FOOT-PROPELLED VEHICLE. — W. J. SHIELDS, Bedford, Ala. The principal object of this inventor is to provide a vehicle which will enable occupants to propel it easily, while affording a far greater degree of comfort than usually attained in vehicles of this class. Further, one which may be easily controlled and adapted to be propelled by one or two persons, the seats being independently adjustable to facilitate simultaneous effort of two persons of different sizes in the propulsion of the vehicle.

TIRE-INFLATING PUMP.—S. E. SPENCER, Springville, N. Y. In this patent the invention has reference to improvements in pump mechanism for inflating the tires of motor-vehicles, an object being the provision of a pump mechanism that may be detachably connected to the driving-shaft of the motor and operated therefrom to quickly inflate the tires.

FELLY-JOINT.—J. B. HIGGINBOTHAM, Aberdeen, S. D. In this instance the invention relates to an improved device for connecting the sections of a wheel-felly so that the necessary tension may be exerted on said sections to draw them forcibly together and produce a rigid self-sustaining felly, which with the addition of the tire encircling it forms a most secure and durable structure.

SHIFTING-RAIL FASTENER FOR VEHICLE SEATS.—F. H. DELKER, Henderson, Ky. This invention consists in certain improvements upon the fastener for which Letters Patent of the United States were formerly granted to Mr. Delker. The present invention has for its principal object the provision of a simpler fastener than that disclosed in the former patent and one which may be more cheaply constructed. A further object is to provide a fastener which cannot be so easily accidentally disengaged and which will operate satisfactorily without an aperture in the spring-leaf member to weaken it.

Prime Movers and Their Accessories.

TURBINE.—C. N. SCHOTTMULLER, Taylor's Falls, Minn. In this patent the invention has reference to improvements in steam-turbines, and an object is the provision of a motor of this type that may be operated in either direction with an economical use of steam. Two or more turbines may be connected together, with condensers attached and operated as compound condensing-engines.

SHAFT LIQUID-SEAL PACKING.—C. L. COOK, Louisville, Ky. In this case the invention refers to improvements in packing for shafting, and particularly the shafting of turbine-motors and propeller shafts of steamships, an object being to provide a novel form of packing in which a liquid is employed as a packing or sealing medium, rendering the packing impervious to atmospheric pressure.

ROTARY ENGINE.—I. SEVERANCE, Minneapolis, Minn. The object of this inventor is to provide an engine arranged to allow convenient reversing to insure a positive working of the valves in unison with the rotary motion of the piston and to provide a continuous action of the motive agent under initial pressure on the piston-heads without the usual cut-off for each revolution of the piston.

Railways and Their Accessories.

TIE-PLATE.—B. S. WASSON, Chicago, Ill. In this patent the object is to provide a plate so constructed that when secured on a tie it will not buckle or work loose, also providing protection for the tie from cutting or wear from the rail-base and furnishing a means for rigidly securing the plate to a tie without danger of splitting the tie.

COAL, ORE, OR BALLAST CAR.—G. F. SIMONTON, Vanwert, Ohio. The invention relates to metallic freight-cars, the same being especially adapted for transportation of dumpable material—such as coal, ore, and ballast—although it may be employed for other classes of dumpable substances. In some features the present car is similar to the metallic cars disclosed by Mr. Simonton's prior applications for Letters Patent. One improvement of the present invention is a metallic underframing usable in connection with any style of car. Another, is the construction of the hopper-doors by which material may be discharged in the middle of the track, this being especially desirable when unloading ballast.

Designs.

DESIGN FOR A TOILET-POWDER RECEPTACLE.—S. M. COLGATE, Orange, N. J. The design of this ornamental receptacle for containing toilet-powder is very neat in appearance. It shows a receptacle very practical in shape for easy and convenient handling in use, and in fair proportion to its height the rounded article shows a width about double the thickness.

DESIGN FOR OIL CLOTH.—N. KLAU, New York, N. Y. The design of this ornamental oil-cloth is wholly pictorial, and comprises individual or cluster pictures of children in distinctly separated scenes of games, sports, and diversions of juvenile life of that kind enjoyed almost entirely out of doors.

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 the paper.

Business and Personal Wants.

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.**

MUNN & CO.

Marine Iron Works. Chicago. Catalogue free.

Inquiry No. 6289.—For manufacturers of or dealers in Acido Anhidrico Sulfuroso Vinario.

