sap liable to contaminate the fresh sap. By boring but one hole and in avoiding blazing the tree by cutting off bark, Mr. Grimm's method secures the great advantage of prolonging the life of the tree.

TROLLING-HOOK.—A. H. SMITH, Tremont, La. The barbs of this hook may be made to enter openings in the shank when not required for use, enabling the hook to be carried in the pocket without danger. The hook may be placed in a receptacle without the barbs becoming entangled with objects. The hook is so constructed that when taken by a fish it will fasten strongly in position, but may be quickly released without the introduction of fingers into the mouth.

PAINT OR PROTECTIVE COMPOSITION.—E. G. BERTRAND, 22 Rue Legendre, Paris, France. The present invention refers to a paint, and is intended mainly for the painting of houses and windows, its special property consisting in preventing to a great extent the passage of heat-rays, while at the same time letting the light-rays pass. It is applied like whitewash or grained or with a pad or dabber, and packed in a tub, box or barrel.

MANHOLE-COVER.—C. E. BURNEY, New York, N. Y. This cover is more particularly of the type employed in that part of a ship known as the "tank." Very little labor and skill is needed in the operation. By placing the lid upon the lower side of the casing—that is, placed toward the water—little pressure is needed to hold it in place, the idea being that if the manhole-cover were subjected to excessive water-pressure this pressure would serve to make the joint still tighter.

DOOR FOR BOOKCASES OR THE LIKE.—O. O. BUICE, Montgomery, Ala. The intention in this patent is to provide for bookcases, showcases, and like holders a new and improved door, simple and durable in construction, easily applied, and readily moved into a closed or open position completely out of the way of the user of the case.

CUFF-HOLDER.—J. H. and A. I. DWORK, New York, N. Y. This device for holding cuffs is attached to the sleeves of one's shirt, and it is of that general class in which is provided a shank with an attaching device at each end, one device being adapted to engage the shirt and the other to engage the cuff.

CHAIR HEAD-REST.—R. S. GIBSON, New York, N. Y. The present invention may be classified as relating to improvements in head-rests for barbers' chairs or the like, the object being to provide a new and clean bearing-surface or rest for each customer, thus reducing the danger of spreading scalp diseases or the like.

DEVICE FOR TRUING MUSICAL STRINGS.—C. A. GRAHAM, Columbus, Ohio. Strings for musical instruments formed of catgut and the like are generally of non-uniform diameter, and this defect impairs the accuracy of their notes. This invention overcomes the defect, and the end is attained by providing a grinding device to the action of which the string is subjected, so that the surface of the string is cut or ground down into true uniformity.

BOTTLE-CLOSURE.—C. J. GUSTAVESON, Salt Lake City, Utah. The object in view in this case is a novel construction of bottle-cap, label, and connections between the label and the cap whereby the latter cannot be removed or displaced without marring the label in such manner as to indicate that the bottle has been opened.

SPRING-FRAME.—F. A. HALL, JR., Montclair, N. J. Heretofore it has often been a disadvantage that frames for woven-wire springs are liable to rupture, slight strains being sufficient in some cases to make the frame useless. This weakness is mainly present in the connection between the side-bars and the brackets, and this invention resides in forming on these parts interengaging wedge-like surfaces bound firmly together, to prevent twisting or working movements of the parts.

Designs.

DESIGN FOR A CUP.—R. L. JOHNSON, Hanley, Staffordshire, England. In this design the upper portion of the cup is plain and cylindrical. The portion leading to the bottom flange is vertically fluted. The cup has a ring-handle. Leaf decorations appear at the bottom of the knuckles on the body, and between each group of leaves a bar-scroll is introduced.

DESIGN FOR A COVERED DISH.—R. L. JOHNSON, Hanley, Staffordshire, England. The cover of this design is decorated at its center by a cluster of leaves, from which rises the handle. Depressions, a scroll and clusters continue the decoration. The body is vertically fluted, and lead to vanishing effects. A bar-scroll is formed near the upper edge, and at the upper knuckle are clusters of leaves. Stem-handles are at the ends. The base is flared and decorated with clusters of leaves.

SHOE.—C. F. KLEIN, New Orleans, La. The invention in the present patent is in the nature of an improvement in shoes, having reference especially to the reinforcing of the vamp at the lower end of the front opening of the shoe and also preventing the external tip above the toe from becoming distorted or torn by the laster.

