

What is its explosive force compared with rifle powder or nitro-glycerine, and why is it not used for explosive purposes? A. The claim that one ounce of gold fulminate could destroy New York City is absurd. The fulminates are all explosive; only one has any commercial use, and that is the mercury fulminate. It is used as detonator only. The fulminates are all far too expensive, and are also too unstable for any use as explosives. Mercury fulminate can be used for rifles, but it is never done, for reasons specified.

(9031) A. M. Works asks: What should be the diameter and width of an under-shot waterwheel to develop about two horse power when fixed in a current of six miles an hour. A. The area of each bucket should be 4 feet; the most suitable shape may be 4 feet wide, 1 foot deep, and have an immersion of 1 3/4 feet above the periphery. The wheel should be 8 feet in diameter, have 12 buckets, and should run at from 9 to 12 revolutions per minute according to its work.

(9032) J. A. S. writes: Please inform me in regard to the elevation of the Mississippi River; as to whether it is higher at its mouth than at its source, and please state how much, if possible. A. The Mississippi River, on the gravity plane, is about 426 feet higher at St. Louis than at its mouth in the Gulf of Mexico. All levels on the globe are referred to the gravity plane, which is about 13 1/4 miles nearer the earth's center at the poles than at the equator. This plane is the true basis upon which all level data are made. Uphill and downhill always refer to the gravity plane. Its relation to a perfect sphere is the cause of much misunderstanding and discussion among people, either from the desire for a catch argument or from want of truthful knowledge of the facts. Water never runs uphill, although St. Louis is nearer the earth's center than the mouth of the Mississippi River.

(9033) W. F. H. asks: 1. In a permanent steel ring [O] magnet are there any poles? If so, what determines their location? A. In a magnetized steel ring the poles may be placed at any points desired by making those points the places from which the magnets leave the ring when the ring is magnetized. That is, pull the ring from the magnets, or the magnets from the ring, at the points where you desire poles to be located. Of course it is easier to place the poles at diametrically opposite points of the ring. 2. Are the magnetic lines of force the same in a permanent steel magnet as in an electro-magnet? If so, why could not the permanent magnetic field be made to revolve an armature as well as an electro-magnet field? A. Permanent magnets were first used for the fields of dynamos and motors. They are not now used because they cannot be made as strong as electro-magnets, and they are liable to lose their magnetism by jars, etc. 3. Why is there a neutral point midway between the poles of a magnet? A. The neutral point of a magnet is the point or line on which there is just as much positive as negative force, and not the point or line of no force. Break a magnet on the neutral line and two poles are found on the ends of the two pieces. They were there before the bar was broken. The pole at the end of a magnet is due to the fact that there is no magnetism of the opposite sort to render it inactive. Put the opposite poles of two magnets together, either bar or horse shoe, and the poles at the point of contact disappear, not because they are destroyed, but because their mutual attraction prevents any of the lines of force escaping into the air at that place. If all lines of force can find their way around the magnetic circuit without emerging into the air they are not discoverable from the outside and the circuit is not discoverable from the outside. The metal acts as if it were not magnetized. Only the lines which leak out of the metal are to be detected by any of our methods. 4. Will you please inform me how the noise and vibration of a heavy printing press, on the second floor of a business block, can be prevented or measurably deadened, to prevent the annoyance it causes to tenants on the first floor? A. It is a difficult matter to so deaden a floor that the noise from a heavy printing press will not be heard in the room below. A layer of deadening material could be put over the floor and a second floor laid on that with some advantage. A deadening layer of mortar or other material can be put into the space between the floor and ceiling below. A second ceiling can be put into the room below, enclosing an air space and reducing the height of the lower room by six to ten inches. These various expedients have all been employed and all together will reduce the annoyance as much as it can be reduced.

(9034) E. G. asks: Will you inform me how to prepare silk for making a small balloon to hold gas for about two or three weeks? Could I use paper instead of silk? The balloon must be about 3 feet long, 2 feet wide, and lift about 3 ounces. It is to be used indoors. Can I use anything besides above-mentioned materials? A. Silk is prepared for use in a balloon by varnishing it. It should be stretched tight, and the varnish applied in the usual way. When dry it can be used. Good boiled linseed oil forms an excellent coating for balloons. An India rubber coating may be used. It is prepared as follows: India rubber, 1 pound, cut small; oil of turpentine, 6 pounds; boiled linseed oil, 1 gallon. Digest the India rubber in the turpentine in a warm place for a week, frequently shaking the vessel; then place

it in a water bath, and heat slowly till the solution is complete. Next add the oil, previously warmed, simmer gently for five minutes, stirring all the while, after which closely cover it over, and when cold strain through flannel. You could probably make a balloon of such small size and for indoor use of tissue paper.

NEW BOOKS, ETC.

