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 This is for our information and not for publication.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.

(8916) J. E. W. asks: 1. Can I make a good durable lacquer to dip small malleable iron articles, to give them the color of brass? A. You can make a lacquer of clear, light-colored shellac dissolved in wood alcohol and colored yellow with any of the soluble yellow pigments. 2. Would the lacquer be durable on the articles if handled much? A. The lacquer will not be durable to handle in the use of the articles. 3. If the above is not practicable, give a description of a brass plating plant and the process of plating, with the estimate of what it would cost for a small plant. A. For a description of other processes for coloring by dipping, and plating by dipping and by electro-plating we refer you to Brannt's "Techno-Chemical Receipt Book," $2 by mail. 4. Would the same plant be used for bronze and nickel plating? A. The bronzing and nickel plating processes are also fully treated in the book.

(8917) H. E. M. writes: Can you furnish me a receipt for a waterproof glue or cement that will hold emery as hard as common glue will? A. Melt together one part of shellac and one part of resin; when uniformly mixed, stir in one part of carbolic acid, crystals.

(8918) F. H. K. asks: 1. How much water pressure per square inch can be obtained from a 28-barrel tank, 21 feet from bottom of tank to ground, 1¼-inch discharge pipe reduced to ¼ or ⅛ inch at outlet? Pipe making one turn to connect with motor. Does this reduce pressure? A. You will have a pressure of 9 pounds per square inch at the ground. The friction for so short a pipe will be imperceptible. 2. I understand that the north magnetic pole of the earth is considered negative. Then the end of the compass needle pointing north would be positive. Is this so? A. The north magnetic pole is negative, and the north end of a magnetic needle is positive. 3. Are the north and south poles of a battery or a magnet the same as the negative and positive poles, respectively? A. The positive pole of a battery and of a magnetic needle are equivalents when the positive current enters at the end of a left-hand coil. The entrance of the current in the coil is its north pole.

(8919) J. A. R. asks for a formula for a good black varnish for rubbers and rubber boots. A. The manufacturers of rubber varnishes impart the gloss by applying a coat of asphalt varnish before vulcanizing. The following rubber varnishes are all well recommended: a. Dissolve 1 part of shredded caoutchouc in 8 parts of benzol, and then add 2 parts copal oil varnish. b. Carefully melt 1 part of colophony, then add gradually ½ part of finely shredded caoutchouc, stirring thoroughly. Then add 1 part linseed oil and keep heated until uniform mixture is obtained. c. Dissolve 1 part gum dammar and ½ part shredded caoutchouc in 1 part of oil of turpentine, warming in a water bath; then add 1 part of linseed oil varnish. d. Mix 1 part caoutchouc, ½ part lard, and 6 parts good fish oil, and heat in a water bath, stirring until all is dissolved. Apply warm. This is claimed to give an excellent glossy coat. 2. Also a formula for the best dry powder fire extinguisher (such as is sold by some New York firms), one that will extinguish an oil fire. A. Bicarbonate of soda and sal ammoniac, both very dry, and kept in a dry place, make as good a dry powder fire extinguisher as can be made. If mixed with a little finely powdered mineral matter, such as tripoli, there will be less tendency toward caking.

(8920) H. S. M. asks for the ingredients and proportions for making a rubber cement from raw rubber which will stand hot water. I want to use it for repairing rubber boots, such as patching, putting on soles, etc. A. 1. Dissolve 1 part of shredded caoutchouc in 30 parts of carbon bisulphide. 2. Melt together 1 part of shredded caoutchouc and ½ part of colophony; when cool, dissolve in 3 to 4 parts of oil of turpentine. Mix solutions 1 and 2 for use.

(8921) E. R. B. writes: Will you send me one or two formulas for chemicals used in dipping gas mantles to render them incandescent under heat? A. The incandescent gas mantle, or Welsbach mantle, is made as follows: A mantle is woven of cotton in the proper form, and is dipped into a solution of the mixed thorium and cerium nitrates, dried and redipped until the cotton is sufficiently impregnated. When this is ignited the cotton burns away, and the nitrates are decomposed to oxides, in which form they incandesce vividly. The best light is obtained when the mixture consists of 99 per cent thorium oxide and 1 per cent cerium oxide. Other earths have also been used; such as lanthanum and didymium; zirconium and magnesium have also been tried, but the thorium-cerium mixture gives the best light. These rare earths can be purchased in quite pure form, but are expensive. Commercially, they are obtained from monazite sand. Their manufacture is largely controlled by the Welsbach companies.

