oyster shells be put? A. They could be used in making shell lime for gas works, or for road making. A shell road is equal to a macadamized road in quality. New Orleans is celebrated for its shell roads.

(163) F. C. H. asks: What is the reason that when I use a microphone in the circuit with a Bell telephone receiver, and when the microphone is spoken to, that each sound of the voice is accompanied with a scraping sound audible in the receiver? And will you please tell me how to remedy it? A. The microphone is badly adjusted, and probably breaks the circuit. The carbon electrodes should be held more tightly pressed together, or their surfaces may be deficient in finish.

(164) C. E. B. writes: I am desirous of making a model composed of rubber, the same as the large rubber bands. Will you be kind enough to tell me how I can mould it? A. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 555, which we can send you for ten cents, for process of moulding India rubber type. This will probably cover your needs.

(165) W. A. H. asks: Will condensed air create a vacuum in a siphon or injector the same as steam does? And do you think an air siphon could be built, supposing the air to be under 30 to 35 pounds pressure? A. It will in the jet siphon; the injector depends upon the condensation of steam, and will work with air as in steam blowers. An air siphon could readily be built to work as described. For general descriptions of pneumatic machinery, we refer you to our SUPPLEMENT catalogue and indices of SCIENTIFIC AMERICAN.

(166) J. B. asks for the constituent parts of the transfer ink as used in the various autocopyist systems. A. Aniline colors mixed with water and glycerine or with vaseline are the general constituents of such inks.

(167) J. S. writes: Please give me a receipt for mucilage. A. Dissolve gum arabic in water, until thick enough to suit the requirements.

(168) C. S., J. H. C., and others.—For printer's rollers use 10½ lb. best glue; 2½ gallons black molasses, or honey; 1 lb. India rubber, dissolved in alcohol; 2 oz. Venice turpentine; 12 oz. glycerine; 4 oz. vinegar. This formula is given for the mysterious "black composition, so durable and elastic, and known to but very few persons until recently. *Purified rubber only* to be used. The old home recipe is 2 lb. glue, soaked overnight, to one gallon of New Orleans molasses. In cold weather more molasses is used, but the press room should be kept at about 70°. The mould should be of iron, perfectly smooth and oiled inside; never heard of a wood mould being used.

Enquiries to be Answered.

The following enquiries have been sent in by some of our subscribers, and doubtless others of our readers will take pleasure in answering them. The *number* of the enquiry should head the reply.

(169) Will you please let me know if there is any way to keep blue checked cotton, such as is used for overalls, from fading and shrinking? I have a roll which turns brown and shrinks about three inches when made up.—F. W. M.

(170) 1. How can I cut and polish stones and minerals? 2. What tools and materials are used? 3. What size wire on the field magnets and armature should I use in making a dynamo twice the size of the one described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 600?—O. I. F.

(171) Could you give me a receipt for making a walnut stain (water) and an ebony acid stain? Is there a walnut alcohol stain?—T. H. F.

(172) Rule for calculating a safety valve, not a complicated rule, but a very simple rule that a man with a limited education can understand, and an example explaining. Also a receipt for removing zinc and white lead paint from iron.—A. D. C.

(173) I would like to get some pointers in regard to making gaskets for hydraulic pumps. We use a hydraulic pump which has to lift a four hundred ton pressure on a 13 inch ram. Gaskets are continually giving out on connections and plungers, and valves sometimes fail to act. Please give me a rule for speeding up machinery and squaring up diameters or find out the square inches in a given space.—J. A. B.

(174) 1. How can you find out the horse power of a boiler? 2. Are feed pipes liable to burst quicker in front of a boiler than behind?—D. C.

(175) Please inform me the construction principle and operation of the air brake used on cars.—C. S. B.

(176) 1. What number of horse power will be required to generate a sufficient amount of electricity to run fifty arc lights? 2. What will the probable cost be for a plant of sufficient power to run fifty arc lights?—H. C.

(177) Please give me a receipt for cleaning the white keys of a piano that have turned yellow, and what will keep them white? Also a receipt to make black varnish, that which the tinsmiths use on stove pipe, which gives it a nice gloss.—G. H. A.

(178) Please inform me how to color clothing from a light into a dark blue, and also what kind of an eyeglass would you recommend to guard against snowblindness?—H. M.

