a monograph on the subject is timely and will meet with full appreciation. Levers, tackle, windlasses, hydraulic machinery, cranes and shears, excavators and dredges and pile drivers are samples of the subjects included in this work. German like, the author starts from the simplest types of machinery—levers and jacks—and goes up to the most complicated machinery in use by modern engineers. Formulæ and the resolution of force are applied wherever needed to elucidate the action of the machinery. The illustrations are very well executed and leave nothing to be desired.

THE ART OF PRESERVING HEALTH. Outlines of practical hygiene adapted to American conditions. By C. Gilman Currier, M D. 1893. New York: E. B. Treat. Pp. 468. Price $1.75.

The contents of this work indicate a very full scope. Nothing appertaining to practical hygiene seems foreign to it. Ventilation, food, water, plumbing and sewage, diseases, bacteriology, infection and disinfection are among the topics which it treats. Each topic involves a branching out into allied subjects, so that nothing is left to be desired as regards range. The author's treatment of the subject seems judicious, as he does not seem to be carried away by any fads and his recommendations seem dictated by common sense. As an example of the details of the treatment, the arsenic found in some of the kindergarten papers and in certain bed ticking is spoken of, a detail indicating that the author has done his best to thoroughly and adequately cover his subject.

Beautiful Calendar.—Messrs. Styles & Cash, ornamental printers and stationers, corner of Fourteenth Street and Eighth Avenue, New York, issue every year very handsome calendars, which they present to their customers and friends on the first of January with their greetings. This year's issue does not lack the merit of their previous productions.

The "Columbia" desk calendar of the Pope Manufacturing Company is received. It is a pad calendar having space for memoranda for each day of the year, but a portion of each day's leaflet tells something of the advantages of bicycles, and especially of the well known Columbia wheel. The Columbia was among the very first in the field as a good wheel of American manufacture, and it has always held its place.

☞ Any of the above books may be purchased through this office. Send for new book catalogue just published. MUNN & Co., 361 Broadway, New York.

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.

(5699) H. C. writes: I have a two cell electroplating battery. When I want to plate a wax matrix I am unable, after brushing same with black lead, to make it a conductor. I wish to electrotype on a small scale and would like to have these questions answered: 1. The batteries are common telegraph (zinc, copper and blue vitriol). Will such batteries (two in number) furnish a current sufficient? How can I increase the current? How can I make a wax matrix a conductor? A. After the black lead has been applied sprinkle iron dust on your wax. This will start the plating. Your batteries cannot have their current increased beyond a certain point, determined by their internal resistance. In parallel ½ ampere is about all they will give and in series about ⅛ ampere. They will give current enough for small work. 2. About what proportion of sulphuric acid should plating vat contain? A. About 5 per cent by weight. Consult our SUPPLEMENT, No. 310, for particulars as to electroplating.

(5700) J. F. writes: 1. I have a magneto machine that was used on a telephone circuit. Will you please tell me whether I can use it to run a small model of an electric motor? A. Not if of the ordinary alternating current type. 2. I have an electric motor of 1-16 horse power. Can you please tell me what power will be required to run it and get the full power out of it? A. 1-16 horse power or a little more. The volts required should be marked on the machine.

(5701) A. W. writes: 1. In SCIENTIFIC AMERICAN of October 28, Notes and Queries, No. 5442, you say a 14 inch wheel, 26 pitch, but do not mention number of blades; please do so, as I do not know the kind of wheel to get until then? A. Use a three-bladed screw. 2. I am making an Edison pattern dynamo of following dimensions: Fields 2½ inches long by 1 3-16 diameter, with twelve layers of No. 24 wire on each, 12 ounces on both; field pieces are 3 inches long, bored for 1¼ armature diameter. What number of wire, number layers, number convolutions, and 12 commutator bars is proper for the armature? A. Your armature should have 20 ohms resistance. This would be given by No. 30 wire wound in three layers, giving about 1,300 convolutions. The dynamo would have a capacity of 0·4 ampere. This is for series winding.

(5702) W. R. L. asks: In microphone transmitters there seems to be a great diversity of opinion as to the why. Some say it is the variable pressure, others the movable contact, or the heat generated, etc. What is the most probable theory? Some use large contact surfaces, while others use mere points. Which is the best, or are they both best according to the manner of use? A. Variations in resistance, due to more or less contact between the surfaces, is the "why" of it. This greater or less contact may be brought about by greater or less pressure or greater or less areas of contact. Absolute separation produces jarring sounds. Your last surmise is about correct, though larger surfaces are now preferred.

(5703) G. F. H. writes: 1. What is the reason that in an incandescent electric lamp of 50 volts you unscrew the globe and touch the standard of two of them, the shock does not feel as strong as in a common 2 volt cell battery? Sometimes the current cannot be felt at all in the incandescent lamp. A. If you touch the similar poles or terminals, there will be little shock unless a ground exists. If opposite poles, the shock may be severe, and in case of an alternating current system, any touch may be fatal. The standard proper is insulated from the wire and should give no shock. 2. Why is it that by wetting your fingers you can get more of a shock than by using dry fingers? A. It improves the electrical contact. We strongly advise you not to touch any terminal, as it may produce instant death.

(5704) V. G. A. asks what Chatterton's compound is. A. Chatterton's compound is made of—

Stockholm tar	1 part.
Resin	1 part.
Gutta percha	3 parts.