THE WOMAN WHO TOLLS. Being the Experience of Two Ladies as Factory Girls. By Mrs. John Van Vorst and Marie Van Vorst. New York: Doubleday, Page & Co. 1903. Pp. ix, 303.

This book may well be considered as a detailed study of one phase of the life which "the other half" lives, as Jacob Riis has told us. That the woman who toils is exposed to even greater temptations and to greater misery than the man who toils, many of us have perhaps suspected. Just what this woman must endure has been set forth by the two authors of this book in a way that is anything but cheerful. The picture is true; and because it is true it is gloomy. Here and there it is brightened a bit, particularly when the conditions that prevail in some of the better factories are described. On the whole, the conditions of the working girl as they are set forth in this book are decidedly deplorable, to say the least.

RACQUETS, TENNIS, AND SQUASH. By Eustace Miles, M.A. Illustrated with 54 photographs and 16 diagrams. D. Appleton & Co. 1903.

This work at once demands recognition as an authority upon the games mentioned above, owing to the fact that the author is a past-master in the art, and has made a deeper study of the theory of "games of the court" than any other living player. The work is divided into several parts; the first part being "Hints on Training," in which the author describes preparatory exercises, the proper methods of breathing, massage, work, rest, etc., preliminary to putting one's self in fit condition for the strenuous side of these sports. The chapter on food and diet will probably be viewed somewhat askance by the ordinary Anglo-Saxon, as the regime suggested by the author is somewhat too rigorous and crude for most people engaged in active forms of exercise. The author describes and illustrates a number of methods of developing the stroke at home, both for Tennis and Racquet, in which the ball is suspended by means of tackling in such a manner that the various strokes may be practised in leisure moments when the much-sought-after court cannot be obtained. Plans of both tennis and squash courts are shown, which will be of service to those who propose to lay out private grounds. Anyone who wishes to perfect himself in the game should certainly have this book before him, as it will soon be considered a standard authority. Lists of the winners of the championships in both America and England are published in the book. It will be noted that Mr. Miles has won the amateur tennis championship in England in 1899, 1901, and 1902, and also the American amateur tennis championship in 1900.

INORGANIC CHEMISTRY. With the Elements of Physical and Theoretical Chemistry. By J. I. D. Hinds, Ph.D. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. 1902. 8vo. Pp. viii, 566. Price, \$3.

This volume is intended to supply a rather complete text-book on inorganic chemistry and a handy reference-book for all students and teachers of chemistry. The author has endeavored to present an orderly and systematic treatment of the subject without reference to any teaching method, so that the teacher may go from chapter to chapter as his own method requires. Part I. contains a good general introduction to chemistry and a logical division of the subject into its principal branches. Part II. gives such an outline of physical chemistry as is necessary to the full understanding and appreciation of the descriptive portion of the work. Part III. discusses theoretical chemistry with more than usual thoroughness. It is the purpose of Part IV. to treat, with the fullness which it deserves, every known chemical element, and the compounds which are of commercial and theoretical interest. In classification and treatment the periodic system has been closely followed. We are pleased to note that the author has adopted the modern spelling of chemical terms, recommended by the Chemical Section of the American Association for the Advancement of Science.

THE DESIGN OF SIMPLE ROOF-TRUSSES IN WOOD AND STEEL. With an Introduction to the Elements of Graphic Statics. By Malverd A. Howe, C.E. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. 1902. Pp. 129. Price \$2.

In his preface Prof. Howe modestly asserts that very little, if anything, new will be found in the pages of his book. Nevertheless, the book finds its justification in the fact that it has brought together in small compass all the essentials required in the proper designing of roof-trusses. Although the timber roof-truss is considered by many engineers somewhat antiquated, Prof. Howe has deemed it worthy of discussion, and not without reason, we think. His treatment of the steel truss is contained in the sixth chapter of the book, in which he says what he has to say in a terse, technical

way. The method of discussion which Prof. Howe has adopted is both graphical and mathematical.

ANIMALS BEFORE MAN IN NORTH AMERICA. Their Lives and Times. By Frederic A. Lucas. New York: D. Appleton & Co. 1902. 12mo. Pp. vii, 291. Price, \$1.20.

This book pictures the early life of our continent, tells something of the fishes that once swam about its shores, of the reptiles that splashed through the swamps, and of the great mammals that once roamed over the western plains. All this Mr. Lucas has told with a certain charm that relieves his work of much of the monotony that would be expected of a subject of so scientific a character. His book may be said to occupy a position midway between the technical manual and the popular description of historical animals.

THE THERMODYNAMICS OF HEAT-ENGINES. By Sidney A. Reeve. New York: The Macmillan Company. London: Macmillan & Co., Ltd. 1903. 12mo. Pp. xi, 316. Price \$2.60.

