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

"U. S." metal polish. Indianapolis Samples free.

Heading machinery. Trevor Mfg. Co., Lockport, N. Y.

The exhibit of Wm. Jessop & Sons bas received the highest award at Chicago Exhibition.

The Improved Hydraulic Jacks, Punches, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Steam pressure regulators, reducing valves, safety cbecks. Foster Engineering Co., Newark, N. J.

Light machinery, patterns, tools, models, and experimental work. Waite Mfg. Co., Bridgeport, Conn.

Screw machines, milling machines, and drill presses. The Garvin Mach. Co., Laight and Canal Sts., New York.

Metal spinning, nickel plating, brass castings, experimental brass works. S. Newman, 64 Main St., Cin'ti, O.

Centrifugal Pumps for paper and pulp mills. Irrigating and sand pumping plants. Irvin Van Wie, Syracuse, N. Y.

Emerson, Smith & Co., Ltd., Beaver Falls, Pa., will send Sawyer's Hand Book on Circulars and Band Saws free to any address.

Split Pulleys at Low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

Send stamp for circular of castings and parts of the dynamo-motor advertised on page 336, Scientific American. Elbridge Electrical Mfg. Co., Elbridge, N. Y.

The "Olin" Gas and Gasoline Engines, from 1 to 10 horse power, for all power purposes. The Olin Gas Engine Co., 222 Chicago Street, Buffalo, N. Y.

Perforated Metals of *all* kinds and for *all* purposes, general or *special*. Address, stating requirements, The Harrington & King Perforating Co., Chicago.

The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail, $4; Munn & Co., publishers, 361 Broadway, N. Y.

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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 This is for our information and not for publication.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.

(5559) F. B. H. asks for the specific gravity of graphite, as used in lead pencils and different pigments used in paints. A. We give some specific gravities: graphite, 1·9 to 2·3; zinc white, 5·6; white lead, 6·5; barytes, 4·5 to 4·75; red oxide of iron, 2·6 to 3·1; chrome yellow, 5·653; chrome red, 6·266. In works on paints specific gravities of other pigments may be found. In many cases it will be almost impossible to find reliable data. We recommend and can supply you with the following books relating especially to the subject you refer to: "The Painter's Encyclopedia," by Gardner. Price $1.50. Hurt's "Painter's Colors, Oils, and Varnishes." Price $3.50. Riffault's "Treatise on Colors for Painting." Price $7.50. Church's "Chemistry of Paints and Painting." Price $1.75 mailed.

(5560) A. B. asks: Is the life of a bichromate plunge battery dependent upon the amount of fluid in the cell, *i. e.*, will a cell holding one quart of fluid be longer lived than a cell holding only one pint of fluid, the carbon and zinc plates being the same size in both cases? A. The life for one charge is dependent on the fluid contents. A quart of solution properly used will give twice the quantity of energy that a pint of solution will afford. A large cell contents obviates the necessity for frequent recharging.

(5561) C. C. L. writes: Does exposure to light affect bichromate of ammonia? Does exposure to air weaken it, and what is the change? Is there a test for its purity and strength? Is its action on organic matter chemical or mechanical when exposed to light? What is the nature of the change? A. The salt is permanent in the air. In contact with organic matter when exposed to light chromium trioxide is produced, the action being one of chemical reduction. There is no test for its purity and strength except analysis.

(5562) P. K. asks: Is there any way to cut bottles so as not to crack them? A. File a notch on the side, rub the end of a red hot poker back and forth upon the surface of the glass until a crack is started, then with a hot poker lead the crack wherever you wish. It will follow the course of the hot iron. Cracking coal is preferable to the hot poker. It consists of a crayon of charcoal, saturated with a weak solution of nitrate of potash and dried. It burns to a point, and maintains a continuous red heat. If the potassium nitrate solution is too strong, the crayon will be more or less explosive.

(5563) D. & C. ask: Can an incadescent electric light current from a circuit of 110 volts potential be successfully used for electroplating? If so, how? If not, why? A. By using sufficient resistance it can be done. But as a very small quantity of the electric energy will be utilized in the plating, the resistance absorbing most of it, the process will be too uneconomical for use.

(5564) G. B. B. writes: Has the Leclanche battery to be filled with new solution before working, or will it work if the circuit has been left open for some time? If so, about how long will it take? A. New solution is not required unless the old has been exhausted by use. Standing on open circuit restores the strength of the battery if the solution is not used up.

(5565) E. M. asks: If a hen and a half lay an egg and a half in a day and a half, how many eggs will seven hens lay in seven days? A. One hen in a given time will lay half an egg less than a hen and a half. Therefore one hen will lay one egg in a day and a half, or two-thirds of an egg in a day. Seven hens in seven days will lay $7 \times 7 \times \frac{3}{3}$ eggs, or $\frac{98}{3} = 32\frac{2}{3}$ eggs.