DESIGN FOR A STATUETTE.—R. F. OUTCAULT, New York, N. Y. The design comprises a base supporting the representation of a nondescript dog, appearing with a smiling face and sitting on its haunches alongside a mischievous boy, the latter appearing in an erect standing position.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

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READ THIS COLUMN CAREFULLY.—You will find inquiries for certain classes of articles numbered in consecutive order. If you manufacture these goods write us at once and we will send you the name and address of the party desiring the information. **In every case it is necessary to give the number of the inquiry.**

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Marine Iron Works. Chicago. Catalogue free.

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For hoisting engines. J. S. Mundy, Newark, N. J.

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Morgan Emery wheels. Box 517, Stroudsburg, Pa.

Inquiry No. 4255.—For makers of machinery for preparing peat for fuel.

"U. S." Metal Polish. Indianapolis. Samples free.

Inquiry No. 4256.—For makers of small stationary engines 1 h. p. and not heavier than 20 pounds, for running ice cream freezer or churning butter.

Blowers and exhausters. Exeter Machine Works, Exeter, N. H.

Inquiry No. 4257.—For makers of chemical apparatus for extinguishing fires.

Mechanics' Tools and materials. Net price catalogue. Geo. S. Comstock, Mechanicsburg, Pa.

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Sawmill machinery and outfits manufactured by the Lane Mfg. Co., Box 13, Montpelier, Vt.

Inquiry No. 4259.—For manufacturers of cloth-cutting machinery.

Let me sell your patent. I have buyers waiting. Charles A. Scott, Granite Building, Rochester, N. Y.

Inquiry No. 4260.—For parties engaged in making buttons from milk.

Special and Automatic Machines built to drawings on contract. The Garvin Machine Co., 149 Varick, cor. Spring Streets., N. Y.

Inquiry No. 4261.—For makers of a pneumatic carpet sweeper or beater.

Manufacturers of patent articles, dies, stamping tools, light machinery. Quadrigat Manufacturing Company, 18 South Canal Street, Chicago.

Inquiry No. 4262.—For manufacturers of a coil spring fine cleaner.

Crude oil burners for heating and cooking. Simple, efficient and cheap. Fully guaranteed. C. F. Jenkins Co., 1103 Harvard Street, Washington, D. C.

Inquiry No. 4263.—For manufacturers of hydraulic rams.

The largest manufacturer in the world of merry-go-rounds, shooting galleries and hand organs. For prices and terms write to C. W. Parker, Abilene, Kan.

Inquiry No. 4264.—For makers of small steam engine castings, also of small double, upright marine engines.

The celebrated "Hornsby-Akroyd" Patent Safety Oil Engine is built by the De La Vergne Refrigerating Machine Company. Foot of East 138th Street, New York.

Inquiry No. 4265.—For makers of cast iron kettles of 250 gallons capacity.

Contract manufacturers of hardware specialties, machinery, stampings, dies, tools, etc. Excellent marketing connections. Edmonds-Metzel Mfg. Co., Chicago.

Inquiry No. 4266.—For manufacturers and inventors of vending machines,

FOR SALE.—Stone sawing machine pat. No. 717,911. Claud S. Payne, R. R. No. 4, Salem, Ind.

Inquiry No. 4267.—For makers of safety oil lamps for railroad cars, which extinguish automatically in case of collision or accident.

WANTED.—Some novelty to manufacture. Ample capital. Must be article that will meet ready sale throughout the United States. Address Box 52, Titusville, Pa.

Inquiry No. 4268.—For the manufacturers of the Shaw patent compression flange coupling.

WANTED.—Cheap novelties in large quantities for advertising purposes. Address John H. N. Davis, Secretary United States Insurance Adjusting Company, 324 Dearborn Street, Chicago, Ill.

Inquiry No. 4269.—For castings and materials for building a one-half horse power dynamo.

Successful salesman of high-class specialties ("for 14 years in Southeastern New England") desires connection with a progressive firm, as

Address Eastern Representative,
P. O. Box 10, Providence, R. I.

Inquiry No. 4270.—For addresses of miners and grinders of high-grade phosphate rock.

ELECTRICAL TESTING.—If you wish to know the properties of any electrical instruments, materials or apparatus, the utility of an invention or the practicability of an idea, tests by us might be of great value to you. New York Laboratory, Lamp Testing Bureau, No. 14 Jay Street, New York. 8th Floor.

Inquiry No. 4271.—For manufacturers of sun flower, castor and other vegetable oils.