(179) How can I make a porous brick that will absorb kerosene oil? I want to make a fire-kindler that will kindle wood or coal. Also a brick that could be used as a fuel? There is a fire clay here. Could I make it of that? Please give me a receipt for a good top dressing for carriage tops, and oblige.—C. L. S.

(180) I have some abelone and other sea shells just as they came from the water. I write to enquire the best method of removing the rough outside coating without injuring the shells.—W. B. D.

(181) Can you inform me of a good receipt for making black bicycle enamel, and oblige.—O. K.

(182) Can you tell me how to make phosphorized oil?—A Student.

(183) Could you please give a receipt for taking the green boil off gold that is there after it has been annealed and boiled out in nitric acid pickle? If you could, you would greatly oblige your subscriber.—W. J. S.

(184) I have a small telescope with a two inch object glass, mounted equatorially, with clock works to follow a celestial object in its daily motion, and camera attachment. I have been making efforts to take a photograph of the moon and find that I can get a very good impression one and one-half inches in diameter on the sensitive plate by exposing it two minutes. The image, however, lacks definition, and I am led to believe that the trouble lies in the eye piece of the telescope, which is a simple convex lens of one inch focus. (The focus of the object glass is 36 inches.) If you will kindly give me some suggestions through the columns of your valuable paper, with regard to the style and power of the eye piece, etc., to be used for obtaining a good picture, they will be thankfully received by C. V. A.—Could the size of the picture be increased to good advantage?—V.

(185) We have a hot air furnace and we are not able to get the heat into any room in the direction the wind blows, when in north room facing north cannot get the heat to come in the room, and so with every room facing the wind from different quarters, in a good brick house and the cold air draught taken from the hall way or from outside. Can or is there any remedy, or what are the causes?—C. H. S.

(186) I am thinking of studying, after working hours, some works on electricity. I want a knowledge of the electric light and motors. Could I get a practical knowledge of either or both without teacher? If you think I can, please give price and title of book or books. I know nothing at all about the subject at present.—E. F. C.

(187) How do ocean steamers like the Etruria get their boiler feed water and water for culinary purposes? In other words, do they use sea water in their boilers? I thought they filled up their boilers with fresh water before sailing and used sea water to keep up supply while at sea, using for culinary purposes fresh water carried in tanks from either side. A friend says I am wrong, as they use distilled water for boilers and cooking, from their condensers, but I would not think that that source of supply would be sufficient for both, should think that they would want a separate condenser from that in connection with exhaust.—W. S. B.

(188) What will cement hard and soft rubber together so as to be proof aginst the action of all acids save those that act upon the rubber?—J. D. B.

(189) Do you know any means to put in order a watch that has been magnetized by a dynamo electric machine, or any solution to prevent it from being magnetized?—H. M.

(190) How many 50 volt lamps would the eight light dynamo of SCIENTIFIC AMERICAN SUPPLEMENT, No. 600, run, if the dynamo were run by a one horse power, 11 inch, rotary water motor? How many with a water motor 6 inches in diameter? How many 25 volt lamps? The dynamo, in all cases being shunt wound.—L. D. M.

(191) What is the best mode to restore oil paintings that are cracked, and the best mixture to add to gold bronze for picture frames? Also are there any well defined principles for a belief.—F. A. L. S.

Replies to Enquiries.

The following replies relate to enquiries recently published in SCIENTIFIC AMERICAN, and to the numbers therein given:

(1) Hardening Soles of Shoes.—G. W. (1) in Notes and Queries in a recent number of SCIENTIFIC AMERICAN, asks for a receipt for hardening soles of shoes, and you reply that there is nothing practical for such purpose except nails. Stockholm tar rubbed on the soles of shoes hardens the leather materially, renders it impervious to water, and makes it wear much longer than leather not thus treated.—W. M. S.

(16) Grafting Wax.—A good grafting wax can be made by melting together 50 lb. resin, 10 lb. beeswax, and 1 gallon raw linseed oil. As soon as the resin and wax are melted, dip a pint at a time into a bucket of cold water, keeping it away from the bucket with a stick. As soon as it is cool enough, stretch with slightly greased hands. If the wax is to be used in very warm weather, a little less oil and beeswax will be better.—A. T. C.

