

Chief Engineer's Office, U. S. Navy Yard,
WASHINGTON, November 18, 1874.
Commodore Thos. H. Patterson, U. S. N., Commandant:
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[Signed] EDWIN FITHIAN,
Chief Engineer, U. S. N.

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Notes & Queries

J. S. & Co. will find directions for utilizing mica scraps on p. 42, vol. 25.—J. D. F. will find directions for manufacturing ice on p. 54, vol. 31.—

L. F. L. will find instructions for preventing the percolation of water through a brick wall on p. 75, vol. 32.—R. H. D. will find a recipe for Worcester-shire sauce on p. 281, vol. 26.—A. C. A. will find some particulars as to the manufacture of aluminum on p. 91, vol. 31.—J. H. will find directions for preparing buffalo hides on p. 266, vol. 28.—J. M. C. will find a formula for ascertaining the contents of a cylinder on p. 281, vol. 25, and for the proportions of a safety valve on p. 107, vol. 31.—E. S. T. will find a recipe for indelible ink on p. 112, vol. 27.—

H. R. W. will find a recipe for wood filling on p. 347, vol. 31.—L. F. S. will find directions for making rubber hand stamps on p. 156, vol. 31.—B. A. S. will find directions for making and using a pantagraph on pp. 99, 179, vol. 28.—F. G. T. should consult, as to his diet, a physician who is acquainted with his case.—C. S. R. will find a recipe for a dip for brass goods on p. 282, vol. 29.—W. F. R. and others can solve the problem of the length of the hypothenuse by the method illustrated on p. 187, vol. 32.—

W. B. will find directions for calculating the proportions of gear wheels on p. 187, vol. 29.—F. B. will find directions for removing clinkers from stoves on p. 187, vol. 32.—A. B. will find the dimensions of the Great Eastern on p. 346, vol. 31.—J. R., Liège, Belgium, and others will find a description of a wood-splitting machine on p. 73, vol. 28.

(1) H. M. asks: Please explain the anti-septic action of common salt, and also of sugar. A. In the case of salt, the albumenoid and other putrifiable matter goes into solution in the brine; sugar or sirup acts by preventing the access of atmospheric oxygen to the substances immersed in it.

(2) H. D. D. and others.—One process for utilizing tin scrap consists in first cutting it in a suitable machine into comparatively fine chips, and then placing it in a revolving cylinder so arranged as to constantly shower the chips with mercury, with which the tin unites; and the two may afterward be separated by distillation, or by the oxidation of the tin.

(3) W. C. asks: Can heat enough be obtained in a small furnace to melt brass without the aid of a pair of bellows? A. Yes.

What will dissolve chemical paint out of a brush? A. This depends wholly upon the composition of the paint. Most of the common pigments find solvents in either water, turpentine, alcohol, ether, or oil.

(4) J. H. asks: In pressing quicksilver through buckskin to extract the impurities or gold, is it injurious to have the hands in contact with it? A. We do not know of any trouble originating in this way; but as mercury is slightly volatile at common temperatures, extreme care should be taken not to inhale the vapors, as it is liable, otherwise, to produce salivation.

(5) J. McM. asks: Why is an inverted image seen when one looks upon the concave side of a burnished spoon, and a erect image when the convex side is turned towards the face? A. In the case of a concave mirror, the reflected rays of light approach and cross each other before reaching the eye, thus producing an inverted image. In the case of convex mirrors, the convex surface simply causes the rays to diverge.

(6) D. H. S. Jr. asks: 1. Has ozone ever been used as a bleaching agent? Yes. 2. Can it be produced by the discharges (into atmospheric air or pure oxygen) of the electricity generated by the glass plate or cylinder electrical machine? A. It can, but in exceedingly minute quantities in comparison with the bulk of the gas operated upon. 3. Is there any work extant which treats minutely upon the production, properties, and uses of ozone? A. Read the work by Cornelius B. Fox, entitled "Ozone and Antozone," published by J. A. Churchill, London, England.

(7) L. N. P. says: 1. I am thinking of putting electric bells into a house. Is there any likelihood of the batteries or any connections ever setting fire to easily inflammable things? A. No. 2. Is there any chance of batteries in a closet forming gas liable to catch fire? A. No.