Address any dealer in electrical supplies if you wish to buy it.

(5705) F. J. T. asks: 1. What is the depolarizer used in bichromate batteries? A. The chromic acid of the alkaline bichromate. 2. How can I find tables for winding motors, etc., to get fractional parts of, and horse power? Also resistances, so as to wind electro-magnets, etc.? I have "Experimental Science," but cannot find what I want. A. These have to be calculated. Examples of dynamo and magnet calculations are contained in Sloane's "Arithmetic of Electricity," $1 by mail. 3. How can I find how to make a small gasoline engine? A. We can only refer you to books, but it is doubtful if you can build one from books alone. We recommend and can supply you with the following books relating especially to the subject you refer to: Robinson's "Treatise on Gas and Petroleum Engines," price $5.50; also Clerk's "Treatise on the Gas Engine," price $2 mailed.

(5706) S. S. D. says: Will you please tell me how to make a good composition for printers' rollers?

A. Best glue	10½	lb.
Black molasses or honey	2½	gal.
India rubber, dissolved in oil of turpentine	1	lb.
Venice turpentine	2	oz.
Glycerine	12	oz.
Vinegar	4	oz.

The above formula is given for the mysterious black composition, so durable and elastic, and known but to very few persons until recently. Purified India rubber only is used. To recast add 20 per cent new material. The common receipt for printers rollers is 2 pounds best glue, soaked over night, to 1 gallon New Orleans molasses. Will not recast.

(5707) G. F. T. asks (1) how to make a good solder for mending tinware, one that does not require acid to solder with if possible. One that will solder sheet iron. A. An alloy made of 4 parts tin, 2 parts lead, 1 part bismuth, makes an easy-running solder for soldering with an alcohol lamp. Tinned articles can be soldered without acid, but untinned articles as sheet iron must be made clean and tinners' acid used. 2. Can you tell me how to make ordinary glass vials untransparent entirely? A fluid to wash them in I would like to know of. A. The fluid hydrofluoric acid is used for making gas translucent, the fumes answering the same purpose; it is a most dangerous poison and is not recommended for use by amateurs. Coarse emery shaken in the bottle with buckshot, or the outside of the bottle inclosed in a box with emery and shot and well shaken, will produce the desired effect.

(5708) L. S. F. asks: Practically, how close to the wind can a first class yacht sail? That is, what is the minimum angle between the yacht's path and the direction of the wind, allowance being made for leeway? A. Much depends upon the model and trim of sails, in the ability of yachts to sail close to the eye of the wind. Fine lines and flat sheets may carry a yacht up to two points of the wind, say 22 degrees off, but a large class cannot sail nearer than 3 points or 33 degrees.

(5709) L. E. R. asks: 1. Is there any known substance that will dissolve carbide of silver? A. If such a compound were produced, it would probably dissolve with decomposition in nitric acid. 2. How may one change a formula written in parts, where liquids as well as solids are in parts, to apothecaries' fluid measure, also dry? A. Parts generally mean parts by weight. Substitute in the solid parts grains or other units, and for the liquids equivalents in liquid measure, having regard to the specific gravity of the fluids. Tables of equivalents are given in the text books.

(5710) G. L. R. asks: Please answer in your Notes and Queries (1) how the compass is kept from being attracted by the mass of steel around on the man-of-war? A. Special constructions of compass are made, shielded from the influence of the ship. 2. I have 6 cells of the Daniell's battery, copper on the outside of the porous cup in blue vitriol and water, and zinc on the inside of the porous cup in salt and water; please tell me what the copper color substance is that forms on the outside of the porous cup and how I can remove it without taking pieces out of the cup when I try to remove the substance. A. It is metallic copper. You can remove it by dissolving in nitric acid. It may be cheaper to get a new cup.

(5711) M. S. P. asks: How many cells of storage battery are required to run the electric motor described in SUPPLEMENT, No. 641, also the number and size of the plates in each cell of storage battery? The number of cells of gravity battery required to charge the storage battery, and the time required to charge the same? A. Two cells, each having one square foot of positive plate. To charge slowly, 5 gravity cells will answer. By using parallel series of 5 gravity cells the charging can be accelerated. We advise not less than 20 gravity cells in 4 series of 5 each.

(5712) H. O. G. asks: What will clean a boiler of lime where you carry 15 pounds of steam to heat a building without injuring the boiler? A. Charge the boiler through the feed with a half pound of caustic soda for each nominal horse power, through the feed or in any convenient way. Use the boiler a week and then clean out thoroughly. If there is means for blowing off the boiler, a less quantity used at stated intervals, and the water partially blown out, will keep the boiler in good condition.

(5713) N. A. W. asks: It is quite generally known that carbonic acid gas is deathly poisonous, and we are also told that carbonic acid gas gives the palatable, sparkling, and exhilarating taste to champagne, beer, etc. If one is poisonous and the other healthful, why should the two gases have the same name? A. Carbonic acid gas if inhaled tends to asphyxiate or drown by exclusion of air. It is possible that it also has a poisonous effect when drawn into the lungs. In drinking champagne very little or none of the gas gets to the lungs, and its presence in the wine does not interfere with respiration. A lung poison is not necessarily a stomach poison. The gas is the same—there are not two gases of the same name.

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