FOR SALE.—Patents on two valuable inventions. One adapted to handle by shop rights, the other a useful novelty suitable for hardware trade, novelty stores, or agents. Chas. B. Post, New London, Ohio.

Inquiry No. 4272.—For makers of peanut butter and meal.

Inquiry No. 4273.—For makers of cordage and fabrics of sisal and other coarse vegetable fiber.

Inquiry No. 4274.—For manufacturers of house-boats.

Inquiry No. 4275.—For moulders of rectangular glass battery jars for storage batteries.

Inquiry No. 4276.—For makers of spring steel ⅛ inch in width.

Inquiry No. 4277.—For makers of automatic electrical clocks for closing circuits, having 24 figures on dial.

Inquiry No. 4278.—For manufacturers of voltmeters and ammeters for battery circuits having a scale of 1 to 10 volts or more.

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication.
References to former articles or answers should give date of paper and page or number of question.
Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.
Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.
Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.
Scientific American Supplements referred to may be had at the office. Price 10 cents each.
Books referred to promptly supplied on receipt of price.
Minerals sent for examination should be distinctly marked or labeled.

(9044) D. G. E. asks: In what respect, if any, do the magnetic properties of nickel, cobalt, etc., differ from those of iron? Can these metals be used for cores of electro-magnets? A. While it would be possible to use cobalt or nickel for the cores of an electro-magnet, the power required to magnetize the cores would be much greater, and the cost would be very much greater. These metals are inferior to iron in permeability.

(9045) W. D. C. says: Can you please inform me what per cent of the entire earnings of the railroads of the United States is from passenger traffic, what per cent is from freight, what per cent is from mail, and what per cent is from express? A. In 1901 passenger earnings were $360,702,686; freight earnings were $1,126,267,653; express and mail not reported in detail, but the miscellaneous returns were $125,478,488.

(9046) A. B. B. says: Please let me know what is the process for etching on glass. A. This preparation may be made by mixing sulphate of barium and fluoride of ammonium in the proportion of three parts of the former to one part of the latter, with sufficient sulphuric acid to decompose the ammonium, and bring the mixture to the consistency of rich milk. The mixture should be made in a receptacle of lead and kept in a bottle of the same material or of gutta percha.

(9047) W. E. B. says: Please give me a good formula for making chloride of gold, as commonly used in toning photographs. A. Dr. John H. Janeway, an amateur photographer, suggests the following method: Dissolve a $2.50 gold piece in 6 drachms of chemically pure muriatic acid, 3 drachms chemically pure nitric acid, and 3 drachms distilled water. Put the gold in a large graduate, pour on the acids and water, cover the graduate with a piece of glass to shut off or retard the escape of fumes, and set in the sun or in a warm place. When the gold is dissolved add bicarbonate of soda very gradually, stirring with a glass rod at each addition, until effervescence has ceased and the froth subsided, and the carbonate of copper which has been formed is deposited as a green precipitate. Now add 6 ounces of water, and let the whole settle for not over thirty minutes, and then very carefully filter the solution. To the clear golden liquid which has passed through the filter add carefully enough nitric acid, chemically pure, to turn blue litmus paper decidedly red, then add enough pure water to make the solution measure 32 fluid ounces. The solution will keep for any length of time, and 1 ounce will tone four sheets of paper. 2. Please tell me where I can procure pure gold for this purpose. Is it necessary to use pure gold for this purpose? A. Nearly pure gold must be used. 3. Can I procure books which will enable a person of ordinary intelligence to master assaying without a teacher? Is a course of home study without aid, except such as can be gotten from textbooks, a practicable way of getting a good practical, working knowledge of the subject? Where can one procure the needed books and apparatus? A. We can supply "The Assayer's Guide," by Lieber, price $1.50; "A Manual of Assaying," by Brown, price $2.50. You can study assaying at home. We have mailed you the address of parties handling supplies.

(9048) A. W. writes: During my late residence in the highland of Bolivia, a discussion arose among a number of people, including some engineers, upon the following question: Would a rifle fixed in a vise at right angles to the line of gravitation on the seashore, carry a longer or shorter distance than the same rifle fixed under same conditions at 13,000 feet above the sea? I take it that the density of the atmosphere is the only variant in the question, as the difference in attraction of gravitation would be so small as to be not worth consideration. A. At 13,000 feet the air, being much less dense, will resist the rifle ball less than at the sea level. Hence we think the ball would be sent further by a given energy of the powder than at the sea level.