(8) F. G. N. ask: 1. Suppose that I take a permanent magnet, and surround its armature with a helix, would not a feeble current be generated every time the magnet and armature were united and separated? A. Yes. 2. If the ends of the helix are connected with a Rhumkorff coil, would not the feeble current of electricity generated induce a stronger one in the other wire of the coil, so that, by connecting several wires successively, we might finally obtain a current indefinitely stronger than the one we started with? And if we connected the last coil with a helix surrounding a soft iron horseshoe, would not the current of induced electricity transfer it into a much stronger temporary magnet than the permanent one we began with? A. If properly constructed, it would. 3. Would the induced current differ from the generating current otherwise than in being stronger? A. That would depend upon the construction of the machine. 4. If this is true, does it not overthrow the idea that one force cannot produce a greater one without a corresponding loss in time or distance? A. Not at all. If the results you suggest were to follow your premises, they would not tend to overthrow the idea mentioned. In this case it would be simply a transfer of mechanical force (the moving of the armature) into electrical energy, and the amount of the energy would be proportioned, other things being the same, to the rapidity of the movement of the armature.

(9) D. H. L. H. says: In your answer to W. E. D., you give directions for making a Callaud battery; can I nickel plate steel with such a battery? A. Yes.

(10) P. R. H. asks: Is there any battery that will produce electricity continuously, without being touched or renewed after once being completed and put to work? A. No.

(11) I. H. asks: How can I plate with nickel without a battery? A. Use a magneto-electric machine.

(12) M. P. asks: What is the best method of removing gold that has been deposited on brass by galvanic battery, so as not to destroy the brass in the operation? A. Place the articles in strong nitric acid, and add some common salt in crystals. After coming out of the acid, the articles must be polished.

(13) E. M. asks: Will you please suggest the simplest way that I can produce rotary motion by electricity? I have a small battery and electro-magnetic telegraph. But I want to show to my pupils how a wheel may be turned. Being poor, I cannot buy an electric engine. Any cheap and simple way by which I can make rotary motion by the battery, at home, that is what I want. A. Suppose you attach four soft iron keepers to the circumference of a wooden wheel, so that in turn they approach the poles of an electro-magnet. Let the circuit of the electro-magnet be closed as each keeper approaches the poles and opened as soon as it comes opposite. The method of making a circuit closer will occur to any ingenious mind.

(14) W. D. H. asks: 1. How can I electroplate in bronze? In what solution shall I immerse the articles to be bronzed? A. Make a solution composed of 50 parts carbonate of potash, 2 parts chloride of copper, 4 parts sulphate of zinc, 25 parts nitrate of ammonia, and use a bronze plate as the positive electrode. 2. Which is the best battery for the purpose, Smee's or Leclanché's? A. The Smee.

(15) L. K. asks: 1. How many feet of air does one grown person require to keep him in good health for six hours? A. The average amount of air inspired and exhaled at each respiration is 30 cubic inches, and the average number of respirations 20 per minute, so that 500 cubic feet of air pass through the lungs in 24 hours. The amount of carbonic acid exhaled is variable, and is interesting as an index of the rate of internal change. The more energetic the circulation, the larger the quantity of carbonic acid; it is less during sleep than while awake, and less during fasting than after a full meal. 2. Is it best to have a constant change of air from the outside into a room in which we are sleeping? A. A sleeping apartment should always have adequate ventilation while in use.

(16) O. D. asks: I have heretofore worked the burglar alarm apparatus in my house by the Leclanché battery, of which I use 6 cells. But this winter they stopped working. I then put in 6 new cells of the same; still they did not work. I then substituted the ordinary sulphate of copper battery, and have had no trouble since. Now can you tell me what probably was the matter with the Le-

clanché? Did the cold weather produce any mischief? A. No. The Leclanché battery will stand as much cold as the sulphate of copper. Did you test your Leclanché cells separately on short circuit to see if the connections were good?

(17) H. M. asks: What chemicals are used to render paper sensitive so that you can photograph directly on it? A. Chloride of ammonium 40 grains, gelatin 20 grains, water 20 ozs. Dissolve by the aid of heat and filter when cold. Take 10 or 12 sheets of thin clear paper, and, having marked the rightside, immerse them bodily in the liquid one by one, taking care to remove air bubbles; then turn the batch over, and remove them singly, beginning with the sheet immersed first. Render the paper sensitive by a solution of ammonio-nitrate of silver, 60 grains to the oz. of distilled water.

Is there any chemical that I can insert in the bark or sapwood of trees, that will kill them? A. Try a strong solution of chloride of zinc.

