RECENTLY PATENTED INVENTIONS.

Agricultural Implements.

MOWER-GUARD.—John C. Prout, Jr., Ogden, Utah. This invention provides a cap for mower-guards which can be used to restore a broken guard to its original shape, and which is so constructed that it can be sprung upon the guard and carried thereby without interfering with the action of the cutter-bar. The cap consists essentially of a body-portion conforming with the shape of the guard-finger, and a table projecting rearwardly from the body-portion, which is adapted to fill the position of a broken guard-section.

Mechanical Devices.

KNITTING-MACHINE.—George W. Ruth, Norristown, Penn. The inventor has devised a striping and splicing attachment for circular-ribbed-knitting machines, whereby an extra thickness of fabric is secured at any desired point, as, for example, half way around the knee of a stocking or around the heel. The attachment provided for this purpose breaks the splicing-yarn at the proper time, the break occurring near the hole through which the main yarn is fed, so that the end of the splicing-yarn may be readily taken up.

Railway-Appliances.

VALVE FOR AIR-BRAKE SYSTEMS.—William Palmer, Jr., Rincon, Territory of New Mexico. It is the purpose of this invention to provide means whereby the auxiliary reservoir can be recharged without the release of the brakes when descending heavy grades. These means consist of a retaining valve, which coacts with the chamber of an air-holder, which automatically closes by reduction of pressure in the train-pipe, and which opens only when the pressure is restored to the same degree as in the chamber. By placing the engineer's brake-valve in release position and admitting the excess pressure to the train-pipe, the air-holder chamber will be charged to a higher pressure than that normally carried in the train-pipe when the brake-valve is in running position; and the auxiliary reservoir can be recharged without releasing the brakes, merely by placing the brake-valve in running position.

Miscellaneous Inventions.

STOCK-RACK FOR PLATFORM-SCALES.—Samuel J. Rice, Scotch Grove, Iowa. The platform-scales are provided with a stock-rack, the sides of which are adapted to be connected by a cross-bar hinged to one side and hooked to the other. On the sides of the rack, end gates are hung adapted to swing inwardly and fold on the corresponding side. Each of the posts of the rack is pivoted at its lower end so as to permit the sides to be swung outwardly when especially large loads are to be weighed.

CARBON-BRUSH HOLDER.—Renwick E. Crockett, Michigan City, Ind. The object of the invention is to construct the carbon-brush holder so that the brush can be entirely removed for inspection or raised from the surface of the commutator without altering the tension upon the brush. Within the body of the holder, a brush-casing is arranged to slide. A tension device is connected with the brush-casing and acts in the direction in which the casing is adapted to slide. The tension device is mounted to hold the brush-casing elevated or away from the surface adapted for engagement with the brush.

FOLDING SUPPORT OR HOLDER FOR ARTISTS' TABLETS.—William C. Shimoneck, Washington, D. C. This device is adapted for use in the field or where a table or desk is not available. The body of the tablet-holder is composed of leather, canvas, or other pliable material, held stretched by means of a collapsible frame formed of light metal bars which are detachable from one another in such a manner that the body of the tablet may be left free to be folded or rolled into compact form so that, together with the detachable frame-portion, it may be packed in a case for convenience of handling or of transportation.

ELEVATOR-DREDGE.—William S. Russell, Toledo, Ohio. This invention is concerned chiefly with the upper tumbler and chain of buckets used to raise the material from below the dredge and discharge it into a hopper. The tumbler has flat polygonal faces, with flat projecting blocks on the faces, and curved seats at the angles between the faces. Detachable wearing-plates are provided, having flat faces fitting the flat faces of the tumbler-blocks, and curved overlapping ends fitting into and locking against the curved seats of the tumbler, and adapted to receive the recesses and hubs of the buckets and links.

THILL-COUPLING.—Edward F. Colvin, Milton, Penn. Secured to the thill-iron is a pivot-bolt having a polygonal head. A clip having jaws provided with internal sockets is adapted to receive the ends of the bolt. One of these sockets has a rearward extension to receive the bolt-head and prevent accidental detachment thereof. A spring is arranged in the rear of the sockets. A cam or curved projection on the thill-iron head works in contact with the spring when the thill-iron is elevated and is free from or out of contact therewith when the thill-iron is lowered.

