

borhood of one-half of one degree, or at least the rise in temperature is less than one degree. The flow of the falls is estimated at—in round numbers—12,000,000 horse power, and it would be reasonable to say that 300,000 tons of coal a day would perform the task referred to.

(9054) T. M. F. says: Please send me by return mail formula or other information relating to the "coloring" of meerschaum pipes (smoking) after they have been smoked for a while. A. We give you an extract from our new "Cyclopedia of Receipts, Notes and Queries" (price \$5). Ordinarily, the pipe is boiled for coloring in a preparation of wax which is absorbed, and a thin coating of wax is held on the surface of the pipe, and made to take a high polish. Under the wax is retained the oil of tobacco, which is absorbed by the pipe, and its hue grows darker in proportion to the tobacco used. A meerschaum pipe should at first be smoked very slowly, and before a second bowlful is lighted, the pipe should cool off. This is to keep the wax as far up on the bowl as possible, and rapid smoking will overheat, driving the wax off and leaving the pipe dry and raw. A new pipe should never be smoked outdoors in extremely cold weather. Fill the pipe and smoke down about one-third, or to the height to which you wish to color. Leave the remainder of the tobacco in the pipe, and do not empty or disturb it for several weeks, or until the desired color is obtained. When smoking, put fresh tobacco on the top and smoke to the same level. When once burnt, the pipe cannot be satisfactorily colored, unless the burnt portion is removed, and the surface again treated by the process by which meerschaum is prepared. The coloring is produced by action of the smoke upon the oils and wax, which are superficially on the exterior of the pipe, and are applied in the process of manufacture.

(9055) W. V. H. writes: In your issue of May 2 you refer to Lord Rayleigh's experiments on surface tension of liquids. May I ask what is the supposed cause of the rotation of pieces of camphor floating in pure water? What is the force which causes the pieces to rotate? I found the pieces I floated in water rotated some with the hands of a watch, and some contrariwise, and that the smaller the piece the more rapid was the rate of rotation. I am quite at a loss to know what force it can be that causes the rotatory movement. A. Camphor is soluble to a slight degree in water. When camphor is dropped upon water a small film of camphor is formed upon the water. The camphor film has less surface tension than the water. The elasticity of the surface film of the water pulls the camphor in some direction, since the piece of camphor is never perfectly regular in outline. The solution takes place more easily at the points of the camphor, and the greater strength of the film of water pulls the piece of camphor along, or rotates it most capriciously. A perfect sphere of camphor would not rotate under these circumstances. The camphor film would spread out uniformly over the water, and the ball of camphor would lie still in the middle of the expanding film of solution of camphor. The actual pieces of camphor move in any direction they may happen to take. The smaller pieces go faster because they are lighter and move more easily than the heavier pieces. You can see the effect of a reduction of surface tension in producing motion if you will lay two needles upon water parallel to each other, about three-quarters of an inch apart, and then drop a drop of alcohol between them. The surface tension of alcohol is much less than that of water and the greater surface tension of the water pulls the needles apart very suddenly, sometimes a distance of a couple of inches.

(9056) C. B. C. asks: 1. Does an arc light require more volts or amperes? A. The electric arc has a back electromotive force of about 30 volts. (Carhart.) Hence 45 to 50 volts are employed in an open arc lamp, and about 10 amperes. In an inclosed arc lamp about 80 to 85 volts and 4 to 5 amperes are found necessary. 2. Can the motor described in SUPPLEMENT No. 641 be run on a 104-volt circuit? A. The simple electric motor cannot be run with an alternating current nor with a voltage much above 14 to 16 volts. 3. What would happen if a direct-current motor were connected with an alternating current dynamo? A. If the alternating current were sent through a direct-current motor at rest, it would be heated and burned out. If the motor were running at the speed required by the alternating current, the motor would ordinarily take its load and carry it. The alternations in this case would occur on the commutator bars, just as they would on the rings of an alternating-current motor, since the motor is "in step" with the current. 4. Why are carbon brushes preferable under any circumstances? A. Carbon brushes have less friction upon the commutator bars than copper brushes have.