(21) Utilizing Leather Scraps.—In a former issue of your SCIENTIFIC AMERICAN, one of your readers asks for a receipt to utilize leather scraps. The most establishments first clean and then soak them in a 1 per cent solution of sulphuric acid until soft, and press them into blocks and dry by steam. Now add 1 lb. glycerine to 100 lb. and press into sheets, to be used in soles of boots and shoes.

(27) Bell Telephones, Battery, etc.—1. No change is necessary in the telephones. 2. About ½ oz No. 36 silk-insulated copper wire. 3. A single contact transmitter is best, and the use of an induction coil is a great improvement. Put transmitter battery and coil in a local circuit and connect the line wire, receiver terminals, secondary wire of coil and ground together. A transmitter with horizontal diaphragm, having a carbon button in the center, and a small carbon pencil, about ⅛ in. × 1 in., resting vertically upon the button, is about as easily made and as sensitive as any of the ordinary transmitters. It requires no adjustment whatever. 4. See back numbers of SCIENTIFIC AMERICAN SUPPLEMENT. 5. If carbons are dry and the lead runs at a low heat, there will be no injury. Type metal would be preferable. 6. A sealed potash cell works very well on bell and gas lighting circuits. A spark coil is necessary for the latter.—W. A. R.

(27) Lead Connections for Carbons.—Will you permit me space in your paper to say in answer to late inquiry that lead may be successfully used for head caps to carbon heaters, and from a long experience I know it will bind tight enough to make good contact. I have cast lead caps on pretty nearly all forms of carbons, rods, plates, cylinders of rods, plates of rods, etc., using a wooden mould into which to pour the lead. If heated hot enough to run freely, so as to not be chilled by the cold carbons, it will shrink so as to be easily lifted from the mould, and so as to bind so tight on to the carbons as to defy all attempts to loosen it or pull it off. Those who wish to construct batteries from electric light pencils may be glad to know that many of these pencils are defective in manufacture and are rejected on inspection. These defective pencils are not plated, but thrown aside to be ground up and recast or remoulded. They will serve as well as the best for battery use. I bought five hundred full length pencils (12 inches × ½ inch) at one time, for two cents a piece, and have used them to construct all kinds of batteries. By getting these naked carbons, the trouble and expense of eating off the copper from those that are plated is avoided, and just as good results obtained. Of course if one can get the refuse pencils from an electric light station for little or nothing, it would pay to use them with the attendant trouble of eating off the copper. But many may not be able to do this, and such can get these condemned pencils at much less cost than new pencils. I prefer the lead cap on the bare carbon as much less liable to damage them, copper plating and then casting on type metal, from any possible leaking of acid through the paraffine in the tips.—C. D. PARKHURST.

(34) Capacity of Wire.—1. The number of volts a wire is required to carry does not affect the size of the conductor. That is determined by the number of amperes. The rule is, allow 800 circular mills per ampere of current carried. The circular mill is the square of the diameter of the conductor in thousandths of an inch; 800 circular mills per ampere for 120 amperes=96,000 circular mills. Diameter of No. 0 (B. and S. gauge) is 0·32495. As thousandths of an inch 324·95×324·95 =105,502 circular mills. Therefore No. 0 wire should be used. 2. The dynamo you examined was probably a Gramme machine, in which the current divides, half going through one side of the armature, and half through the other, so that the wire need not be as large as the line. 3. In general, to increase E. M. F., wind armature with more and finer wire; to increase amperes, wind with heavier wire. The amount of saturation of armature core has a great deal to do with it. 4. Yes. [A wire cannot be said "carry volts." Between contiguous molecules there is no difference of potential, although a wire may be carrying a current due to many thousand volts difference of potential as referred to its terminals.—ED.]

(35) Bleaching and Polishing Ivory.—Slake some lime and put your ivory in the clear water decanted from the residue and boil until it looks white; to polish put in lathe, use pumice stone, and wind up with chamois and a very little olive oil. Make the leather warm. [It is risky to boil large articles of ivory, as it tends to split them.—ED.]

(41) Burning Tree Stumps.—Bore a 1 in. hole 18 in. deep in center of stump, put in 1 oz. saltpeter, then fill hole nearly full of water, then plug up tight; this is done in the fall and spring. Take out the plug, pour in ½ gill of kerosene and set on fire, and it will burn out to the very extreme ends.—C. T.