FOCUSING ATTACHMENT FOR CAMERAS.—Laird H. Wallace, Ogden, Utah. It is the object of this invention to provide means whereby the devices used in focusing on the ground glass of a camera are rendered more compact. The inventor secures this compact arrangement by furnishing a lens in the sight-opening of the hood, through which the image is viewed by the photographer. This is advantageous because it permits the eye to be brought closer to the object, and so enables a hood of less length to be used than would otherwise be possible.

SIPHON-FILTER.—Joseph G. Sutton, Seneca, Mo. The filter consists of a filtering-block formed of porous material, preferably a natural stone, known as "Missouri tripoli." This block has intersecting passage-ways bored therein, the outer ends of the passage-ways being closed by a plug of cement, and the discharge-ends being all in communication with a specially-constructed outlet-tube tightly cemented into the block. When immersed the block becomes saturated with water by capillary absorption until the central chambers are filled. The siphon outlet-tube then causes a continuous filtration therethrough.

SCRAPER.—Charles M. McMullen, Rock Glen, N. Y. To provide a scraper for use on the heating-pipes of brine tanks for removing salt-scale, is the object of the present invention. The scraper comprises a movable carriage which supports standards having elongated slots. Scraper-saddles are provided, shaped to fit the external surface of the pipes; and rods are connected with the saddles and loosely engage the elongated slots in the standards, whereby, when the carriage is moved, the scraper-saddles are tipped to bring the forward edges of the saddles into contact with the external surface of the pipes.

CONDUIT-THREADER.—Fredrick A. Pooler, Los Angeles, Cal. This inventor has devised improved means for drawing wire rods, cables, and the like through a conduit. The invention embodies a novel form of creeper or threader-rod having gripper-devices for preventing back movement, and a pair of operating cords adapted, when alternately drawn backward, first to cause the crawler-block to travel toward the head of the threader-rod and then to pull the crawler-block into gripping-engagement with the conduit wall, and at the same time to shoot the threader-rod forward, such movement being continued step by step until the head of the rod projects beyond the forward end of the conduit-section with which access may be had.

THILL-COUPLING.—John C. Bowers, Brooklyn, New York city. An axle-clip having a bearing is included in the construction of this coupling, which clip holds a coupling pin. The eye of a thill-iron engages the coupling-pin, and from the ends of the coupling-pin links are hung. A spring is held by the clip and is capable of engaging the eye of the thill-iron to hold it in place. A bell crank lever is fulcrumed between the links and presses the spring to hold it in engagement with the eye of the thill-iron. While the device is in use the coupling-pin or bolt is securely locked in position, but can be readily locked or unlocked for removal when changing from a shaft to a pole.

SUSPENDER-END.—William Bloomberg, Manhattan, New York city. The suspender-end is composed of buttonhole-tabs connected by a neck. Two clasp-supporting straps are formed integrally with the tabs and neck. A clasp is secured to and unites the lower ends of the straps, the two clasp-supporting straps extending from the main part at points at each side of the center of the neck and at an angle thereto. The suspender-end is simple, strong, and durable in construction.

WAISTBAND FOR TROUSERS.—Max Wald, Manhattan, New York city. This waistband for boys' knee-breeches is formed of a single blank of cloth, folded to form a lining, the lower end of which continues to an upwardly-extending folded member, terminating in a downwardly-extending member, both members forming a fold for connecting the lower edge of the lining with the lower edge of the button-flap extending in front of the lining. Elastic pieces are stitched in alinement with some of the button-holes. When a strain is exerted on the button-flap, the elastic pieces take up the strain.

FILTER.—Edgar L. Stream, New Orleans, La. The filter comprises a tank, a tubular shaft mounted in the tank, and disks on the shaft. A face or periphery of perforated material is provided for the disks, and an endless apron of filter material has its edges engaging the disks. A rotary brush engages the apron within the tank. When the filtering material becomes clogged, the liquid in the tank will rise to the level of the brush; the liquid will filter through the apron and run out through the tubular shaft. The brush will clean the apron of sediment before it passes into the liquid to be filtered.