(9057) T. N. W. P. wishes to know of an acid that can be used in a cold state for etching on type metal. A. The basis of type metal is lead, and this is cut very slowly by any acid. Sulphuric acid will eat it away faster than any other, but this is a very slow operation. We should suppose it would be necessary to cut out a mold and cast the type metal in the mold for the marking tool. Any number of duplicates may be made from one mold.

NEW BOOKS, ETC.

MODERN MACHINE SHOP TOOLS: THEIR CONSTRUCTION, OPERATION AND MANIPULATION, INCLUDING BOTH HAND AND MACHINE TOOLS. By W. H. Vandervoort, M.E. New York: Munn & Co. 1903. 8vo. Pp. 600. 672 Illustrations. Price \$4.

An entirely new and fully illustrated work, treating the subject of Modern Machine Shop Tools in a concise and comprehensive manner. Special care has been taken to eliminate all matter not strictly pertaining to the subject, thus making it possible to give the reader complete information germane to machine shop tools and methods in a single volume at a moderate price. The work is logically arranged, the various hand and machine tools being grouped into classes, and description of each is given in proportion to its relative importance. The illustrations represent the very latest tools and methods, all of which are clearly described. Each tool is considered from the following points: First, its construction with hints as to its manufacture; second, its operation, proper manipulation and care; third, numerous examples of work performed.

It is a book of practical instruction, written with a full appreciation of the influence of modern manufacturing shop methods upon the training of young mechanics. A book in which the apprentice will find a thorough course of instruction; the mechanic, a valuable manual of practice, and the superintendent and foreman many valuable suggestions. The chapters on gearing, belting and transmission machinery, fastenings, and hardening and tempering are included because of their importance in machine shop work and the necessity of the mechanic becoming thoroughly familiar with these subjects. The chapters on shop conveniences and useful data and tables also contain much information of incalculable value as a book of reference. This book is strictly up to date in all respects and is the most complete, concise, and useful work ever published on the subject. No machinist can afford to be without this book.

ELEMENTARY PHYSICS. By Frank William Miller, A. M., and August Frederic Foerste, Ph.D. New York: Charles Scribner's Sons. 1903. 16mo. Pp. ix, 413. Price \$1.25.

The authors tell us that the purpose of this book is to make the pupil acquainted with the more elementary facts of physics and physical chemistry, to give some idea of methods of experimentation, to illustrate the drawing of conclusions from experiments and observations, and to show that theories are merely attempts to explain by means of certain suppositions, various phenomena whose existence is unquestionable, but whose nature cannot be otherwise more satisfactorily explained.

SILVERWORK AND JEWELRY. A Text-Book for Students and Workers in Metal. By H. Wilson. With Diagrams by the Author and Other Illustrations. New York: D. Appleton & Co. 1903. 12mo. Pp. 346. Price \$1.40.

This is the second of a series of hand-books on the artistic crafts, the purpose of the editor being to provide trustworthy text-books for workshop practice from the point of view of the expert who has critically examined the methods current in the shops, and, putting aside vain survivals, is prepared to say what is good workmanship. Work in precious metals, the subject which is considered in the present volume, is treated from the standpoint of reasonable needs, and of the natural development of traditional forms and of pleasing, unobtrusive finish. The work is intended as a practical guide to some of the more simple processes of the craft.

THE UTILISATION OF WOOD-WASTE. By Ernst Hubbard. Translated from the German of the Second Revised and Enlarged Edition by M. J. Salter, F.I.C., F.C.S., Member of the German Chemical Society of Berlin. With 50 illustrations. London: Scott, Greenwood & Co. 1902. 12mo. Pp. xvi, 192. Price \$2.50.

In the industries in which wood is employed, a quantity of waste material is obtained which cannot be used for fuel or for construction, unless special appliances are employed for that purpose. The object of this book is to give information as to the most advantageous methods of utilizing all wood waste. In this revised edition the latest utilizations are described for the utilization of waste material. It contains many alphabetical suggestions.