AUTOS.—Duryea Power Co., Reading, Pa.

Inquiry No. 6290.—For manufacturers of lens-grinding tools.

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

Inquiry No. 6291.—For makers of gates for buggies or wagons which may be opened without having to get out.

Perforated Metals. Harrington & King Perforating Co., Chicago.

Inquiry No. 6292.—For makers of small gas, gasoline and steam engines and parts for amateur use, ¼ to ½ b. p.; also of castings or draft forgings in mild steel for dynamos.

Handle & Spoke Mchy. Ober Mfg. Co., 10 Bell St., Chagrin Falls, O.

Inquiry No. 6293.—For machinery for grinding alfalfa meal.

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

Inquiry No. 6294.—For makers of hand fire engines, or "hand tubs," operated by several men at pumps, with hose laid into wells or river.

Special Machinery to order, manufacturing, metal stampings, etc., Brickner Machine Co., Tiffin, Ohio.

Inquiry No. 6295.—For manufacturers of small tin caps, such as used on tops of beer bottles.

Thermo-piles for electrolytic assays and direct-current work. $3 each. Walsh's Sons & Co., Newark, N. J.

Inquiry No. 6296.—For manufacturers of thread and small spools.

We manufacture tripoli stones of all dimensions, disc, cylinders, etc., samples free. Seneca Filter Co., Seneca, Mo.

Inquiry No. 6297.—For makers of small pasteboard boxes for mailing purposes.

In buying or selling patents money may be saved and time gained by writing Chas. A. Scott, 719 Mutual Life Building, Buffalo, New York.

Inquiry No. 6298.—For turbine water wheels for a small mill.

We manufacture anything in metal. Patented articles, metal stamping, dies, screw mach. work, etc. Metal Novelty Works, 43 Canal Street, Chicago.

Inquiry No. 6299.—For manufacturers of labels.

Patented inventions of brass, bronze, composition or aluminum construction placed on market. Write to American Brass Foundry Co., Hyde Park, Mass.

Inquiry No. 6300.—For manufacturers of and dealers in automobile parts.

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

Inquiry No. 6301.—For manufacturers of sewing needles.

Literature on the manufacture of vulcanized fiber and tubing. Would like to correspond with a party familiar with the subject. "H" Box No. 128. Fall River, Mass.

Inquiry No. 6302.—For manufacturers of castings for gas engine cylinders.

Patents on a machine being manufactured and sold on royalty which will be used by every grocer and provision man are for sale. Owner in business and need of money. Write for particulars. Address H. W. R., Box 74, Sterling, Mass.

Inquiry No. 6303.—For manufacturers of corrugated rollers, such as used for corrugating wrapping paper boards.

Manufacturers of patent articles, dies, metal stamping, screw machine work, hardware specialties, machinery and tools. Quadriga Manufacturing Company, 15 South Canal Street, Chicago.

Inquiry No. 6304.—For makers of rice-milling machinery.

FOR SALE.—Patent No. 723,253, telegraph key, simple, durable and inexpensive. Would arrange with manufacturer on royalty. Address William E. Duncan, Train Dispatcher, G. S. & F. Ry., Macon, Ga.

Inquiry No. 6305.—For makers of bottles for soda water, on the same style as the English-made "Codd's ball-stoppered bottles."

The SCIENTIFIC AMERICAN SUPPLEMENT is publishing a practical series of illustrated articles on experimental electro-chemistry by N. Monroe Hopkins.

Inquiry No. 6306.—For Foster's gluten tester, and for a tintometer to be used in testing wheat and flour.

Robert W. Hunt & Co. bureau of consultation, chemical and physical tests and inspection. The Rookery, Chicago.

Inquiry No. 6307.—For manufacturers of razor handles, also for dealers in English steel.

Drawings, Estimates, Tools, Dies, Sheet, Wire and Rod Specialties (all metals). Stamping, Spinning, Turning and Screw Work, Tin Plating, Nickel Plating, Bronzing, etc. The W. S. Burn Mfg. Co., New Haven, Conn.

Inquiry No. 6308.—For manufacturers of decorative glass spangles.

Inquiry No. 6309.—For manufacturers of or dealers in voting machines similar to those used in New York State.

Inquiry No. 6310.—For machines for making gas from gasoline.