TORCH-BURNER.—William A. Nicholas and Gustave Burkhardt, Chicago, Ill. The torch-burner of these inventors is of the type used for brazing bicycle-frames, and is designed to be used by jewelers and electricians as well as bicycle-manufacturers. In a casing open at both ends, an open-ended perforated nozzle is centrally situated. A perforated flange rigidly supports and centers the nozzle. A tubular interrupter or spreader is arranged in front of and in alinement with the nozzle and serves to break up the two divided currents which emerge from the perforations of the nozzle and from the nozzle itself.

DOOR-CHECK.—John Speirs, Jersey City, N. J. The invention seeks to provide a lock for a door, so constructed that the door may be held partially open for the purpose of ventilation or for the purpose of enabling one to see a person who is demanding entrance. The lock is operated entirely from within, and when set merely to provide ventilation, it will not be possible to force the door sufficiently to effect an entrance, or to tamper with the lock from the outside.

ACETYLENE GAS GENERATOR.—James W. Kinry, Beloit, Kans. This apparatus comprises a generator, a cooling chamber, and a gasometer. The gas formed in the generator passes into the cooling-chamber, and then into the gasometer. A water supply pipe connects the cooling-chamber with the generator, and is provided with a valve controlled by the rise and fall of the gasometer, so as to regulate the supply of gas automatically.

Designs.

GAME-BOARD.—Paul R. G. Sjöström, Westfield, N. J. The leading feature of this design consists of a base, upon which is a rectangle formed in double lines terminating in disks at the corners, and also having disks intermediate of the corners. Within the rectangle mentioned, other rectangles are variously disposed, in the lines of which, disks are arranged. Outside of the rectangles are other figures also terminating in disks. The game constitutes a kind of maze puzzle and is played by means of checkers.

TRACE-CARRIER.—Frank G. Engberg, Kindred, N. D. The carrier consists of an elongated loop having at one end a neck which is forked and return-bent, so as to form double hooks.

PIPE-COUPLING.—Jere J. Hanrahan, Brooklyn, New York city. The coupling-section is screw-threaded at both ends. At right angles to the body of the section, a cylindrical portion is secured, which is provided with a projecting perforated ear. The coupling is more compact than that ordinarily employed and consequently presents a neater appearance.

MONUMENT.—Edwin O. Townsend, Manhattan, New York city. The monument provided by this design consists of a massive base upon which there stands a polished block of stone ornamented by moldings and carvings.

CARPET.—Eugene A. Crowe, Brooklyn, New York city. Upon the carpet there is represented a shield emblazoned with an ax and a mallet, the handles of which are crossed. Foliate sprays, a horn of plenty, a pair of scales, and a vase complete the design.

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

NEW BOOKS, ETC.

How to Gain Admission to Annapolis, West Point, or the Schoolship St. Mary's. New York: S. A. Nelson, 16 Park Place. 1898. Price 50 and 75 cents.

We have often been asked questions as to how admission may be gained to the army and navy or to the professional schools which turn out officers for the two services. The little volume before us is adapted to give precisely information of this class, and, so far as we know, the field which it covers is a new one. Of course, a candidate for admission to either school can obtain information by addressing the War and Navy Departments, but there are many things which a candidate would like to know in relation to them which cannot be readily obtained, and this volume is intended to give exactly this information. There is also a list of the leading military schools and colleges in the United States.

Text-Book of Physics. Sound. By J. H. Poynting and J. J. Thomson. London: Charles Griffin & Company. Philadelphia: J. B. Lippincott Company. 1899. 8vo. Pp. 163. 85 figures. Price $3.

The present volume deals entirely with sound. The text-book is intended chiefly for the use of the students who lay most stress on the study of the experimental part of physics and who have not reached the stage at which the reading of advanced treatises on various subjects is desirable. It will serve admirably as an introduction to Helmholtz's great work entitled "The Sensation of Tone," which deals chiefly with the physiological aspect of sound, and to Lord Rayleigh's "Theory of Sound," at once the most systematic, original, and complete work on the subject. The present volume is none too free from mathematics, but at the same time can undoubtedly be mastered even by those who have little mathematical training. The authors are both well-known physicists, and anything which emanates from their pens is sure to be of value.

English Cathedrals. By Francis Bond. London: George Newnes, Limited. Philadelphia: J. B. Lippincott Company. 1899. 16mo. Pp. 314. Price $2.