STATICS BY ALGEBRAIC AND GRAPHIC METHODS. Intended Primarily for Students of Engineering and Architecture. By Lewis J. Johnson, C.E. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. 1903. 8vo. Pp. viii, 133; 42 figures, 6 double-page plates. Price \$2.

An attempt has been made in this book to carry out several specific purposes. The author has sought to give much attention to the elements of the science and to make as clear as possible the course of deduction. Inherent mathematical limitations of pure statics are pointed out; how important problems are to be solved is also shown. The author endeavors to develop algebraic and graphic methods of solution. He presents a

graded set of problems, illustrating not only general principles, but also how statics are used in engineering practice.

HOME FLORICULTURE. A Practical Guide to the Treatment of Flowering and Other Ornamental Plants in the House and Garden. By Eben E. Rexford. Illustrated. New York: Orange Judd Company. 1903. Pp. 300.

Mr. Rexford's book is a book for amateur floriculturists, written because there is a constant and increasing demand for a work that treats of flowers from the standpoint of the amateur. The basis is the author's own personal experience among flowers and not theory. The book is intended simply to assist the amateur in the acquirement of the knowledge which can come only from intelligent personal study, and observation which will lead to a better acquaintance with flowers.

ELEKTRISCHE STRASSENBAHNEN. Von Johannes Zacharias. Mit 128 Abbildungen. Wien, Pest, Leipzig: A. Hartleben's Verlag. 1903. 16mo. Pp. 240. Price \$1.50.

"Street railway" was originally a term confined only to surface roads which traversed a city. Nowadays the term has been broadened in its application so that it includes even elevated and underground roads. The work which lies before us adopts this broader meaning, and, therefore, treats both of elevated and underground roads as well as of surface roads. An appendix describes industrial roads as well. The book may be divided into six sections; the first describes track construction; the second, line conductors; third, rolling stock; the fourth, power houses; the fifth, the designing and building of a street railway; and the sixth, various railroads. The text is elucidated by many illustrations.

ELECTRICITY AS APPLIED TO MINING. By Arnold Lupton, G. D. Aspinall Parr, and Herbert Perkin. New York: D. Van Nostrand Company. London: Crosby Lockwood & Son. 1903. Pp. vii, 280. 8vo. Price \$3.50.

Twenty-five years ago the use of electricity in mining was confined to signaling and shot-firing; twenty years ago the pioneers of electric lighting and electric power transmission were beginning to use electricity in mines. Since that time the improvements have been so numerous that to-day electricity is widely used for lighting and as a mode of transmitting power. It follows, therefore, that a work which is especially devoted to this branch of the subject of applied electricity should not be without value. The authors have not sought to provide an elaborate text-book. All they have done is to present to the reader the leading truths and main principles of electricity and electrical engineering. A book which is the result of the collaboration of three men, each a specialist in the particular branch of the subject upon which he is writing, should surely find a place in the growing literature of electrical and mining engineering.

THE UTILIZATION OF WASTE PRODUCTS. A Treatise on the Rational Utilization, Recovery, and Treatment of Waste Products of All Kinds. By Dr. Theodor Koller. Translated from the German Second Revised Edition. With twenty-two illustrations. London: Scott, Greenwood & Co. New York: D. Van Nostrand Company. 1902. Pp. viii, 279. 8vo. Price \$3.50.

The book which lies before us treats quite fully of the subject of the utilization of waste products in all its aspects. The wastes which are discussed vary widely in character, for which reason it would be impossible here to enumerate them. It is necessary merely to say that the author seems to have covered the entire field. Considered as a piece of English, the translation here presented is not quite what it ought to be. The English rendering may be technically correct, but is certainly not idiomatic. The publishers have seen to it that the book is admirably printed and illustrated.

THE PATH OF EVOLUTION. Through Ancient Thought and Modern Science. By Henry Pemberton. Philadelphia: Henry Altemus Company. 12mo. Pp. xxix, 374.