(8922) W. H. K. asks: In connecting a pump to a boiler, where should the feed-valve be—between the pump and check-valve or between the check-valve and boiler? A. A valve or cock should always be placed in the feed pipe next to the boiler, and only used for contingencies, or examination of the check-valve, which should be in front of the valve or cock. Another valve at a convenient place should be used to regulate the boiler feed.

(8923) L. J. S. writes: We have just finished a brick stack 125 feet high, 48-inch flue, for our new plant and I wish to have a copper lightning rod placed on same—a copper cable rod about 17-32 inches in diameter, 28 strands, in shape of a cable. Now there is a cast iron cap on this stack, to which I wish to fasten the copper rod and then encircle the whole cap with this rod and have copper points, say about 8 inches long to the number of about ten, placed all around edge of cap; rod to be well grounded. Also is there any danger if rod is grounded inside of boiler house, or is it safer to keep it on the outside? A. Your method of arranging the lightning rod is correct. We advise you to carry the lightning rod over the roof of the boiler house and ground it outside to the water line or to a well. If you know the depth of the water line an iron rod driven to the water makes a good ground connection.

(8924) C. A. A. writes: I burn brick in a brick yard, and in burning the brick, there are, after opening the kiln, some brick entirely burned up, and I would like to know what kind of stuff there is in the clay that causes these brick to burn into dust? A. The quality and strength of your brick depend upon the proper proportion of pure clay in the mixture. If you are turning out of your kilns good and bad brick you should know your system of mixing and the proportions of pure clay and sand, or possibly you are using a clay marl that does not run even. We advise you to make a study of "Sixty Years a Brick Maker," by Crary.

(8925) C. A. P. asks: 1. What is the average per cent of loss of power in gearing a wheel to 250 revolutions a minute from a wheel making one revolution a minute? A. Change of speed does not change or lessen power further than is caused by the actual friction of the wheels or belts used in the change. 2. Is this average the same in all instances where the ratio is the same as the one mentioned? A. It is not always the same by the different methods of making the change of speed, and is a matter of friction only. 3. When obtaining power from a weight, how heavy would the weight have to be to give one horse power? A. 33,000 pounds falling one foot per minute or its equivalent of weight and feet are equal to one horse power.

(8926) C. V. F. asks: What would you use to best advantage to clean greasy articles to be soldered where it is not necessary to use the scraper if it was not for the grease? I have used carbonate of potash and soda solution but not with good results. What is best to use to lift the solder from the bar with the copper? I keep it clean, but it does not lift the way it ought to. How do you prepare the sal ammoniac for soldering purposes? A. Hot water and soda should be sufficient to clean grease from work to be soldered. To charge the copper with solder, draw it from the end of a solder stick. For a solution, dissolve zinc in hydrochloric acid to saturation, to which add a little sal ammoniac and water.

(8927) J. G. H. asks whether surveyors make any allowance for the curvature of the earth in surveying large tracts of land or bodies of water. A. The curvature of the earth is always a factor in accurate surveying. The United States Geodetic Survey makes a fine point of this element. The curvature for one mile is 0.667 of a foot, and for three miles it is 6 feet. An appropriate rule is, two-thirds the square of the distance in miles equals the curvature in feet. The South Atlantic Ocean has not been fully surveyed.

(8928) A. M. B. asks where he can procure the metal bismuth in sheet and insulated wire form? A. Bismuth is a brittle metal, and cannot be rolled into sheets or drawn into wire. It can be cast into thin plates and short wires.

(8929) L. G. H. asks: Define clearly what is meant by a "radially expanding" propeller wheel? Is there such a thing as a "radially diminishing" propeller wheel? A. A radially expanding propeller blade increases in width from the hub outward on a curved line. Wheels have been made that swell in width in the middle and narrow toward the

end of the blades. They may be called radially diminishing blades.