There are already a number of excellent books upon cathedrals, including Mrs. Van Rensselaer's and Bell's Cathedral Series, to say nothing of the older works. There are also several volumes which bear the name of great church dignitaries, which might just as well not have been written, as they are confused and abound with errors and solecisms. The present volume is of an entirely different nature, and will be warmly welcomed by the student of cathedrals, notwithstanding the fact that the literature on the subject is already large. The volume takes up the architectural aspect particularly by what might be termed the "biographical" method, and this is what is so much needed by so many students. The text is most valuable. It is clear and scholarly, and the illustrations, while reproduced on a very small scale, still serve to elucidate the text. The book would be of great value if taken with the tourist into the cathedral towns. The author will not spare the visitor's legs, but no one can see a cathedral without considerable marching and countermarching.

The Shipping World Year Book. A Desk Manual of Trade, Commerce, and Navigation. Edited by Evan Rowland Jones. London: Shipping World Office. 1899. 16mo. Pp. 1140. Price $2.

The annual year book published by The Shipping World is one of great importance to all who are in any way interested either in ocean transportation or in dispatching goods of any kind. It is filled with valuable information, such as the tariffs of all countries, a port directory giving particulars of all British and foreign ports, the rates for pilotage and towage, the dimensions of harbors, dry docks, etc. There are also many tables of distances, etc., which are very important for seamen. There is no question that this little book is at the head of its class.

Commercial Management of English Works. By Francis G. Burton. Manchester, England: The Mechanical Engineer. 1899. Pp. 310. 8vo. Price $5.

The volume before us goes into the organization of commercial establishments, such as engineering works. It defines the duties of the various offices, and shows how they should be performed in an economical manner. Various methods of keeping books, stock, drawings, etc., are also entered into. There is little question that many large concerns could adopt the methods advocated by Mr. Burton with good results. Of course, the present volume is specially intended for use in Great Britain, but at the same time the methods given would prove of value in this country.

How to Prepare for a Civil Service Examination. With Recent Questions and Answers. By Francis E. Leupp. New York: Hynes & Noble. 1899. 12mo. Pp. 5 7. Price $2.

The government of the United States is a good employer to those who do not possess the inclination or means for entering into professional life or into independent money-making adventures. Civil Service has been used by many young men and women as a path to a larger field of effort in private life. To those who wish to fit themselves for civil service examinations many problems are presented, and it is to aid in solving these problems that the present volume has been prepared. The examinations are eminently of a practical character, and much time and energy may be saved by a perusal of the book before us, as any candidate may learn from it just what is necessary and what is unnecessary in brushing up his studies. Advice is given as to the chances of making one's way into the civil service and of staying there. The book is admirably arranged, and cannot but prove of the greatest possible value to every candidate.

Chemical and Metallurgical Handbook for the Use of Chemists, Metallurgists, and Mining Engineers. Second Edition. By J. H. Cremer and G. A. Bicknell. Cleveland, O.: Published by the Author. Pocket book form, leather, gilt. Pp. 337. Price $3.

Chemical literature is probably the most extensive of any science, with the exception of possibly electricity, yet the number of practical works is astonishingly small, and for this reason we welcome works like the present, which give chemists and those in need of chemical information exactly what is needed without going into theory. After atomic weights the reactions of metallic salts are given in a particularly concise form; then come tables showing the molecular weight, specific gravity, melting point, boiling point, and solubility of the principal inorganic compounds. Then come the laws of chemistry, percentages of alcohol, specific gravity of sulphuric, nitric and hydrochloric acids. Then follow methods for the analysis of iron ore, pig iron, steel, coal, coke, etc. This is followed by various tables which are specially useful to the metallurgist.

Salva-Webster. An English-Spanish and Spanish-English Dictionary. Compiled by J. Gomez, Ph.D. Edited by F. M. de Rivas. Chicago: Laird & Lee. 1899. Pp. 382. 24mo. Double Index. Price 40 and 75 cents and $1.

A small Spanish dictionary handy for the desk was never more acceptable than at the present time, now that we have extensive colonies where Spanish is spoken. The dictionary itself is a model one for its size, and it is one of the modern wonders of book-making that a double-indexed dictionary, of this size, substantially bound, can be sold for such a small sum. It is admirably adapted for the use of those who occasionally receive Spanish commercial letters.

