that sound could not be turned into electricity. Please decide whether I am right, and if not, please explain the principle of the process. A. Sound is not convertible into electricity, but sound waves are utilized as a motive power for operating apparatus for varying the current, or for generating it, according to the kind of instrument used. In the case of the carbon transmitter, the vibration of the diaphragm by the impact of sound waves varies the current in the local circuit by varying the pressure of the two electrodes of the transmitter. The Bell telephone, when used as a transmitter, is simply a magneto-electric generator in which the armature is vibratory instead of rotary. The diaphragm (which is the armature), when vibrated by sound waves, causes electrical impulses to be generated in the coils of the instrument. These electrical impulses produce in the diaphragm of the receiving instrument vibrations corresponding to those of the transmitting instrument, and the vibration of the diaphragm of the receiving instrument produces air vibrations similar to those which actuated the diaphragm of the transmitting instrument.

(9) S. S. asks: 1. Can I do satisfactory nickel plating without a battery? A. No. 2. If not, what kind of a battery would you recommend? A. Use a large bichromate Bunsen type battery.

(10) N. S. C. asks: 1. What are the proportions of air and common illuminating gas that constitute the most explosive mixture? A. One gas, seven to ten air. 2. How can I remove writing ink stains from a photograph? A. Use a dilute solution of oxalic acid.

(11) F. X. W.—For information as to construction of electrical apparatus in general we refer you to Bottone's "Electrical Instrument Making for Amateurs," which we can send you by mail for $1.20.

(12) H. M. B. asks how and of what material is superphosphate made. A. It is made by treating phosphate of lime with sulphuric acid in proper amount. As a source of phosphate of lime the natural phosphate rock of Charleston, S. C., is largely used.

(13) G. F. writes: In using tallow in my laundry I succeed in making it odorless. I wish to know the way to make it white and soft. A. Melt and heat with water, allow to cool, and remove the solid tallow. If it is bad to start with, you will probably be unable to purify it satisfactorily.

(14) R. H.—For information on balloons we refer you to May's "Ballooning," which we can send by mail for $1.00. For emery wheel address makers, stating your requirements. A 40 foot sloop yacht may run at from $300 up to $2,000 per annum; a 40 foot steam yacht will cost about twice as much.

(15) W. W. C. asks: 1. How can I treat cow horns so they may be bent into shapes? A. Steam will soften them so that they can be bent to a certain extent. 2. Is there any process for dyeing or coloring horns black? A. They may be dyed by an aniline dye, or by soaking in copperas solution, followed by soaking in logwood decoction.

(16) V. C. T. asks: What would be the best book to get for a young man of 18 to learn electricity? A. We recommend Thompson's "Elementary Electricity," price $1.25. "Practical Electricity," by Ayrton, $2.50. Thompson's "Dynamo-Electricity," $5. We can supply all of these works, free by mail.

(17) A. P. asks for a paste or cement by which cotton cloth may be made to adhere to metal plates, the latter throwing out a heat of about as great as the hand can bear. A. Try silicate of soda, also try gum tragacanth mixed with water and a little glycerine to the thickness of soft butter.

(18) F. V. asks how to make a solution of tin for electroplating.

A. Distilled water.....200 parts by weight.
Pyrophosphate of soda.....2 " " "
Fused chloride of tin.....200 " " "

Dissolve the soda salt first, and then gradually introduce the tin salt.

(19) W. I. K. asks: How many cells, and of what kind, would be required to run a one candle power Edison miniature lamp? How long will same be run by the battery, that is, in continuous use? A. One or two good bichromate cells, Grenet or Bunsen, would run it for a number of hours.

(20) W. W. C. asks: 1. Will a battery composed of a zinc and a copper plate suspended in a strong solution of NaCl be reliable when placed in the circuit of an electric door bell? A. It will be very weak and liable to polarization. 2. What is the best and simplest home-made battery for an electric door bell? A. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 157. 3. Does a stop or diaphragm when placed in a lens have any more effect than to exclude the rays of light that fall on the outer edge of the lens? A. This is practically its function. 4. Would a Darlot R. H. (common angle lens), which with full opening covers a four-fifth plate, cover a larger one if stoppered down with a diaphragm three-sixteenths of an inch in diameter? If so, what size? A. Probably it would cover a 6½×8½ plate. To test it hold the lens in front of a window, then place a large white cardboard behind it, moving it nearer or further from the lens until the image is distinct. Then measure the circle it cuts, and you have the actual size of plate it will cover. 5. What is the best shape for a canvas canoe for speed on smooth water? Why? A. The one that will expose the minimum surface, because "skin friction" is the principal resistance to the motion of a vessel. 6. Of what wood would you recommend that the frame be built? A. Ash, hickory, or white oak, as strong, light, and easily bent. 7. Is there any better way for waterproofing canvas than applying one or two coats of linseed oil, letting it dry, and then varnishing? A. Melted paraffin is excellent. For full details of canoe construction we refer you to our SUPPLEMENT, Nos. 164, 181, 216, and 219, which we can send you for 10 cents each.

(21) O. S. asks: 1. Is there a locomotive or stationary engine in existence that can get up steam enough to run itself with a one-inch hole in the dome? A. It is a question of size of boiler, of size of engine, of relative sizes, and of steaming capacity The question we answer affirmatively. 2. Is there any substance that can be mixed with liquid glass that will thin it, and what is liquid glass made of? A. Water. Liquid glass is a solution of silicate of soda or potash in water. 3. Which is the highest mountain in the world? A. Mt. Everest, in the Himalaya ranges in Asia—29,000 feet high. 4. What was the highest altitude ever reached by man, and by whom? A. 37,000 feet, attained by Glaisher and Coxwell in a balloon, September 5, 1862. 5. Are white maple and sugar tree the same? A. Yes.