The author has divided his book into two parts. The first is devoted to theory, and the second to the application of theory to practice. In the first part he discusses the general principles of energetics, the cycle, the thermal properties of matter, the steam engine cycle, and the laws of permanent gases, gas engine cycles, hot air engines, heat engine possibilities, and refrigerating machines. In the second part he discusses the simple steam engine, the compound steam engine, and the Otto gas engine. The appendix is comprised of tables.

HARDENING, TEMPERING, ANNEALING AND FORGING OF STEEL. By Joseph V. Woodworth. New York: Munn & Co. 1903. 8vo. Pp. 288, 200 illustrations. Price \$2.50.

A new work from cover to cover, treating in a clear, concise manner all modern processes for the heating, annealing, forging, welding, hardening and tempering of steel, making it a book of great practical value to metal-working mechanics in general, with special directions for the successful hardening and tempering of all steel tools used in the arts, including milling cutters, taps, thread dies, reamers, both solid and shell, hollow mills, punches and dies, and all kinds of sheet metal working tools, shear blades, saws, fine cutlery, and metal cutting tools of all description, as well as for all implements of steel both large and small. In this work the simplest and most satisfactory hardening and tempering processes are given. The uses to which the leading brands of steel may be adapted are concisely presented, and their treatment for working under different conditions explained, also the special methods for the hardening and tempering of special brands. In connection with the above numbers of "kinks," "ways" and "practical points" are embodied, making the volume a text book on the treatment of steel as modern demands necessitate.

A chapter devoted to the different processes for case-hardening is also included, and special reference made to the adoption of machinery steel for tools of various kinds. The illustrations show the mechanic the most up-to-date devices, machines and furnaces which contribute to the attainment of satisfactory results in this highly important branch of modern tool-making.

DIES; THEIR CONSTRUCTION AND USE FOR MODERN WORKING OF SHEET METALS. By Joseph V. Woodworth. New York: Munn & Co. 1903. 8vo. Pp. 384, 505 engravings. Price \$3.

A treatise upon the designing, constructing and use of tools, fixtures and devices, together with the manner in which they should be used in the power press, for the cheap and rapid production of sheet-metal parts and articles. Comprising fundamental designs and practical points by which sheet metal parts may be produced at the minimum of cost to the maximum of output, together with special reference to the hardening and tempering of press tools, and to the classes of work which may be produced to the best advantage by the use of dies in the power press. A complete treatise on the subject and the most comprehensive and exhaustive one in existence. A book written by a practical man for practical men, and one that die-makers, machinists, toolmakers or metal-working mechanics cannot afford to be without.

This work shows engravings of dies, press fixtures and sheet-metal-working devices, from the simplest to the most intricate in modern use, and the author has described their construction and use in a clear, practical manner, so that all grades of metal-working mechanics will be able to understand thoroughly how to design, construct and use them, for the production of the marvelous variety of sheet-metal articles and parts which are now in general use. Many of the dies and press fixtures shown and described herein were constructed by the author, others under his supervision; while others were constructed by some of our most skillful mechanics and used in some of the largest sheet-metal goods establishments and machine shops in the United States. A very much needed book and an important addition to the literature of mechanics.

THE JOURNEY'S END. A Romance of Today. By Justus Miles Forman. Illustrated by Karl J. Anderson. New York: Doubleday, Page & Co. 1903. 12mo. Pp. 240. Price \$1.50.

KALENDER FÜR ELEKTROCHEMIKER SOWIE TECHNISCHE CHEMIKER UND PHYSIKER FÜR DAS JAHR 1903. VII. Jahrgang. Herausgegeben von Dr. A. Neuberger. Mit einer Beilage. Berlin: Verlag von M. Krayn. Pp. xxx, 600.

REPORT OF THE MINISTER OF AGRICULTURE FOR THE DOMINION OF CANADA FOR THE YEAR ENDED OCTOBER 31, 1902. Printed by Order of Parliament. Ottawa. 1903. Pp. lxiii, 284.

SMITHSONIAN INSTITUTION. Bureau of American Ethnology. J. W. Powell Director. Bulletin 27. Tsimshian Texts. By Franz Boas. Washington: Government Printing Office. 1902. Pp. 244.

SPECIFICATIONS FOR LANCASHIRE BOILER AND BOILER SEATING. By Inspector M.I.M.E. Manchester: Technical Publishing Company, Ltd. 1903. 8vo. Pp. 23.

THE MENTAL STATUS OF CZOLGOSZ, THE ASSASSIN OF PRESIDENT MCKINLEY. By Walter Channing, M. D. Brookline, Mass. From the American Journal of Insanity. Pp. 46.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending

May 12, 1903,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Table listing inventions with patent numbers, including items like Acetylene generators, Acid in products of combustion, Acid or other liquid distributing system, Aerating liquids and bottling same, Air brake pipes, fluid pressure coupling, Air brake system attachment, Air compressor, Air means for filtering, etc.

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