With Sampson Through the War. By W. A. M. Goode. With Contributed Chapters by Rear-Admiral Sampson, U. S. N., Captain R. D. Evans, U. S. N., Commodore C. C. Todd, U. S. N. New York: Doubleday & McClure Company. 1899. Pp. 307. Illustrated. Price $2.50.

The volume before us is an important contribution to the literature of the Spanish-American war, a literature which is already appalling in size. The book is an account of the naval operations of the North Atlantic squadron during the Spanish-American war of 1898, and was written by a correspondent of the Associated Press. The book may fairly be said to be the authoritative work of the North Atlantic squadron during the Spanish-American war, and it contains a true history of the famous Santiago fight, besides clearing up many mooted points. It is admirably written and is well calculated to give an excellent idea of the causes which led up to war and the war itself.

Roentgen Rays. Memoirs. By Roentgen, G. G. Stokes and J. J. Thomson. Translated and edited by George H. Barker. New York: Harper Brothers. 1899. Pp. 76. 12mo.

The volume before us is one of the series which the publishers are issuing, entitled Harpers' Scientific Memoirs. We have already reviewed two previous volumes which presented classic papers; we now come to equally important papers which are of comparatively recent date. The original communication of Prof. Roentgen will probably always be one of the great classics of physics, and it is gratifying to have the papers admirably translated by a physicist of repute and published in a worthy form. In addition there is Sir G. G. Stokes' "On the Nature of Roentgen Rays" and Prof. J. J. Thomson's "A Theory of the Connection Between Cathode and Roentgen Rays."

Michael Faraday: His Life and Work. By Silvanus P. Thompson, D.Sc., F.R.S. New York: The Macmillan Company. 1898. Pp. 308. 12mo. Price $1.25.

The Faraday literature is much larger than might be supposed. It is seldom that a man of science is honored by such biographies as have been penned by Dr. Bence Jones, Prof. Tyndall, Prof. Clerk Maxwell and Dr. Gladstone. Faraday is, however, worth it all, and when the final summing up of the scientific history of the century shall be made, Michael Faraday will be in the front rank among the little band of men whose pre-eminent achievements extended the boundaries of knowledge. Faraday is the beau ideal of the man of science, and for forty years his was the living and inspiring voice at the Royal Institution, and while there his researches in physics laid the foundations of electrical engineering. So much for the man and his relation to his time. At the present day probably no one is better qualified to take up the rather difficult task than Prof. Thompson, himself a brilliant physicist, and he has acquitted himself admirably; in fact, his lucid style is well adapted to portray the great discoverer and reveal him in his true light. We cannot undertake to give even a synopsis of the chapters, but recommend any one interested either in science, electricity, or even biography itself to purchase this book, whose cost is not forbidding. The excellent frontispiece portrait is marked with the initials S. P. T. If Prof. Thompson really drew the portrait, he deserves additional thanks.

THE MODERN THEORY OF SOLUTION. A Memoir by Pfeffer, Van't Hoff, Arrhenius and Raoul. Translated and edited by H. C Jones, Ph.D. New York: Harper Brothers. 1899. Pp. 133 12mo.

The book before us will prove of great value to all those who are interested in theoretical chemistry, and the papers which are included in it are of great importance and the bibliography is very complete. This is also a volume of Harpers' Scientific Memoirs, and we are glad to note that six other volumes of the series are now in active preparation.

TWENTIETH CENTURY SKETCH BOOK. By M. H. Avery, Woonsocket R. I. 1898. Price 50 cents.

This up-to-date method of sketching will doubtless prove interesting to many who are anxious to make progress in mechanical and geometrical and trigonometrical drawing. No drawing-board, T-square, scale, angles, or protractor are required. It is made in two parts, one without angle readings and the other with angle readings.

THE BRITISH NAVY. By A. Stenzel, Captain Imperial German Navy, Retired. New York: E. P. Dutton & Company. London: T. Fisher Unwin. 1898. Pp. 327. 4to. Price $5.