Inquiry No. 6311.—For a mill for powdering licorice root or any similar hard root.

Inquiry No. 6312.—For toy steam engines and steam locomotives for experimental purposes, not to be over ½ h. p.

Inquiry No. 6313.—For makers of twisted metal concrete and expanded metal for fireproofing and concrete construction.

Inquiry No. 6314.—For a metal out of which to make a pump for pumping a weak solution of chlorine in water, without injuring the pump.

Inquiry No. 6315.—For makers of rug machinery for manufacturing old carpets into rugs; also for broom-making machinery.

Inquiry No. 6316.—For a glass disk 10 or 12 inches in diameter from which to grind a mirror for a reflecting telescope.

Inquiry No. 6317.—For the address of the manufacturers of the "Eclipse" smoothing iron.

Notes and Queries.

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.

(9493) E. L. S. asks: 1. How can you tell from the appearance of copper wire when it is burned out? A. You can tell from the appearance of copper wire that it has burned out. If it has burned out it will not be there, any more than a stick of wood or a coal will still be in existence after it has burned out. A "burn-out" is a melting and burning of the wire because of heat. 2. What is meant by the sidereal system? A. The sidereal system is the portion of celestial space occupied by the stars, in distinction to the space occupied by the sun and the planets, the solar system. 3. Can you give me some of the theories why the planet Mars is red? A. The planet Mars is red because its surface is composed of red materials, or because its atmosphere absorbs the other light waves. 4. Why does green wall paper contain arsenic? A. Green wall paper contains arsenic when arsenic is used as a color to print the paper. Paris green is a very beautiful green, and hence was frequently used for printing wall papers. If Paris green is not used, there will not be arsenic in the color. 5. What causes spontaneous combustion? A. A rapid absorption of oxygen, sufficiently rapid to injure the material, is spontaneous combustion. It occurs with paint oils, principally when cotton rags or waste are saturated with a drying oil. 6. Will you please tell me the names of the lightest and heaviest metals known, and their weights? A. Potassium is the lightest metal, with a density of 0.86 to 0.88, and iridium is the heaviest metal, with a density of 21.78 to 22.42. 7. Please explain the working of a steam turbine? A. A steam turbine is driven by jets of steam striking directly against the blades of the rotating parts.

(9494) W. O. S. writes: I am tempted to use your valuable paper, to find out if it is possible to mold articles out of cement, and what substance or composition would have to be used to get as clean a cast as articles molded out of plaster of Paris. A. It is possible and practical to mold hydraulic cement in the same manner as plaster of Paris. The cement should be finely ground and quickly mixed with water, and thick, so as not to run freely, pressed into an oiled mold the same as with plaster. It requires longer time to set than plaster.

(9495) A. K. S. writes: In the picture of a Panhard going 80 miles an hour, printed on front page of your issue of October 22, I noticed the wheels appear very elliptical and the housing is diamond-shaped. Will you be kind enough to explain how this peculiarity occurred? Was it due to the fact that the whole surface of the plate or film was not exposed simultaneously by the action of the shutter, thus allowing some parts enough time to blur, while others did not have time? A. The drawing out of the image of a wheel in a snapshot picture is due to the fact that the car moved while the picture was being taken. A velocity of 80 miles an hour is 117 feet a second. If the exposure were only a hundredth of a second, the car moved a foot while the shutter acted. The lengths of snapshots are very uncertain quantities, and often they are longer than the figures on the shutter would indicate. A slight friction in the plates will make the exposure longer.

(9496) H. H. says: 1. Please inform me of a simple and reliable method of measuring the internal resistance of primary batteries. A. The simplest method of measuring the internal resistance of battery cells is to connect two cells or any number of pairs of cells in opposition, and measure their resistance by a Wheatstone bridge, in the same manner as any other resistance is measured. The cells in opposition send no current into the apparatus, and thus are like any other resistance in opposing the current of the battery of the measuring set. 2. Also the formula for the mixing of paste for positive and negative plates for storage battery. A. The paste for coating the positive plates of a storage cell is made by mixing red lead to the consistency of putty with dilute sulphuric acid made by slowly pouring one part of concentrated sulphuric acid into four times its volume of water. Be sure to pour the acid into the water slowly and with constant stirring. The paste for the negative plate is prepared in the same way with litharge.