Mr. Pemberton's work may be considered as a history of the theory of evolution. Man's place in nature has been the subject of philosophical thought for centuries. Mr. Pemberton traces the development of our present theories from the views held by the Roman philosophers, through the scholastic philosophy of Roger Bacon, the system of Giordano Bruno, of Descartes, and the philosophers who followed him.

CONTINUOUS CURRENT DYNAMOS AND THEIR CONTROL. Being a Series of Articles Reprinted from the Practical Engineer and Completed by W. R. Kelsey, B.Sc., A.I.E.E., F.Ph.S. London: The Technical Publishing Company, Ltd. 1903. Pp. vi, 440.

The author has endeavored to give a fairly complete account of the ways in which principles are dealt with in designing and constructing various forms of generators and motors, and to consider this in conjunction with the mechanical points involved. As the author points out, his book differs from others of the same character in a fuller treatment of electrical construction so far as tramway motors

and their gear are concerned, and in the discussion of the flux-speed-torque curves for motors excited by the different standard methods,

ANNUAL REPORTS OF THE WAR DEPARTMENT FOR THE FISCAL YEAR ENDED JUNE 30, 1900. Part 12. Report of the Military Governor of Cuba on Civil Affairs. In Two Volumes. Vol. II. In four parts. Part 4. Washington: Government Printing Office. 1901. Pp. vi, 250.

TWENTY-SECOND ANNUAL REPORT OF THE UNITED STATES GEOLOGICAL SURVEY TO THE SECRETARY OF THE INTERIOR, 1900-1901. Charles D. Walcott, Director. In Four Parts. Part III. Coal, Oil, Cement. Washington: Government Printing Office. 1902. Pp. 763.

TWENTY-SECOND ANNUAL REPORT OF THE UNITED STATES GEOLOGICAL SURVEY TO THE SECRETARY OF THE INTERIOR, 1900-1901. Charles D. Walcott, Director. In Four Parts. Part I. Hydrography. F. H. Newell, Chief of Division. Washington: Government Printing Office. 1902. Pp. 690.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending June 2, 1903, AND EACH BEARING THAT DATE.

(See note at end of list about copies of these patents.)