This work, a translation from the German, has a special interest due to the fact that it is an impartial survey of the British navy from the standpoint of a trained foreign critic. While the general tone of the book is distinctly complimentary, Captain Stenzel is at times severely critical, and indicates what seem to be the weak points both in the material and administration of the British navy. The work opens with a historic survey, followed by chapters on the Admiralty and its naval policy. Then follow a comprehensive description of the stations and dockyards, and chapters on the personnel, the education and training, and the uniform of the navy. This matter will be much of it new to the general reader, and not so familiar as that contained in the chapter on material. This last, although it goes over well-worked ground, is excellent in its arrangement and selection. It commences with the historical development, showing excellent photographic views of the last and largest of the old 3-deckers, as represented by the "Duke of Wellington," of 131 guns and 6,071 tons. The growth of the armorclad ship is traced by diagram, photograph, and description from the "Wellington" to the modern "Majestic." The illustrations are many and excellent, and the work is concluded with a complete table showing all the ships of the navy, with their particulars of size, speed, armament, and cruising qualities.

HANDBUCH DER TELEPHONIE. Nach dem Manuscript des Dr. Victor Wietlisbach. Bearbeitet von Dr. Robert Weber. Vienna: A. Hartleben. 1899. 372 illustrations. Large 8vo. Pp. xiv., 368. Price $3.

The work of the late Dr. Wietlisbach, which lies before us, constitutes one of the most valuable contributions to the literature of telephony which has yet appeared. The eminent position occupied by the author as Weiland director of the Swiss telephone service in Bern, and his vast technical knowledge, well fitted him for the task of producing a handbook which has surpassed anything that has yet appeared in German The care bestowed upon every detail of the subject, the clearness of the verbal and mathematical explanations, and the exhaustiveness with which everything relating to the telephone has been discussed, should earn for the book a prominent place in the technical library of every electrician.

PAGANINI'S PHOTOGRAMMETRISCHE INSTRUMENTE UND APPARATE FUR DIE REKONSTRUKTION PHOTOGRAMMETRISCHER AUFNAHMEN. Von Prof. E. Dolezal. Separat-Abdruck aus Der Mechaniker. Berlin W.: F. and M. Harrwitz. 1899. 9 illustrations. Price 50 cents.

In 1855, Prof. Porro, of Milan, made the first attempt at applying the camera to geodesy, and thus founded the modern science of photogrammetry. Since Porro's time savants have endeavored to develop the results obtained and to bring this new branch of surveying into more general use. Of these men perhaps the most prominent is Prof. L. P. Paganini, Director of the Photographic Division of the Military Geographical Institute of Florence. The little pamphlet which lies before us is a reprint of an article which appeared in Der Mechaniker, and gives a history of Paganini's work and describes in detail the various instruments which he has invented. Since Paganini is so closely identified with the development of photogrammetry, it necessarily follows that Prof. Dolezal's article contains everything that is now known of the science. His pamphlet is therefore to be considered as a valuable contribution to the literature of geodesy.

ORGANIC CHEMISTRY OF CARBON COMPOUNDS. By Victor von Richter. Edited by Prof. R. Anschütz. Translated by Prof. Edgar F. Smith. Vol. I. Chemistry of Aliphatic Series. Philadelphia: P. Blakiston's Son & Company. 1899. 8vo. Pp. 635. Price $3.

Richter's Organic Chemistry is well known in the United States as a standard work, which no chemical library can do without. The present work is a translation from the eighth German edition, which has been ably edited by Prof. Anschütz, and the subject matter is vastly different from that given in the earlier editions. The marvelous advances in the various lines of synthetic organic chemistry have made many of the changes in the text absolutely necessary. It is a book which can be confidently recommended to all who are in need of an advanced work on organic chemistry. The second volume, which will be devoted to "The Aromatic Series," is in rapid preparation, and will be published during 1899.

Business and Personal.

The charge for insertion under this head is One Dollar a line for each insertion: about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in the following week's issue.

Notes & 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.

(7642) J. A. K. asks for a formula for making blue prints of maps, etc. I used red prussiate potas., 120 gr.; ammonia cit. and iron, 140 gr.; pure water, 4 oz.; mixed them separately, and then poured together, but the white was of a yellowish cast instead of a white. A. We think the proportion of chemicals is too small. Try using the following: Iron and ammonium citrate saturated, 1 oz.; water, 4 oz. Mix up this solution separately and then mix another solution composed of potassium ferrocyanide and water, 4 oz. For use mix equal quantities and float the paper for two minutes.

