

on the sensitizing bath for five minutes, is then hung up to dry, and should be kept dry or in a vessel containing chloride of calcium placed in a false bottom. In printing one-third longer time is required than with silver paper. The print, which is only slightly discernible, is next dexterously floated on hot oxalate bath heated from 120° to 140° Fah. The developing oxalate bath is made as follows:

Oxalic acid.....	25 parts.
Sodium chloro-platinite.....	2 "
Water.....	250 "

The picture quickly develops out according as it has been printed. It is then washed in dilute hydrochloric acid and water baths and dried. See also SCIENTIFIC AMERICAN SUPPLEMENT, No. 711, page 11360.

(3232) J. M. writes: Do you think from a sanitary standpoint it would be proper to discharge the sewage of a hotel into a dry well, twenty feet deep, the bottom of which is loose, porous sand? The well will be 300 feet from the building. And if there would be any danger of contaminating the water of a spring 1,600 feet from the well and which runs from the base of a hill opposite to the one on whose side the well will be located? It is the intention to use disinfectants and deodorizers in the well; and do you think quicklime sufficient? A. From a sanitary standpoint it would not be proper to discharge the sewage into the well. The better way would be to make a tight cistern of cement in the ground to receive the sewage, the contents of the cistern to be periodically removed and spread on the ground at a distance from habitations. The well, if used as a receiver of sewage as you propose, would be likely to contaminate the spring and other waters near or distant, below the level of the bottom of the well. Quicklime would be a poor disinfectant.

(3233) J. C. S. & Co.—The work on the specimen of etched glass received was done by means of hydrofluoric acid, either in the form of liquid or vapor. The entire glass, with the exception of the portion to be etched, is covered with a protective coating of varnish or wax. If liquid hydrofluoric acid is used, the glass is either dipped into it or a wax lip may be built up all around the plate and the acid poured on. The etching requires 5 or 6 minutes. After the acid is poured off, the glass must be thoroughly washed with water. According to another method, powdered fluor-spar is placed in a lead trough and sulphuric acid is poured over it. The glass is laid over the trough face down, and the etching is effected by the vapors. Great care is required in the use of this acid to avoid inhaling the vapors or allowing it to touch the skin.

(3234) T. H. W. asks: Is there a colorless wash or varnish that can be applied to a bright metal surface that will not easily rub off and prevent rust? A. Mastic or very thin white copal varnish may be used for bright work.

(3235) J. M. S. says: 1. Will you please tell me how an amateur can take photographs in colors? I have tried a mirror back of the plate, without success. Also if plates are manufactured for photography in colors, if so, where can I buy them? A. The Lipmann process of photographing in colors is only an experiment and is confined to the solar spectrum. No practical process has been formulated. Try Cramer's isochromatic plates, which reproduce the color values to better advantage. 2. Please give me a formula for making blue print paper that will keep for a long while? A. For a blue printing formula see SCIENTIFIC AMERICAN SUPPLEMENT, No. 584.

(3236) R. P. P. writes: Please find inclosed sample of cement taken from a thermometer used by packers of canned goods and upon steam boilers, which stands heat and pressure of about 300 degrees. It is used to form a steam tight joint between the thermometer tube and the brass casing. Will you be kind enough to inform a yearly subscriber of your paper how to make and use this cement, also if it will stand brine? A. The cement appears to be composed of plaster of Paris mixed with a solution of silicate of soda or soluble glass. You can obtain the silicate through the drug trade. It may be plaster of Paris mixed with strong solution of alum, or oxide of zinc mixed with a solution of chloride of zinc 10 to 20 per cent. Either cement is applied like plaster of Paris, and will stand brine reasonably well, especially the latter.

(3237) R. H. W. writes: I herewith inclose you a box of matches, just as it was opened, except two matches taken out. Will you kindly explain, through the columns of your journal, how every match in the box could be charred in this way, the phosphorus all burned, and no greater combustion. The wood part of the match seems to be merely discolored. The box containing them shows no mark of violence, and is not burned. These matches were packed 1 dozen boxes in a paper which was sealed up nearly air tight. A. The composition on the end of the matches probably contained phosphorus mixed with some compound rich in oxygen. If the package was closely sealed, the combustion would for want of air be confined to the ends of the matches if these became ignited. Moisture, if present, would be of great effect in reducing the intensity of the combustion, and might by itself suffice to confine it to the tips. How the ignition occurred can only be a matter of surmise.

(3238) O. McK. writes: 1. I want to make a dynamo from which wires run to the motor which drives the machine. If you have a SUPPLEMENT telling how to make such a dynamo, please say what number it is. A. SUPPLEMENT No. 600 contains full information on the construction of an 8 light dynamo. 2. What is a laminated armature? A. A laminated armature is one in which the core is formed of thin iron plates separated by insulation. 3. What candle power lamp would this run? A. The dynamo above referred to runs eight 16 candle power lamps. 4. Does distance between dynamo and motor have any effect on the speed? A. The distance makes a great difference if not compensated for by an increased cross section of conductor. If the resistance is kept down, the distance is immaterial.

