applied science being contined to electricity, photography, and the rate. The initiales are alf of them writien with a true regard for selectific accuracy, and are yet conclud in such simple language that the man who makes no prejensions to scientific knowledge ear readily anderstand them. Their length, more over, has been so calculated that they will not farigue the attention.

RADIOM AND RADIO-ACTIVE ELEMENTS. Popular Account Treated Experimentally, My Leonard A. Levy and Herbert G. Willis, Illustrated, London: Percival Marshall & Co., 1904. 12mo.; pp. 105. Price, 25 cents.

Messrs. Levy and Willis have in this book endeavered to give a popular and withal a scientifically accurate account of radium. The book may be said to accomplish its purpose, and to do credit to its authors. It is likely to be of interest to the man in the street. Although a compilation in its way of the writings of Curie, Ramsay, Ru'herford, Elster, and Geitel, the book nevertheless presents a certain originality of creatment. In our opinion the work may be commended to those who are interested in something more than the sensational side of radioactive substances

THE WIDOW'S MITE AND OTHER PSYCHO-10GICAL PHENOMENA. By Dr. I. K. Funk. New York and London: Funk & Wagnalls Company, 1904. 12mo.; pp. 538. Price, \$2.

If anyone expects to find in Dr. Funk's book a scientific exposition of spiritualism, or, indeed, anything at all that has not hitherto been known about spiritualism, he will be chanical Engineering, Columbia Unisadly disappointed. What Dr. Unis has done versity. New York: D. Van Nostrand Company, 1903. 8vo.; pp. 285. the finding of the Jewish coin, called the "widow's mite." through the spirit of Henry Ward Beecher. Dr. Funk's disclosures are no more remarkable than those of hundreds of other investigators, among their men of the simplifier of Shr William Crookes, Affred Rus well Wallace, Prof. Hyslop and Prof. James. Dr. Platek hituself makes ne aftenna safanti facility to explain the talks that he saw or claims to Lave seem compound binaself simply with a mere somewhat of facts, from which the reader is left to show his own conclusions. Hosfidos marcitting the story of the "wishow's mite." Or. Final presents an interesting account of the work of other men. Whosever may be one's opinion of the value of Dr. Funk's inquiry, one cannot had be impressed to dis earnestness and his farmess.

> TOSCHENBER IF DER KRIEGSFLOFTEN. Jahr ang, 1904. Mii feilweiser Benutzung amtlichen Materials. Herausgegeben von B. Weyer, Kapitänicu!nant a. D. München: J. mann's Verlag, 1904. Pp. 341.

Capt. Weyer's new handbook contains meetly much the same information as had copper wire will give you the number of feet tion of many prominent engineers. Its chap- ever since their publication, and have found

them in every respect trustworthy and accuincrease in length of spark warrant an oil in-1 screw fastenings, riveted joints, and layed rate. Indeed, in some ways his little volumes contain information not elsewhere to be found. Notably is this (1000 of the general ject, as well as a considerable number of data pertaining to Russia's Baltic fleet, now illustrations, diagrams, and tables, add to in course of construction, to be found in last the value of the book as a work of reference year's book. The events of the present war have naturally affected Russia's naval position to a marked degree. Capt. Weyer still listed even those vessels of the Russian navy which have been destroyed; but has clearly indicated their loss, in order that no reader may be misled. It has been impossible to note similar losses in the Japanese navy, because no official reports can be obtained of the damage sustained.

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