(5566) W. A. P. says: We have a fire engine (steam) to which I wish to attach a heater from a coal stove, so as to keep water warm in boiler of engine for winter. Please let me know the best way to arrange heater in stove and how best to connect to boiler. A. The stove should be placed below the floor of the engine house, with a coil of 1 inch iron pipe just above the fire, so that when the engine boiler is disconnected, the pipe will not be overheated and throw out the water. Two or three turns of pipe inside the stove is sufficient. The pipe from each end of the coil may pass up through the floor with a 1 inch hose connecting with the blow-off cock from the bottom of the coil, and another hose from the pipe leading to the top of the coil, connected to cock inserted in the side of the boiler at any convenient place below the water line. A small tub can be placed nearby, partly filled with water, to drop the ends of the hose into when the engine is uncoupled for use, which will prevent the pipes in the stove becoming empty. By this arrangement the fire in the stove may be left burning while the engine is away. The same stove may be used for heating the engine house by placing a register over it, if under the floor, or by setting the stove in an open pit several feet below the floor.

(5567) P. P. asks: 1. How coal tar that is to be used for paint can be colored. A. Coal tar cannot be given bright or very light color by any mixture. Any of the dry paints, with a little turpentine, will mix with and lighten the color. Red oxide of iron paint will make a dark red and zinc white will make a dark gray. 2. What published work should a person consult to become familiar with the analysis of feed water for steam boilers, to determine the amount of lime, magnesia, and other scale-forming salts contained therein? A. "Water Supply," by Nichols, is an excellent work for study on the purification of water for all purposes. $2.50 by mail.

(5568) T. R., A. H. College, Salt Lake City, asks the means of keeping in good order leather pistons, washers, etc., of our apparatus. On account of the dryness of our climate they quickly contract, to our great annoyance. A. Wet the leathers with glycerine. The brown or unbleached is preferred. It does not evaporate, but absorbs moisture and keeps the leathers soft and full.

(5569) J. P. writes: A bets the propelling power of a screw is obtained on the forward side of the blade. B bets it is got from the after side. A. The power of screw propeller is given principally from the after side of the blade by its pushing and projecting the water backward. A small portion of the power of propulsion is also derived from the sucking action of the front of the blade in drawing the water toward it.

(5570) C. & McC. ask for a receipt for making a paint or putty to fill the unevenness of castings like machinery manufacturers use to paint new machinery, such as planers, lathes, and engines. A. Plaster of Paris, gum tragacanth, and fine iron filings mixed in a putty with water make a hard cement for filling iron castings.

(5571) B. H. asks: 1. Can water contain more than 212° heat (and remain such) under pressure, as in a boiler, steam pressure say at 100 pounds or upward? A. There is no limit to the degree of heat that may be given to water within the limit of power to hold it. More than 1,000 pounds pressure per square inch, with a temperature of 546° Fah., has been in practice. Water in boilers under pressure is always at the temperature of the steam due to pressure. At 100 pounds it has a temperature of 338°. 2. Who invented the gimlet-pointed screw? A. The gimlet-pointed screw was first made by the American Screw Company in Providence, R. I., about forty years ago, under patents held by the company.

(5572) T. L. says: The process described in SCIENTIFIC AMERICAN SUPPLEMENT by Mr. F. Watts, F.I.C., analyst to government of Leeward Islands, for purifying water by ferric chloride, has been practiced in the United States at least five years, notably at St. Louis, upon Mississippi water.

(5573) E. S. D.—Carborundum was discovered by Mr. E. G. Acheson, of Pennsylvania, in 1890. It is equal to the diamond in hardness. It cannot be moulded, not being plastic. For excellent papers on the subject we refer you to our SUPPLEMENT, Nos. 863 and 929.

(5574) D. J. H. writes: I have a new house in a section where there is no city water or wells, and the only water obtainable is rain water, which I collect in a stone cellar, lined with lime and Portland cement. Will you please tell me through your paper the cheapest way in which I can rid the water of the lime and reddish color it now has, and make it fit for drinking and cooking purposes? A. The lime should have no place in the lining of the cistern. If you can clean out the cistern and free the surface of dirt by scrubbing with a steel brush, then plaster with pure Portland cement, you will improve the water as far as the lime affects it. The red color is probably due to leaves and dust lodged upon the roof and in the gutters. A clean roof is of the first importance where cistern water is the only recourse.

(5575) H. B. C. asks how to make a lacquer the color of gold leaf, to put on brass work, to make the brass work the color of gold leaf. A. Dissolve clear, light colored shellac in 95 per cent alcohol, 1 ounce to a quart. Settle in a bottle for a day and pour off the clear top solution. Add a little alcoholic extract of saffron or dragon blood gum to color to your taste by trial. If too thick, dilute with proof alcohol.

(5576) A. A. asks: Will you kindly state the condition of the Hudson River tunnel as it stands at present? A. It is completed about two-thirds of the distance under the river. Work stopped, waiting funds.

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December 5, 1893,

AND EACH BEARING THAT DATE.

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