(9497) O. R. writes: I desire to obtain or purchase a formula to make the best up-to-date instrument for locating gold and silver. Can you sell me formula for the same so constructed that it can be set to attract one metal and cut off all other attractions? A. We know of no formula or instrument for locating the precious metals but the prospector's judgment, founded upon experience and the diamond core drill. All so-called devices for locating gold and silver are inoperative. There is a device described in our issue of May 2, 1903, which will locate an electrical conductor in the ground, but there is no means of determining without the use of pick and shovel whether this conductor is a valuable mineral deposit or a stratum of moist earth.

(9498) E. E. P. says: I am trying to find out what will be the most satisfactory power for grinding corn and pumping water for irrigation—gasoline engine, kerosene engine, electricity by windmill, liquid air, or just the old-fashioned windmill. A. The cheapest power for a farm for all purposes is a windmill of modern type large enough for the requirements of the farm work. A 30-foot windmill will give 3 horse-power in a 16-mile-per-hour wind, and will do much of the work even for a small threshing machine. Where large quantities of water for irrigation and the heavier machinery are in use, a kerosene engine is a very cheap power ever ready and easily managed.

(9499) V. K. asks: What is the cause of the pitting of steam boilers? Does such pitting occur where soft water is used, rain or condensed water or soft spring water? Do you know of any remedy preventing such pitting? I have a steam boiler that is pitted in several places below the water line, pits nearly as large as a dollar, varying in depth to nearly an eighth of an inch deep in places. I am at a loss to find a remedy. I use hard water containing considerable lime and magnesia, and to prevent or retard formation of scale I daily inject a solution of sodium phosphate. A. The pitting of boiler tubes and shell is a common occurrence due to any kind of water, but more active with the purer or rain water. The cause has been attributed to some peculiar molecular condition of the iron inducing electrical action, and also to particles of slag or other metals that induce electrolysis.

(9500) H. E. F. says: 1. A claims that the ocean has deep pits that have never been sounded, the reason being that no solid body could reach the bottom. B claims that the water of the ocean is, no doubt, under a tremendous pressure, but still could not exceed the specific gravity of some of the heavy metals—granting the depth exceeds 60,000 feet. A. We have answered this question five times in recent years, in this column, but will try again. Water is a very incompressible substance. Sea water is compressed but forty-four millionths by a pressure of an atmosphere, and at higher pressures the compression is less than this. It is not very sensibly denser at the depth of the bottom of the ocean than at its surface, nor are the metals. A body which will sink at the surface of the ocean, will continue to sink to its bottom. This is known, since the sounding lines bring up from all bottoms the fine ooze, which consists of minute forms of life which have died and sunk till they rested on the ocean bottom. There have not been any depths found which the sounding line has not measured and brought back testimony that it touched the bottom. The greatest depth yet found is 30,930 feet, in the South Pacific near the Fiji Islands. Another depth near Japan is 27,600 feet, and one near Porto Rico is 27,366 feet. The deepest places are near the shores. For other information on this interesting point, see Query 8959, volume 88, No. 17. 2. What is the increased pressure for volumes injected into a closed vessel filled with water? A. The increase of pressure produced by forcing a plunger into a closed vessel filled with water may be anything which the walls of the vessel can stand. This pressure may be increased till the strongest vessel is burst by the water pressure. This is known in books upon physics as hydraulic pressure, and the machine for utilizing it is called the Bramah or hydraulic press. Pascal stated its law many years ago: "Pressure exerted upon an inclosed mass of liquid is transmitted undiminished in all directions, and acts with equal force on equal surfaces and in a direction at right angles to those surfaces." This press is the most powerful machine man has ever invented. It has no limit except the strength of the material upon which it presses. It is in use for all great press work. Owing to the slight compressibility of water as given above, you cannot inject any considerable volume of anything into a closed vessel filled with water. It will burst the vessel.

(9501) C. D. C. asks: Would you kindly explain the following: A three-speed desk fan and a 16-candle-power light are connected across one side of a three-wire direct-current. The fan is connected about 20 feet from the light, between it and the source of supply, and is turned off. A wireman, thinking the circuit disconnected at the service switch, cuts the lamp cord with his pliers, when the short circuit is formed, the fan starts and runs until the short circuit is broken. What caused the fan to run? A. In the case you describe, when the short circuit was established by cutting the lamp cord, the rush of

current into the line was so great that it set the motor in motion. This was not a short circuit, since the resistance of the motor was sufficient to prevent that, but it was enough to run the motor. We have seen lamps burned out on a line in the same circumstances, lamps which were not turned on at all by a burn-out on the same line near them.