(8930) F. H. P. writes: Will you kindly explain through your inquiry department the chemical action which takes place in the manufacture of Portland cement from lime rock and shale, and why the two, when combined in a wet state and burned, will produce a cement which hardens as hard as a rock, while either element when burned and combined dry will only make a lime plaster or a substance which is not hard at all? A. A great deal of investigation has been done to determine the reason and reactions in the setting and hardening of cement. Briefly summed, the conclusion reached and apparently now fully established, is that, in the process of burning, the clay and lime combine, forming basic silicates and aluminates of lime, which then with water form crystalline hydrated silicates and aluminates respectively, thus causing hardening. If it be borne in mind that the crystalline hydrated silicates closely correspond to the zeolites of nature, and the crystalline aluminates to the spinels, the hardening is readily understood. This explains also why a mixture of burnt clay with burnt lime, does not yield a cement; in this case there is no combination between the clay and the lime, and consequently the lime simply slakes with water in the usual manner.

(8931) G. W. L. asks for the cost of production of chlorine gas by some process in commercial use. A. Descriptions of processes are freely found in chemical literature, but costs are rarely published. We give here a few references: Ludwig Mond, presidential address before chemical lecture at British Association meeting, 1896, gives a good description of the processes to date, but no costs. George E. Davis, Journ. Soc. Chem. Ind. xvi. 11,-868, reviews processes to date, and gives following costs for bleach, per ton, including all manufacturing and general expenses: By Deacon-Hasenclever process, £5, 6s. 9d; by nitric acid process, less than £4,-6s, 9d; by Welden process, £5, 6s, 7d. The electrolytic processes had then not been perfected. John B. C. Kershaw, electrician, June 15, 1900, gives figures as to the actual and relative cost of electrolytic chlorine, when used in the work of bleaching goods. F. Oettel, Zeitschieft für Electrochemie, 1900, 7. (21) 315-320, and V. Engelhardt, same journal, 1901, 7 (27) 390-396, gives figures as to cost of bleaching by the Haas-Oettel and Kellner apparatus. Engelhardt takes into account the varying costs of salt and electrical energy. J. B. Swan, Jour. Soc. Chem. Ind. xx. 7, 662; B. E. F. Rhodin, same journal, xxi, 7, 449; and C. P. Townsend, Elec. World and Eng.. April 5, 1902, describe modern electrolytic processes and give figures as to the output per electrical horse power, but none as to cost. Valuable data will be found in Census Bulletin No. 210, on Chemicals and Allied Products, but even here figures as to costs are not given. The Census Department might be able, however, to give such figures, or put you in the way to obtain same.

(8932) J. M. M. wants to know the best known preparation for preserving old and new shingle roofs, also tin—a preparation of coal tar or pitch, with some other ingredient in it to harden it, so it will not run when exposed to hot sun or crack in frost and winter. A. A good quality of pitch, mixed with creosote oil to the consistency of paint, is often used on iron and wood. Pitch thinned down with turpentine or carbon bisulphide gives excellent results and will dry out hard. Care must be taken when using carbon bisulphide as it is highly inflammable; also, it has a very disagreeable odor. Rosin is sometimes added and is claimed to give a better and more durable coat. We know of one concern who claim to add a small amount of rubber, stating that they obtain in this way a paint which adheres well to tin roofs and will outwear the usual linseed-oil paint. If care be taken to secure a good, rather hard pitch, which has not been burned in the distillation, it should not soften to any considerable extent under the usual heat of the sun.

(8933) G. S. K. asks how to compute the width of the brushes for a six-pole armature intended for a current output of 420 amperes. The armature, he says, is provided with a multiple-circuit winding. Each brush stud will have four brushes ¾-inch thick. A. The data for calculation of copper and carbon brushes, as to pressure, contact resistance, and friction, are given in an article in the Electric Engineer, New York, August 7, 1895. As this journal is no longer published, you may not find it except in a library. We have not access to it ourselves, and cannot give you any result attained by the authors. The carrying capacity of copper is from 2,000 to 4,000 ohms per square inch cross section. From this the bearing surface can be easily found, with a liberal factor of safety.