(22) A. C. asks for a formula for collodio-bromide emulsion that is rapid. The following is recommended:

Ether s. g. 0·720.....4 fluid ounces.
Alcohol s. g. 0·820.....2½ " "
Pyroxyline.....40 grains.
Castile soap dissolved in alcohol.....30 "
Bromide of ammonium and cadmium.....56 "

Dissolve 125 grains of nitrate of silver in one ounce of boiling alcohol, and sensitize the emulsion by adding one drachm of the silver solution at a time, thoroughly stirring with a glass rod until the silver is well incorporated. After the whole has stood for twelve hours add 30 grains more of the double bromide of ammonium and cadmium dissolved in half an ounce of alcohol. After standing for a few hours longer the emulsion is poured into a flat dish and allowed to evaporate and dry. It is then washed with distilled water by repeated soakings until all the soluble salts are removed. After drying it is again redissolved in equal parts of alcohol, at the rate of from twenty to twenty-four grains to the ounce of solvents. Then it is ready for use, and plates may be used wet or dry.

(23) J. McG. asks: 1. What is meant by the philosopher's stone? A. A substance which could turn base metals into gold. 2. How can I make ethereal solution of gold? A. To one part strong solution of terchloride of gold add three parts ether in a separatory funnel, mix by gentle agitation, allow it to stand until the supernatant ether is strongly colored, draw off the water from beneath, and the solution will remain. 3. Will hydrochloric acid etch soft steel? A. Yes. 4. Which is the cheapest for newspaper etching—copper or zinc plates? A. Zinc plates are used for relief work.

(24) E. H. F. asks for the best way of applying naphtha to furniture and carpets, to be effectual in destroying Buffalo moths, without injury to the articles. A. Naphtha will not injure carpets, but will injure varnish. It can be applied by sprinkling. It is very dangerous as regards conflagration, its vapor being liable to ignite from fires, lamps, etc.

(25) T. H. B. asks how to prepare a toilet cream, with snow white petrolatum as the base, and mixture tinted a faint or delicate pink. A. You can color the petrolatum pink by a little alkanine, or extract of alkanet root. It can be stiffened with a little white wax, and almond oil can be added. The subject is excellently treated in various books, such as Cooley's "Practical Treatise on Perfumery," which we can send you by mail for $1.50.

(26) G. R. C. asks how white metal is made. I mean the kind that is used in the manufacture of cheap table ware, such as table casters, spoons, butter knives, etc. The metal being naturally soft, will you also please state how same can be hardened and still retain its color? I want it for small castings, cog wheels, etc. A. The following are formulas for white metal. Melt together: (*a*) Tin 82, lead 18, antimony 5, zinc 1, copper 4 parts. (*b*) Brass 32, lead 2, tin 2, zinc 1 part. For a hard metal, not so white, melt together bismuth 6 parts, zinc 3 parts, lead 13 parts. Or use type metal—lead 3 to 7 parts, antimony 1 part.

(27) J. P. asks for a good recipe for stove polish. A. We can supply you with "The Techno-Chemical Receipt Book," price $2, which contains a very good receipt for stove polish.

(28) T. J. asks: Can a molecule exist apart from gravity? A. Gravity is supposed to be inherent in all molecules; none can exist without possessing it.

(29) A. G. asks for the best wire to use for heating purposes. A. Platinum, which may be coated with a thin wash of pipe clay and water.

(30) Carpenter asks: Would you please tell me how long a man could subsist without any special inconveniences in a barrel six feet in diameter, ten feet long, perfectly airtight? A. One or two hours.

(31) S. R. K. writes: Please straighten me out on the following problems: 1.

$$y = 17 \sqrt[1\cdot35]{\frac{45,000}{80,500}} = ?$$

A. Reduce the quantity under the sign to a decimal, find logarithm, divide the logarithm by 1·35, and find number corresponding thereto, multiply this by 17. 2.

$$P = \left(\frac{1}{1\cdot3308}\right)^{1\cdot4} = ?$$

A. Reduce quantity within parenthesis to decimal, find logarithm, multiply the logarithm by 1·4, and find number corresponding thereto.

(32) R. B.—The size of a wheel affects the sliding friction at the axle, and the resistance offered as its circumference in its rolling motion strikes obstacles on the road. The large wheel is normally the easiest running.

(33) J. B. S. writes: I wish to extract the fiber from a certain kind of grass. What is the simplest plan without machinery? A. Soak in water and beat with a mallet until the fiber separates; repeated washings and rubbings will gradually remove all soft matter and leave pure fiber.

(34) F. S. asks how the operation known as "boiling out" a meerschaum pipe is performed. A. The pipe is immersed in hot beeswax for ten or fifteen minutes.

(35) W. T. asks: 1. How many pounds of pressure will a mixture of O and H produce by their combination by electricity in a limited space of the same volume as the gas? A. Ten atmospheres under the most favorable circumstances. 2. What will be the temperature? A. About 7,000° Fah., under assumption of complete combustion; practically far less. 3. Will it take less O and H mixed in a proper proportion to run a gas engine than the gas generally used, and what will be the proportion in cubic feet? A. It will take about seven times as much coal gas and air.

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