Table listing inventions with patent numbers and names of inventors. Includes entries such as: Acid, making sulfuric, M. Neumann... 729,643; Advertising device, W. C. Carr... 729,843; Aerial vessel, G. D. Shultz... 729,800; Aeroplane, T. Gibbon... 730,107; Agitation tank, J. & L. Stevenc... 729,806; Air compressors, unloading means for, E. Hill... 730,121; Alimentary products, machine for the production of coated, L. Hellmann-Taylor... 729,933; Alloys, production of, E. Gates... 729,752; Amins, making substitution products of aromatic, R. Lesser... 729,876; Anchor, W. A. Duncanson... 730,009; Animal trap, E. F. McDaniel... 729,786; Ash or garbage can, E. H. Huenefeld... 729,590; Atmospheric motors, collapsible vessel for, W. M. Fulton... 729,926; Autographic register, H. Koberman... 729,947; Automobile controlling mechanism, Lemp & Persson... 729,776; Automobile steering apparatus, H. H. Bufum... 729,538; Axle box, car, P. F. Woods... 730,185; Badge fastener, button, C. A. Russell... 729,671; Baling press, G. Senger... 729,903; Baling press, W. Frost... 730,106; Balls, etc., manufacturing composition for, G. R. Hutchison... 730,126; Basket handle fastener, E. L. Walker... 729,981; Bat, baseball, J. F. McCoy... 729,639; Battery. See Primary battery; Battery, D. H. Wilson... 729,827; Battery jar, G. H. Condict... 729,550; Battery solution, primary, H. S. Anawake... 729,833; Bearing, W. H. Wright... 729,987; Bearing, ring spindle, C. G. E. Salzberger... 729,677; Bearing, spindle, C. E. Lovejoy... 729,773; Beating engine, removable bed plate for, M. A. Mills... 729,954; Bed and commode attachment, invalid, W. C. Feely... 730,010; Bed bottom, C. E. Lindsey... 729,950; Bed bottom, spring, F. S. Sprague... 729,692; Bed, folding, T. Hauser... 729,860; Bed head and back rest, W. C. Feely... 729,011; Bed, metal folding, D. R. Roche... 729,895; Bedstead, R. Cane... 729,542; Belt, waist, H. J. Gaisman... 729,943; Belt, waist, L. Sanders... 730,050; Berry box, wooden veneer, E. L. Walker... 729,982; Beveling tool, C. Rosecrans... 730,163; Bicycle, G. Seyfang... 730,194; Bicycle seat post and pump, W. A. Allen... 730,074; Bicycle trailer package carrier, W. F. Parker... 730,193; Binder, loose leaf, H. E. Velt... 729,979; Binder, loose leaf, G. A. Lovelace... 730,100; Binder, temporary, C. A. Hartmann... 729,763; Bleaching textile fabrics, etc., apparatus for, M. Haas... 729,574; Blind fastener, J. J. Quackenbush... 729,892; Boat, sectional, B. McMonagle... 729,641; Boiler furnace, steam, E. R. Hoyt... 729,589; Bone cutting machine, F. W. Mann... 730,140; Bookcase, E. von der Groeben... 729,859; Book, combination check and pocket, F. J. Cook... 730,096; Boot black stand foot support, F. Hodes... 729,585; Bottle, A. Hensler... 729,583; Bottle non-refillable, B. Clemens... 730,003; Bottle stopper, Barnes & Ruffin... 729,835; Bottle stopper attachment, dose measuring, J. W. Patterson... 730,044; Box fastener, C. M. Johnson... 729,595; Box stand or bracket, H. Luensmann... 729,619; Brake beam, H. Vissering... 729,707; Brake beam, H. W. Frost... 729,924; Braking system, F. E. Case... 729,734; Brick, J. L. Braun... 729,918; Bridge anchor, P. P. Jacob... 729,591; Brush, fountain tooth, McKinley & Diegel... 730,040; Brush, wire, W. O. Bement... 729,528; Buckle, J. B. Heindol... 730,120; Buckle, trace, J. Fisher... 729,854; Building block, P. Brandner... 729,535; Building blocks or artificial stone, machine for molding, C. H. Hutchings... 730,212; Building blocks, supporting stand and mold for making, L. P. Normandin... 729,887; Building construction, J. P. Angell... 729,913; Burglar alarm for vaults, safes, etc., electric, C. O. Miller... 729,952; Burial case, C. J. Duncan... 729,921; Button and necktie fastener, combined collar, E. A. Herr... 729,582; Button clasp, B. F. Lentz... 730,136; Cabinet, S. C. Price... 730,046; Calcium peroxide, making hydrated, G. F. Jaubert... 729,767; Calipers, micrometer, F. Spalding... 729,970; Camera range finder, photographic, A. L. Lewis... 729,948; Can. See Ash or garbage can; Can body forming machine, J. McGinnis... 730,039; Can or receptacle for ashes, etc., H. Dold... 730,100; Canning apparatus, W. Smith... 729,689; Candelabrum, J. J. Ferry... 729,745; Cane weaving machine, E. H. Odom... 729,958; Car brake, B. von Philip... 729,658; Car brake, emergency, J. M. Ross... 730,048; Car broom or brush holder, D. Flagg... 730,206; Car buffer, railway, T. L. McKeen... 729,787; Car center plate, railway, L. A. Shepard... 729,967; Car coupling, J. Longnotte... 730,033; Car dumping doors, attachment for winding shafts for, A. Filler... 729,746; Car fender and sweeper, automatic, C. P. Gathart... 729,543; Car, fish transportation, S. W. Parham... 729,653; Car signal, M. L. Akers... 729,911; Carding engine, C. Mills... 729,632; Cards, machine for cutting or punching Jacquard, V. Royle... 729,897

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