(8934) G. W. T. asks for the name of an article that when added to glue will keep it in liquid form; if so, the quantity per pound of glue before dissolved, also proportion of water to one pound of glue. A. 1. Boil together for several hours, 10 parts of good strong glue, 26 parts of water and 1½ parts of nitric acid. 2. Soak good glue with water, then melt in the usual way, and stir in strong vinegar or acetic acid until a solution is obtained which will be of the right consistency when cold.

THE LAMP THAT BEATS ALADDIN'S.

Made of high grade brass and finely polished, the Dietz Lucifer Acetylene Gas Lamp, made by the R. E. Dietz Co., 60 Laight St., N. Y. City, is indeed a wonderful improvement on old styles. In this Lamp the water is fed to the carbide around the whole circumference of the holder and not in single drops. This keeps a uniformly bright and continuous flame. It is also a prevention of waste, and the lamp will burn as long, by being constantly relighted, as in one continuous burning.


DIETZ LUCIFER ACETYLENE GAS LAMP.

The lamp is simply constructed and as easy to use and operate as an oil lamp, being filled in the same way. The metal is all of heavy gage brass and the top of the carbide chamber screws on. This lamp is also light in weight and has an elegant appearance. It is optically perfect and its beam of light is extremely large. Focus is not only accurately placed but adjustable.

THE ROCHE NEW STANDARD POLE PLUG,

a cut of which is here shown, has the advantage of sparking *in* the mixture and not away in the wall of the cylinder. The sparking points remain the same even though the rod be loose. Special shaped porcelain to prevent carbonization between points. It is tapered out to form a chamber so that when explosion takes place any particles of soot likely to remain—and which would naturally short-circuit the current—are cleaned away.

All parts of this plug are renewable and interchangeable. It is made of all standard sizes, De Dion and Oldsmobile. The porcelain and electrode can be renewed without throwing the plug away. While the quality of this plug is very high, the price is as low as any.

This plug is manufactured by Mr. Wm. Roche, 42 Vesey St., N. Y. City.

A HOME ATTRACTION.

Piano music has been greatly popularized and simplified since the advent of the "Angelus," manufactured by Wilcox & White Co., of Meriden, Conn., that wonderful invention which enables one, however ignorant of music, to play the most difficult pieces on their own piano with apparent skill and ability.

By the aid of this remarkable instrument, as an attachment to your piano, you can produce your favorite songs or operatic selections with consummate ease, and in such a finished manner as to lead people within hearing to believe that you are an accomplished piano-player.

As a home attraction for the young and old of both sexes this beautiful instrument is without an equal. The catchy music heard at the theater, music hall, or opera, can be at once reproduced in your own home, for the benefit and amusement of your family or friends and to the constant enjoyment of all.

Of late months it has been the fad for the owners of steam yachts and pleasure craft generally to have an "Angelus" attached to the saloon piano, so as to furnish novel amusements for the guests.

AN EFFICIENT AUTOMOBILE.

Among the many automobiles that are now bidding for public favor the "Crestmobile" is entitled to special attention. It is made in several of the more popular styles and appeals strongly to the business man as well as to the one considering pleasure only.

This machine is adapted for use in all seasons of the year. The model "D" is a combination of a light runabout and touring car of 750 pounds weight and 5 horse power. It has an air-cooled vertical motor and a speed of thirty miles an hour. It is recognized as a powerful hill climber and is equally good on an up or down grade. Its capacity is 100 miles on a single charge. Two speeds forward and reverse.

It is fitted with 28-inch steel artillery wheels, having 2½ inch detachable tires. Direct shaft drive starting from seat. There is ample baggage space and the frame is the strongest yet made for American roads. All gears run in oil and are covered.

The machinery is easily accessible at all times and it is the simplest operating mechanism. There is no vibration, easy riding and maximum safety. The machine is manufactured by the Crest Mfg. Co., Cambridge, Mass.