(3239) C. G. A. asks: Can you give me any preparation for softening the wings of butterflies and moths, after they have become brittle? Can

you tell me of something that will take parasites off worms without killing them, and keep large beetles from becoming odorous? A. The wings of butterflies are softened by placing the insect on a piece of hot clean paper laid on wet sand contained in a jar. In the course of 2 to 5 hours the wings are sufficiently soft to permit of spreading the same. Parasites can be taken off caterpillars by means of a fine pair of pliers, but the results are usually not very satisfactory. Large beetles are best opened on the tail or belly and the inner organs removed to avoid rapid decay and smell. (See SUPPLEMENT catalogue.)

(3240) H. G. wants a formula for albumenizing and silvering paper for photographic printing, one that will make paper which will keep for some time if possible. A. You can purchase albumenized paper with less expense than will be required to make it. To sensitize albumenized paper that will keep for some time, prepare a nitrate of silver solution by dissolving sixty grains of silver to the ounce and do not let it get lower than 50 grains to the ounce, testing occasionally with the hydrometer. After solution of the silver, add citric acid drop by drop, until the slight precipitate of citrate of silver formed is just redissolved. Float the paper on the bath from three to five minutes, and on removing, place between sheets of clean blotting paper, which may be used over again. Paper thus prepared has been kept white and good for nine months and tones easily.

(3241) G. G. writes: I wish to ask if you know of any substance to cover large nickel plated wrought and cast iron work to stop corrosion during transmission to South American ports. From experience I know that brass instruments covered with lacquer, notwithstanding being carefully packed, turn black and have to be shipped in air tight tin boxes. A. A good protection for nickel plated goods for export is paraffin applied hot, and the goods then wrapped in paraffin or wax paper. Waxed paper bags make an excellent waterproof and air tight package.

(3242) T. B. asks for a formula for toning wood prints black, or the color of prints on albumen paper. A. Tone with a bath made of—

Chloride of gold.....	1 gr.
Pulverized borax.....	60 "
Water.....	4 oz.

See page 225 of SCIENTIFIC AMERICAN, April 13, 1889.

(3243) J. A. R. says: Please give me a good formula for making a preparation which will kill the bed bug and destroy its eggs. A. Use corrosive sublimate, to be had at drug stores. Druggist will tell you how to use it.

(3244) T. D. McC. writes: In your answer to query No. 3180, I notice what looks like a slight error. You say, "If you divide the voltage by the number of watts, you will have the current in amperes required." As $W = CE$, dividing the number of watts by the voltage will give the required current, which is 0.845 ampere. The resistance of motor should be 130 ohms.

(3245) D. McC. S. S. writes: 1. I notice in this week's issue of your valuable paper, you state in answer to query 3152, "What is the difference between a square foot and a foot square? A. There is no difference in area or quantity of surface, but there may be a great difference in shape," etc. Now it seems to me that though this answer is, when applied to one square foot, perfectly correct, it would be liable to be misleading when applied to more than one. Thus, for instance two feet square would be equal to $2^2 = 4$ square feet, and I therefore think that the number of square feet in a given area of feet square would be best expressed by the formula $x F. sq. = x^2 sq. F.$ Please inform me whether this is not correct. A. This is right as far as it goes, but your formula only applies to squares, and does not take rectangular figures within its scope. 2. Also, could you inform me what is the value of ordinary carrier pigeons in this country, and would these be capable of carrying small packages of say 4 to 8 oz., or can they only carry very light letters? A. Carrier pigeons can only carry light letters. Their price varies with their age, breeding, and proved abilities. 3. Also what is the world's total output per annum of platinum, and what is the present and what the average price of such? A. We have no very recent figures. In 1887, the production of platinum in Russia was placed at 113,724 troy ounces; 2,000 or 3,000 ounces additional were produced elsewhere.

(3246) B. M. I. asks: 1. How is wood made into pulp, and how is wood pulp converted into paper? etc. A. For wood pulp we refer you to our SUPPLEMENT, Nos. 293, 299, 311, and 570. 2. What is "Frankford black" and how is it made? A. It is a kind of black, said to be made by burning grapevine twigs or cuttings, used in printer's ink.

(3247) H. H. W. asks: 1. What is the chemical formula for aurate of ammonium? A. It is of indefinite composition. A typical formula would be $Am_2O_3(NH_4)_2 \cdot 3H_2O$. 2. How is it manufactured? A. By precipitating a solution of gold with ammonium hydrate and boiling in an excess of the same; or by digesting auric hydrate in a solution of ammonium sulphate. 3. What is its explosive power compared to nitroglycerine? A. Probably $\frac{1}{2}$ that of nitroglycerine. 4. What is the highest explosive known? A. Of the commercial explosives, nitroglycerine. 5. Can fulminate of silver or mercury be exploded without drying or removing from the liquids from which it is produced? A. Safety is secured by keeping them immersed in water, yet explosion while so immersed is at least a possibility. 6. Will nitric acid and glycerine produce enough heat on uniting to explode itself? A. No.