(9502) G. F. G. asks: Can you make clear to me the difference of the terms "force" and "energy"? I am studying physics, and find difficulty in understanding just what is force and what energy. Anything you can furnish me with will be appreciated. A. Force is that which produces, changes, or destroys motion. Energy is the power to do work. Put forth your energy, and you can exert force in working upon bodies. Energy is not force; it is that in you which makes you feel that you can do something. Energy in a moving body enables it to do work upon some other body. Energy in a weight which has been raised to a height enables it to do work by falling from that height. Steam in a boiler has energy or ability to do work, but it is not doing any work so long as it is shut up in the boiler. Let it out into the cylinder, and it will exert force in pushing the piston to and fro, and thus do work in moving the train. Force does work. The energy or ability to do work can be measured in terms of the work which might be done if the energy were turned into work. The three words energy, force, work, stand in a logical series, and each has its place. Energy is not force except by an incorrect use of words, and force is not work.

(9503) M. M. asks: 1. Are dry batteries after having run down and been recharged from dynamo as good as originally? A. A dry cell cannot be made as good as at first by recharging. The so-called recharging consists in sending the zinc back to the positive end of the cell, and thus rendering it possible to use the cell as a source of current again. It will perhaps give about one-half as much as at first. If the electricity for recharging costs anything, it is probably not worth the doing. 2. Can "1900" type dry batteries be recharged from direct-current generator giving 3 amperes at 10 volts? A. Any dry cell can be recharged. Only a direct-current can be employed for charging storage cells or recharging dry cells. 3. How many, and how should they be connected? A. Five or six may be connected in series and connected to the dynamo. Connect the positive pole of the dynamo to the carbon, and the negative pole to the zinc of the series to be charged. 4. If it is possible to connect six in series, how long would it take to charge them? A. We cannot tell how long to continue the charge, except to say use a voltmeter and charge till further charging produces no further increase of voltage in the cells.

(9504) H. P. S. asks: Will you please give an explanation of the phenomenon which I noticed lately? I was developing films from a film pack, and each time I had to tear off a black paper, which was attached to the film by means of a silk adhesive strip; each time I noticed a glow, which followed up the parting of the paper and adhesive strip between the two. My explanation for it was that there was electricity formed by the parting of the molecules of the two parts. Was I right? A. The light which you observed in pulling a silk strip from a dry paper was due to the charge of electricity produced by friction. There are many cases of this in cold weather, especially. Stroking a cat in the dark, one may see the flashing of light from her dry fur. It does not appear to be necessary to consider it due to molecular action.

(9505) T. A. asks: 1. Can you please let me know, through your "Notes and Queries" column, how to make a choke coil such as is used for wireless telegraphy? A. A choke coil is usually wound with a wire core, but may have a great variety of windings according to the idea of its designer. Some have omitted the wire core. You will find a variety of designs in Mayer's "Wireless Telegraphy," which we send for $2, mailed. 2. Will you also explain how it stops the waves from going through the relay and battery instead of the coherer? A. The action of a choke coil is a self-inductive one. The rapidly alternating surgings of electric waves is greatly impeded by the induction of the turns of the choke coil upon each other. Alternating currents are frequently controlled by choke coils, just as direct currents are cut down by rheostats.

(9506) C. H. S. asks: 1. What is the extent and knowledge of the Sargasso Sea, and is it true that part of the ocean equal to one-half of Europe is entirely unexplored? A. The Sargasso Sea is an area destitute of currents, a quiet place in which there are many varieties of sea weeds and lower forms of animal life. It extends from 25 deg. to 35 deg. N. latitude, and from 20 deg. to 30 deg. W. longitude. It owes its character to the fact that the water is not in motion. It is not probable that any extent of ocean except in the frigid regions has not often been crossed by ships. Atlases do not show any such unexplored region of ocean as you describe. 2. Do astronomers still hold that Venus revolves only once in a year? A. It is probable that Venus rotates on its axis once in a revolution around the sun, or once in one of its years.

(9507) F. S. P. asks: Will you kindly inform me, through your answer to inquiry department, what is the theory of the firefly's light? Or in other words, what use to the bug is its light? A. The theory advanced as to the purpose of the firefly in displaying its light is that it is a sexual call, just as is the mating song of birds. We have never met any other, and this seems sufficient.