(9049) W. B. G. says: Where are some of the largest flywheels? Give diameters and number of revolutions per minute. State why a small wheel can safely revolve faster than a large one. Does the diameter of a wheel figure as much in the possibility of high-revolution as does the style and make-up of the wheel, that is, will not a 20-foot wheel weighing ten tons and having a heavy center revolve more rapidly and with less danger than a wheel of the same diameter and weight with heavy rim? A. The larger flywheels are from 25 to 30 feet diameter, and in special plants much larger, making from 60 to 80 revolutions per minute. Small flywheels can run faster than large ones. The strain increases with the rim velocity. The strength of the wheel against its destruction by work and centrifugal force is the main item in its construction. A proper proportion between hub, arms and rim due to its proposed velocity is necessary for safety in its design.

(9050) F. M. A. says: Will you please answer the following: 1. A formula for making water paint for painting outside of buildings, and can oil color be used for coloring water paints? A. The basis of the cold-water paints is casein. This is mixed with lime and dry mineral coloring matters in accordance with the color desired. Powdered barium hydroxide has also been suggested instead of the lime. The mixture of casein, lime or barium hydroxide and coloring matter is mixed with water to the desired consistency. 2. Which is best, alternating or direct current for incandescent lamps, and which above current is used for street car system? A. The alternating and the direct are equally adapted to the incandescent lamp. In America the direct current is employed for street car use. 3. About how many years do permanent horseshoe magnets keep their power, or do they always keep their power when a piece of iron is kept on or about 1-32 inch from their poles? A. A horseshoe magnet does not lose its power if a piece of iron about the size of the magnet is kept across the poles.

(9051) W. C. R. asks: Will you please tell me through your paper what the effects of electric currents are on a compass needle? If a certain battery current flowing over a single wire, parallel with needle and a half inch above it, will deflect needle 10 deg., will a battery four times as strong turn needle same distance, if current wire is four times as far away (or two inches)? Will ordinary electric light currents affect needle in same way and in same proportionate distance and strength of current? I want to find out in a general way if the effect on a magnet or compass needle is in proportion to strength of current, and also in proportion to distance from magnet, and about what the proportion is? I took a compass needle, and arranged on blunt pivot that had just friction enough so one cell of battery moved the needle a little. I then tested with a 220-volt electric current, and could not get that immensely stronger current to move it at all. What was the trouble? A. A law can hardly be stated for so crude an arrangement as a needle on a pivot and deflected by a single straight wire laid above it. The general law is that the *strength* of current varies as the tangent of the angle of deflection. By *strength* is meant the amperes. The volts are the pressure, not the current strength. It may be that you had far less amperes with the 550 volts than you had with the cell of battery, due to the much higher resistance of the circuit in the former case. The distance of the wire from the needle affects the deflection as the square root of that distance. That is, a wire removed to twice the distance would, other things being equal, produce one-fourth the effect. At four times the distance the effect will be one-sixteenth as great. You will find the matter fully treated in textbooks of electricity. See Thompson's "Elementary Lessons."

(9052) R. McC. says: Will you kindly answer the following questions: 1. How many ampere turns will it take to saturate a horseshoe magnet ⅜-inch by 1 inch by 14 inches so it will have about a 2-pound pull? A. Taking the problem of the number of ampere turns for a given lifting power of an electromagnet as you state it, about 350 ampere turns are necessary. The core will then be far from saturated. We fear that you have not taken the return circuit of the magnetic lines into account. So little information is given in the question that you had better make a magnet and try it, then change the winding till you get what you require. This is the best way under any circumstances. 2. How large a current will 32 magnets the same size use, saturated 3,000 times in one minute, the magnets to have about a 2-pound pull? A. The current used by these magnets will depend entirely upon the winding, and not at all upon the number of times the interrupter acts in a minute. If one ampere flows around each magnet 350 times, each one will take 1 ampere. If you wind so that 2 amperes flow around 170 times, then 64 amperes will be used. The watts required will be the same in any case. It will be better to wind for rather a small number of amperes, since the loss by heating will be less.

(9053) T. F. says: What is the difference in temperature of the water of Niagara above and below the falls? How much coal would it take (per minute) to raise that amount of water to the difference in temperature? A. It has been stated that the difference in temperature of the water above and below the falls of Niagara is in the neigh-

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 39 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, PhD. 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 pièce 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.

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