(41) Burning Stumps; Coloring Maple Sirups.—1. Bore a 2 in. hole slanting in the stump, fill ⅔ full with saltpeter, fill up with water, and cork. After two or three months, pour a little coal oil on the stump and set on fire. 2. Add a sufficient quantity of diluted caramel (burnt sugar).—W. A. R.

(43) Rifle Sights.—If a rifle having globe and peep sights is screwed firmly into a vise and fired at targets, the ball will be found to strike below the line of sight for a distance varying from 50 to 100 feet, if the rifle is sighted for an exact center at say 60 yards. In an ordinary open-sighted rifle, an expert shot will instinctively draw a fine or coarse "bead" as may be necessary to make the ball "drive the center."—W. A. R.

(52) W. D. R.—You can only clean iron wire by pickling in a bath of hydrochloric acid 1 part, water 3 parts. Then run it through a draw plate in oil—or if not convenient, pass the wire through a series of leather wheels charged with flour emery and oil; the wheels so arranged and grooved as to touch all sides of the wire.—For Galvanizing.—After pickling as above, pass the wire through a trough of muriate of zinc and ammonia, and immediately through a bath of melted tin or zinc, which, if properly done, will bring out the wire clean and smooth. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 34, for illustrated description of method of galvanizing iron wire.

(53) O. K.—You will find in "Techno-Chemical Receipt Book," which you can buy for $2, an article on enameling bricks, p. 415, and on the manufacture of colored enamels, p. 117. Also enamels and glazes for pottery, pp. 221 to 224, Spons' Receipts, 3d series, $2. Also Davis on the manufacture of bricks, tiles, and terra cotta, $5. Also SCIENTIFIC AMERICAN SUPPLEMENT, No. 387, enameling pottery, with receipts for various colors. Also SCIENTIFIC AMERICAN SUPPLEMENT, No. 402, encaustic tiles, how made.

(54) R. T. F.—1. You can buy thin sheet steel through the hardware trade that is suitable for springs. Cut with a tinsmith's shears, file and drill. 2. To stamp your name on velvet in gold leaf. Sprinkle the space that the name is to cover with pulverized gamboge through a thin muslin bag or piece of silk tied over a small box. Lay a piece of gold leaf of the proper size on the spot. Use printer's type properly set in a frame. Heat the type to about the temperature of boiling water, and press upon the gold leaf for a moment. When cold, brush off the gold leaf and excess of powdered gamboge with a fine brush. Try this on a separate piece of velvet, as you may need a little experience.

(53) Glazing Brick.—The brick is dipped in a transparent colored glaze usually formed, besides the coloring oxides, of: Oxide of lead 40 to 50 per cent, silicious sand 30 to 40 per cent, salt 0 to 12 per cent; flux in an oven. Coloring: Red—Iron, iron sulphate, copper (oxidule), ocher. Yellow—Antimony, with sulphate or potash, titanium, chromate of lead, chromate of barytes. Green—Copper, chrome with cobalt. White—White clay, powdered soapstone, 5 per cent tin oxide. The coloring oxides are introduced in quantities usually of 5 to 10 per cent. They act as fluxes, and the composition of the body must be altered in some cases to counteract this.—D. A. S.

(55) Nozzle Streams.—Rubber hose, 100 feet, 60 pounds at hydrant; 1 inch smooth nozzle, 125 feet horizontal, 93 feet high; 1 inch ring nozzle, 125 feet horizontal, 95 feet high; 1¼ inch smooth nozzle, 117 feet horizontal, 81 feet high; 1¼ ring nozzle, 122 feet horizontal, 89 feet high.—J. B. [We can furnish by mail a work on fire streams for $1.50.

(55) W. H. G.—With full length of 50 or 100 feet of hose, the 1 in. nozzle will throw the highest. Friction of the water in the hose interferes with the final pressure at the nozzle. The velocity of the water in the hose having the 1¼ in. nozzle will be more than 50 per cent greater than in the hose having the 1 in. nozzle. This lessens the pressure and makes the difference in favor of the 1 in. nozzle.

☞ Books or other publications referred to above can, in most cases, be promptly obtained through the SCIENTIFIC AMERICAN office, Munn & Co., 361 Broadway, New York.

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