(9508) S. E. O. asks: Will you kindly let me know what kind of chemical it is that changes color with the change of weather? I have a small piece of goods about two inches square, that in clear weather is a blue; when a change is near it turns to violet, and for rain it turns to bright pink. If you can tell me the name of the chemical you will oblige me very much. A. The cloth which changes color with a change of weather is dyed with chloride of cobalt. The change is due to moisture. You can produce it by breathing upon the cloth; it does not indicate a change of pressure of the atmosphere as a barometer does, and hence is usually behind the change of weather. The barometer indicates the cause of the storm; the color indicator shows the effect of the storm.

NEW BOOKS, ETC.

HINTS ON REVOLVER SHOOTING. By Walter Winans. New York and London: The Knickerbocker Press, 1904. 16mo.; pp. 130. Price, $1.

A revolver in itself is a very useful weapon of defense; but unfortunately, many people are not able to use it properly. It is the object of the present little book to give such instructions as will enable anyone to select, sight, and fire a revolver. The book deals with the competitions at Bisley, England, stage shooting, trick shooting, etc.

THE POLISHING AND PLATING OF METALS. A Manual for the Electroplater, Giving Modern Methods of Polishing, Plating, Buffing, Oxidizing, and Lacquering Metals, for the Progressive Workman. By Herbert J. Hawkins. Chicago: Hazlitt & Walker, 1904. 12mo.; pp. 355. Price, $2.

There is considerable call for a new work on plating, to deal with the conditions as we now find them. It is a thoroughly practical work, giving valuable rules and formulæ. It is a book which should be welcomed by all electroplaters.

ELECTRICAL ENGINEERING FOR STUDENTS. By S. R. Bottone. London: Guilbert Pitman, 1904. 16mo.; pp. 153. Price, 80 cents.

The works of Mr. Bottone have been numerous, and have proved very helpful to the amateur. The present volume will prove no exception to the rule. It is divided into two parts, the first dealing with magnetism and magnetic apparatus, while the second part treats of static electrical instruments. The book will be of particular value to those who are desirous of obtaining practical knowledge of electrical work, and find themselves hampered by their inability to see or to make the instruments of which they read in textbooks.

LETTERS ON THE DISEASES OF PLANTS. By N. A. Cobb. Sydney, Australia: The Government of the State of New South Wales, 1904. Pp. 133.

This book is reprinted from the Agricultural Gazette of New South Wales, with additions and emendations. There are over 150 original illustrations and 7 original colored plates, together with 4 plates copied from various authors. It is a very creditable production.

THE PURIFICATION OF SEWAGE. Being a Brief Account of the Scientific Principles of Sewage Purification and Their Practical Application. By Sidney Barwise, M.D. (Lond.), B.Sc., M.R.C.S., D.P.H. (Camb.) With numerous illustrations and diagrams. New York: D. Van Nostrand Company; London: Crosby Lockwood & Son, 1904. 8vo.; pp. 240. Price, $3.50.

The progress which has been made during the last few years, more particularly in the mechancal arrangements for making percolating filters automatic and in the distribution of sewage, has necessitated the rewriting of the present work so as to bring it up to date. This work is written by an English medical health officer, and it shows painstaking care in its preparation. It will be useful to all sanitary engineers and bacteriologists.

ANALYSE DES MATIÈRES ALIMENTAIRES ET RECHERCHE DE LEURS FALSIFICATIONS. By Ch. Girard, Director of the Municipal Laboratory of Paris, in collaboration with MM. Sanglé-Ferrière and De Brévans, Sub-Chiefs of the Municipal Laboratory, and MM. Truchon, V. Genin, Pons, De Raczkowski, Leys, Froideveaux, Cuniasse and Lafaye, Chemists of the Municipal Laboratory. Paris: Vve. Ch. Dunod, 1904. 8vo.; pp. 872, with illustrations. Price, $7.50.