(7643) H. A. S. asks: 1. Will an electric current meter which is made for 104 volts register the proper amount if used when the voltage is 115? A. A current meter is not made for the voltage, but for the amperes which pass through it. It will register more current if lamps which are made for 104 voltsare put upon a 115 volt current, since more current will then flow. This is because the filament becomes hotter and its resistance is made lower. 2. Please inform me also how to remove grease or oil from an old belt so the cement will hold in splicing. A. Soak the ends of the belt in benzine and the oil will be dissolved.

(7644) R. C. asks: Can liquid oxygen be kept securely in any suitable receiving vessel? Is it as yet a commercial commodity? A. Any substance with a boiling point below the ordinary temperature of the air cannot remain in the liquid form in the open air. It will boil and pass into the form of vapor. This is the reason why liquid oxygen or liquid air cannot be kept in the liquid form. It boils at about 300° Fah. below zero. It absorbs heat rapidly from the air because of the great difference between it and ordinary air in temperature, and boils away very rapidly. If held in a receptacle till it had reached the temperature of the air, the pressure would be 10,000 to 12,000 pounds per square inch. This is the same as saying that it is impossible to confine it. It is not on sale anywhere.

(7645) H. G. W. writes: Will you please tell me what baths are used to cleanse brass to prepare it for polishing? I refer to old brass which is to be refinished. Also is there any way to restore the finish of hard rubber which has grown green and dead looking? A. Try removing the lacquer with alcohol; after this is done, you can proceed to clean the brass. There are many substances and mixtures which will clean brass, as oxalic acid, hydrochloric acid, and there are other acids which will do it, but probably oxalic acid is the best. The acid must be well washed off and the brass dried. It should be remembered that oxalic acid is poisonous. You will find it almost impossible to restore the color to hard rubber. We recommend you to try polishing it with very fine putty powder and water and finish with a piece of silk.

(7646) C. M. writes: A friend of mine has a lightning rod on his house fastened close to the wall (frame house) by strips of sheet iron, instead of leaving a space of some inches. The end of the rod is about 2 feet in the ground, having no plate on its end, and I often read in books that all the water and gas pipes must be connected to the rod. Please let me know if this is right or not. Can I test the lightning rod with a magneto machine, and how can I do it? Can you refer me to any SUPPLEMENT describing how a lightning rod must be erected? A. Putting a lightning rod on a house is a very simple matter. Fasten it as firmly to the house as possible. An air gap is of no consequence. Do not insulate the rod from the house. Connect the water pipes to the rod. If there are no water pipes, ground the rod in a moist place with an ample iron plate. Carry the rod above the house at least 4 feet, at all gables and chimneys. Tip each upper end with several points. Iron rods are as good as or better than copper. To test the joints with a magneto, bring wires from the top and the bottom of the rod to the magneto and see if the bell rings well through the rod as a part of the circuit. To test the ground with a magneto, connect the rod and the magneto by one wire. Run another wire from the other side of the magneto to a ground near the ground plate of the rod. The best article that has appeared in many years upon lightning rods is by Mr. McAdie, of the United States Weather Bureau, in SUPPLEMENT, No. 998, price 10 cents. The subject is well treated in Thompson's "Elementary Lessons in Electricity," price $1.40 by mail.

(7647) A. J. A. writes: Some time ago you gave a formula for cleaning and polishing seashells. I cannot find the article treating upon this subject. Have looked papers through with aid of index several times. A. 1. Porcelainous shells are so hard as to require the apparatus of a lapidary to cut or polish them, but they are generally so smooth as to require no rough grinding. They may be polished by using a felt wheel and applying putty powder. Nacreous shells or those of the pearl variety may be filed and cut without a great deal of difficulty. Pieces to be turned are first roughly shaped on the grindstone, then turned and polished with pumice stone, putting on the final polish with rottenstone. Irregularly shaped pieces are filed and ground, then smoothed with pumice stone and water, and finished with rottenstone. The rottenstone is sometimes mixed with sulphuric acid full strength, or slightly diluted, to heighten the polish. 2. Rough shells are polished by first grinding them on a coarse stone, then smoothing them with pumice stone and water on a buffer wheel or with a hand polisher, and finishing with rottenstone.

(7648) F. E. L. asks: Does the chain on a bicycle travel faster or slower according to the size of the sprocket wheels, the gear remaining the same, and if so, is the work that it performs heavy or light in the same proportion to the speed that it travels? A. The chain on the larger sprockets travels the fastest for a given gear and has the lightest work.

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