(3248) L. M. asks: 1. I have some specimens of satin spar that have been cut into gems for setting. They are beautiful, but are very soft. Is there any way of hardening them, also can they be colored, and how? A. They cannot be hardened nor satisfactorily dyed. 2. What way is there of preserving natural colors in dried and pressed flowers, etc.? A. Only by avoiding exposure to light. 3. I have specimens of quartz, clear and white crystals, etc., that have been naturally stained red and yellow

by sulphur, iron and alum. What chemicals or receipt can I use that will clean them and remove the stains without injuring the specimens? A. You can boil in strong hydrochloric or sulphuric acid without effect on the quartz. 4. Where can I buy agate and jasper in the rough, in vicinity, and price per lb., also Mexican onyx that is used in New York, and any other semi-precious stones for ornamental and fancy work, in rough and polished? A. Address Tiffany & Co., or Eimer & Amend, of this city.

(3249) J. R. N. asks: What is the metal gallium? Where found? What are its uses? And how long has it been known? A. Gallium is an exceedingly rare metal, and hitherto only a chemical curiosity. It is found in zinc blende from the Pyrenees and other localities. It was found in 1875, by Boisbaudran.

(3250) G. A. D. asks: 1. What is an alum cell? What is an iodine cell, and how can I construct them? The above are mentioned in "Experimental Science," on page 189, under radiometer. A. An alum cell is a tank with plate glass sides filled with a strong solution of alum. It stops most of the heat rays while allowing the light rays to pass. For use in an ordinary lantern, the cell should be $\frac{3}{4}$ inch thick. An iodine cell may be made with glass sides, but rock salt is used when perfect results are required. The cell should be 2 inches thick. The solution is made by dissolving iodine in bisulphide of carbon. The solution should be a saturated one. This cell stops the light rays and allows the heat to pass. 2. Also a selenium cell, and how can it be made? A. Selenium is rubbed on a heated brass grating; the heat melts the selenium, and some of it enters the spaces in the grating. When the selenium has cooled and crystallized, the cell is ready for use. You will find a full description of the telephone in "The Telephone," by G. B. Prescott. 3. Is it possible to reduce the resistance in a vacuum tube for the passage of the electric current to an equivalent of, let us say, the resistance of dilute sulphuric acid? A. It would be impossible to reduce the resistance to that extent. The resistance of an ordinary vacuum tube is about as small as it can be. 4. How much are five degrees Fahrenheit expressed in heat units? A. A heat unit is the amount required to raise the temperature of one pound of cold water one degree Centigrade. The Centigrade scale can be converted into Fahrenheit according to the following formula:

$$\text{Centigrade} \times \frac{9}{5} + 32 = \text{Fahrenheit.}$$

5. Where could I buy an air pump (piston pump) of good reliable make which would not be too expensive? A. You can buy air pumps from any of the dealers who advertise in our columns.

(3251) C. A. H. asks: In rewinding a small electric motor, say about one-eighth horse power, to adapt it to Edison 110 volt circuit, what should the resistance be in the fields and armature, and the best way to connect up shunt or series? A. The resistance of the machine should be such as to use the amount of current required for the power needed. An electrical horse power is 746 watts. A watt is one ampere multiplied into a volt. If you require one-eighth horse power, you will need about 93 watts. Your E. M. F. is 110 volts; therefore, if you divide the number of watts by the voltage, you will have the current in amperes required, which is 0.84 ampere. Now, to arrive at the total resistance of the machine, you will divide the voltage by the amperage, which will give you 130 ohms. Of this amount, if the machine is series wound, the resistance of the field magnet should be about one-half that of the armature, while if it is shunt wound, the resistance of the field magnet should be about fourteen times that of the armature.

(3252) F. H. B. writes: I have been rewinding a small motor for 110 volts, and about the same time you answer question number (3180) C. A. H. I have been questioning its correctness in my own mind and would like to ask you if am not correct and your answer is wrong; 746 watts divided by $\frac{1}{8}$ gives 93 watts required. Now, you say divide the voltage by the number of watts and gives 1.18 amperes; but I think to divide the watts by the voltage is correct, which gives 0.84 ampere. Now divide the voltage by amperes and it gives 130.6 ohms resistance of wire, instead of 92 ohms. I think this way is correct, because watt is voltage multiplied by amperes. Now, having the watts and voltage, the amperes must be the number of times the voltage is into the watts, instead of watts into voltage, as you state in that answer. A. You are correct in your conclusions in regard to determining the amperage and resistance of the motor. The reply referred to was erroneous, the same is corrected in this number of the paper.

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Zinc from zinciferous ores, obtaining sulphate of, or art, air Bruckner Manufacturing Company.....	457,256
Zinc or other thin sheets to bed plates, device for applying, A. H. Cruse.....	457,306

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