The present, or second, edition of this volume contains some 200 pages more than the first edition; and besides the original articles by MM. Bordas, Sagller, Ladan-Bockairy, Robin, and P. Girard, which were published in the former edition, there is much supplementary material, in which the latest methods of analysis and research have been described with the greatest care, thus bringing to the knowledge of chemists and pharmacists the latest scientific novelties concerning the analysis of food products. Several additional articles, such as those on water, milk, preserves, etc., contain new and interesting facts; while others on saccharimetry, the analysis of sugars and of sugary substances, are entirely new. Because of their clear presentation, the methods here described permit the chemist, with the aid of tables and numerous examples, to comprehend with the greatest facility the slightly complex calculations which belong to these delicate researches. The book treats successively of potable waters, wine, beer, cider, vinegar, alcohols and spirits, milk, butter, cheese, oils, meats, cereals, farinaceous products, bread, cakes and cake making, coffee, chicory, tea, cocoa, chocolate, sugars, preserves, food products, spices and aromatics, colors employed in food materials, etc. Independently of chemical analysis proper, the bacteriological and bibliographic parts of the work have been largely added to, and their connection with the former articles constitutes a work indispensable to all persons interested in the hygiene of foods.

SELF-PROPELLED VEHICLES. A Practical Treatise on the Theory, Construction, Operation, Care, and Management of All Forms of Automobiles. By James E. Homans, A.M. New York: Theodore Audel & Co., 1904. 8vo.; pp. 672. Price, $2.

An excellent book, dealing with the practical side of the construction and operation of automobiles. We do not know of any more useful book for those who wish to understand the mechanism of various types of automobiles. The present is a revised edition, and it contains complete illustrated descriptions of the latest American automobiles and auto novelties.

AN INTRODUCTION TO THE MODERN THEORY OF EQUATIONS. By Florian Cajori, Ph. D. New York: The Macmillan Company, 1904. 12mo.; pp. 239. Price, $1.75.

Most textbooks, particularly on mathematical subjects, can hardly be called books of instruction, as they seem to take it for granted that the student is thoroughly familiar with the subject, instead of taking the position that the student is ignorant of the subject and all details thereof must be explained to him. Dr. Cajori is known as a man who writes clearly and interestingly on subjects of difficult nature. His present work is no exception to this rule; the arrangement is new, and while the subject-matter is of course old, his handling of it is quite different from the usual. Particular attention is paid to exercises, making the subject more concrete. The Galois theory of equations, which is usually found by the beginner quite difficult of comprehension, is specially dealt with.

L'OZONE ET SES APPLICATIONS INDUSTRIELLES. By H. de la Coux, Engineer, Chemist, and Inspector of Technical Instruction for the Minister of Commerce. Paris: Vve. Ch. Dunod, 1904. 8vo.; pp. 557; 159 figures. Price, $4.50.

In this new work M. de la Coux, after having described ozone in its physiological and therapeutic rôle, studies its methods of preparation, and treats of the considerations which influence its economic preparation. The new industrial ozone generators are also described. There are some remarkable properties shown by this gas from the chemical point of view. Certain of these are utilized in the preparation of particular products, which the author acquaints us with. Ozone acts energetically on microbes, and the sterilization of water, air, and various other substances is obtained with it. Each of these subjects has been the object of a special article, showing the complete processes and installations involved. The application of ozone to the treatment of brandies, spirits, and wines, to the manufacture of vinegar and cider, and to distillation, is also thoroughly described. Its use for the whitening of textile fibers, tissues, paper, straw, wax, feathers, etc., is described at length, as well as its use in starch making and in the manufacture of dextrines. After having gone thoroughly over the subject of the use of ozone in the manufacture of oils, greases, soap, varnish, lacquer, etc., its use is also described in the preparation of perfumes and coloring materials, and in dyeing. Among other uses to which ozone is being put are its employment in silkworm culture, in the aging of woods, in bleaching, the disinfection and sterilization of linen and tissues, and in photography. Finally, the analysis of ozone, which is so useful in the control of these various operations, has been very completely described from the qualitative and quantitative point of view.

THE STUDY OF AMERICAN COALS. By William Jasper Nicolls, M.Am.Soc.C.E. Philadelphia and London: J. B. Lippincott Company, 1904. 8vo.; pp. 396. Price, $2.

Primarily this work is designed for those who wish to be informed on the subject of coal without searching through scattered publications. The writer has gathered the material from every available source, and has added it to his practical knowledge gained by experience in the coal fields of Pennsylvania. The book is an interesting one, and deals with the origin, development, transportation, and consumption of coal. The whole range of the subject is dealt with, from the theories of the origin of coal and the geology to the by-products. It is very interesting, and its usefulness is not confined to operators, miners, dealers, and carriers; but to the multitude of consumers—the American people.