(18) J. W. L. asks: Can I light gas by electricity? A. Put on a pair of dry slippers, and walk briskly over a carpet. You will thus charge yourself with electricity, and may light the gas with your finger in dry cold weather.

(19) P. J. N. asks: 1. To what pressure per square inch can air be subjected by means of the air pump? A. A maximum of condensation has not been reached. It depends altogether upon the strength of the pump, its valves, and the power and velocity with which it is driven. 2. What work is the best on pneumatics? A. Ganot's "Physics."

(20) E. L. F. asks: Why does a distant light scintillate like a star? A. Because of the interposed changing layers of air of different densities. The diverging rays are caused partly by the irregular figure of the crystalline lens of the eye, and are partly owing to the pull of the six muscles which move it.

(21) W. B. H. asks: 1. How many Grove cells are required to operate a line half a mile in length, using No. 14 common iron wire, with a relay at one end of 100 ohms, and at the other a relay of 120 ohms? A. Two cells. 2. How can I charge a main line Grove battery of 10 cells? A. Cover the zincs with quicksilver. Put 16 parts water to 1 part sulphuric acid for the outer solution, and use pure nitric acid of commerce for the porous cup. 3. How often should it be replenished? A. Replenish the nitric acid every day and the solution once a week. Brush the zincs every day.

(22) C. W. asks: Which is the heavier, a cubic foot of water or of ice, and what is the difference? A. The water is the heavier. If one cubic foot of distilled water at 39° Fah. weigh about 62½ lbs., one cubic foot of pure ice will weigh about 58½ lbs.

(23) A. C. asks: What acid is used to mix with urine to detect Bright's disease of the kidneys? A. Nitric acid. Urine when mixed with nitric acid and boiled should coagulate if the person is suffering from Bright's disease.

(24) J. D. W. asks: 1. Is the Leclanché battery inodorous and constant? A. Yes. 2. Do the contents of the porous cups ever have to be removed and renewed? A. Yes. 3. What are the proportions of sal ammoniac and water to a quart cell? A. Two thirds full. 4. What is the reaction? A. Ammonia is set free at the negative pole, while the nascent hydrogen from the ammonium reduces the peroxide of manganese to sesquioxide. The zinc unites with chlorine, forming chloride of zinc.

(25) W. H. B. asks: Is there a solution which, mixed with pure white quicklime, will harden it into stone in 24 hours? A. Soluble glass, or silicate of potash or soda, is used for this. You will find it advertised in our columns.

(26) R. M. C. asks: What is the latest and best work on electro-metallurgy? A. "Manual of Electro-Metallurgy," by James Napier.

(27) D. X. asks: What are the powers and focal lengths of the two largest equatorial refractors? A. That at Washington is 28 inches clear aperture, weighs 180 lbs., and was nine months correcting. The new McCormick telescope is a trifle over 26 inches aperture, was eight months correcting, and weighs 170 lbs. Both are of about 33 feet focus, and their highest power is 2,000 diameters. The objectives alone are worth \$25,000 each. The government equatorial cost \$46,000 currency, the McCormick \$38,000 gold.

(28) H. H. asks: 1. What battery, and how many cells, would be the best for electroplating and making an electric light? A. For electroplating, 2 cells of Smee's battery. For electric light, 50 cells of Bunsen's. 2. What solutions should I use for gold, silver, nickel, and copper plating? A. Gold solution, 1 grain of gold and 10 grains of cyanide of potassium in 200 grains of water. For silver, 2 grains of cyanide of silver and 2 parts of cyanide of potassium in 300 grains of water. For copper, a saturated solution of sulphate of copper. For nickel, see p. 346, vol. 31.

(29) C. J. W. says: 1. I have made a Morse sander, key, and battery for telegraphing. I made my horseshoe magnet by winding the covered wire round in the usual way, only I wound both poles to the right and then joined the wires. I made another by screwing two cores into a flat base, and wound one pole to the right and the other to the left. This has a neater appearance. Which is the best in your opinion? A. They must be so wound that the current shall flow in the same direction in both. 2. Does it make any difference to a magnet if the wires from the battery are first applied in one way, and then (by mistake) reversed? A. No. 3. How is the electric bell made? A. The armature lever closes an electric circuit when the spring draws it back, and opens it when the magnetism draws it forward. 4. What meant by positive and negative poles of a bat-