NOTES ON THE COMPOSITION OF SCIENTIFIC PAPERS. By T. Clifford Allbutt, M.A. London: Macmillan & Co., Ltd.; New York: The Macmillan Company, 1904. 12mo.; pp. 154. Price, $1.

While this is primarily intended as an aid to students in writing scientific theses, many of our popular writers of fiction and of fact might profitably consider the principles and the methods here laid down. It is a really excellent little "preachment," as Fra Elbertus would say.

OPTICAL TABLES AND DATA. For the Use of Opticians. By Silvanus P. Thompson, D.Sc., F.R.S. London: E. & F. N. Spon, Ltd.; New York: Spon & Chamberlain, 1900. Price, $2.50.

As its title indicates, a compilation of tables and information for opticians and others, in notebook form.

THE ACADEMIC REVIEW OF ARITHMETIC WITH QUESTIONS AND PROBLEMS. By Guy E. Transue. Clarksville, Mich.: G. E. Transue, 1902. 12mo.; pp. 281.

This book has been written for review purposes only, and it contains the pith of all the best arithmetical works which have come to the author's notice. The first part of the book is devoted to the science of the subject and analysis of processes, and the second part to mechanics and business. A new method of finding the exact divisors of any given numbers will be found most useful. Simple mechanical drawing, with practical measurements and considerable data of value to those interested in the mechanical trades, will also be found in its pages, as well as a considerable amount of information on the making of notes, figuring of interest, etc.

CARBURATION ET COMBUSTION DANS LES MOTEURS A ALCOOL. By E. Sorel. Paris: Vve. Ch. Dunod, 1904. 8vo.; pp. 280. Price, $2.50.

Much has been said, *pro* and *con*, regarding the employment of alcohol in explosive motors. Its adherents declare that it can be substituted for gasoline in any motor, and that it does not leave any disagreeable odor or produce any smoke. Its detractors claim that it produces acids which attack the cylinders and valves, causing the latter to stick to their seats after the motor has cooled off. These praises and reproaches are not well founded. All depends on the circumstances under which it is used, and the method of producing the mixture of air and the combustible. M. E. Sorel, in this new work, indicates the conditions under which alcohol can be successfully used. He compares alcohol with the other hydrocarbons, and then studies various parts of the motors, especially the carbureters, which influence its use. Finally he makes known the laws which govern the phenomena of combustion, and which are generally not well understood by the constructors of this type of motor. The book has complete tables of the various fuels used in automobile motors, and of their conditions at different temperatures. The temperature of vaporization of these fuels is gone into very thoroughly. Many other points that bear on the subject are discussed. The book will be found most valuable to constructors of explosive motors of all types.

ELEMENTS OF MECHANICAL DRAWING, THEIR APPLICATION, AND A COURSE IN MECHANICAL DRAWING FOR ENGINEERING STUDENTS. By Alfred Pierce Jamison, M.E. New York: John Wiley & Sons, 1904. 8vo.; pp. 226. Price, $2.50.

This textbook is intended to give the student such knowledge as will prepare him for a course in engineering, besides aiding him in obtaining sufficient practice in drawing to qualify him to do ordinary commercial drafting. The text is amply illustrated with samples of lettering, sample plates, descriptions of instruments, and the like. It is written largely in the form of problems and their solutions and there are also chapters on mechanical execution of drawings, sketching, color work, and the reproduction of drawings. The chapter on projection goes into the subject thoroughly, yet concisely. The book, as a whole, is a complete handbook for draftsmen.

ETUDE THÉORIQUE DES ALLIAGES MÉTALLIQUES. By Leon Guillet. Paris: Vve. Ch. Dunod, 1904. 8vo.; pp. 232; 117 illustrations. Price, $2.75.

Alloys have, from an industrial point of view, a considerable importance; it is, in fact, rarely that metals are employed in their pure state. Recent researches on alloys have shown that physical, chemical, and mechanical properties of these products depend essentially on the state of the different metals that enter into the compound. It is, therefore, of great interest to determine exactly this state. The aim of the present work is to study the different methods which will lead to this knowledge, to show all the conclusions that have already been drawn from such knowledge, and to describe the different alloys utilized in the industries. The

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