(47) R. C. U. writes: I have a dark chestnut horse with light colored mane and tail. The hair of the mane is white at the ends, but next to the neck it is dark. It seems to grow out dark and fade as it becomes longer. Can you give me a recipe for a wash or preparation which would cause the dark hair to turn white without spoiling the gloss or making it come out? A. We would recommend you to use hydrogen peroxide, a description of which and method of using is given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 339.

(48) W. R. J. asks how to put on lightning rods. Is not a quarter inch copper wire as good as any of the patent rods offered? What is a reliable rule for determining the number and height of the points? Is there any danger in making the ground connection with the usual half inch galvanized iron water service pipe? Is not this the best ground that can be made? A. A quarter inch copper wire will make a good lightning rod. Every salient point, such as chimneys, gables, etc., should be protected by the rod. Metal parts of the roof, gutters, leaders, etc., should be connected with the rod. The lower ends of your bell wires should also be connected with the rod or ground connections. If your house is large, a rod at each end or at each corner would be desirable. Water pipes make excellent grounds if the rod is well connected with them.

(49) A. T. McI.—The smaller glass tubes may be broken by nicking them one side with a sharp file, and then breaking them as you would a notched stick. The larger tubes you may shorten by means of an ordinary grindstone or by employing an iron lap charged with sharp sand and water.

(50) F. C. E. asks: In winding the secondary wire of coil described in SUPPLEMENT No. 160, the several convolutions of wire would frequently slip close to one another immediately after winding, thus making it impractical to wind the wire very closely. For this reason I had room for only one pound of wire. Could not the insulating paper be coated with something more or less sticky, so as to, in this way, prevent the wire from slipping? A. You might use an adhesive varnish for retaining the wires in place. A varnish of this kind could be made by dissolving beeswax in benzine or turpentine, and adding a very small quantity of oil or glycerine.

(51) J. W. E. asks (1) the name and price of the most complete treatise on springs, elliptic and spiral. A. We know of no work treating specially on springs. You will find the information you desire scattered through mechanical books and cyclopedias. You will find a good article on spiral springs in SUPPLEMENT No. 20. 2. Also the name of the scientific practical school in Hoboken, N. J. A. Stevens Institute of Technology.

(52) G. W. H.—A stove with a coil of pipe around the fire for heating bath tubs, or rather a small tank from which to draw the water into a tub, are in common use among those who have no range boilers. They are made to order. Any pipe fitter can make one. A blacksmith can bend the coil.

(53) J. M. R. writes: I am a young machinist; will you kindly inform me what steps I should take to become a marine engineer? A. Go as fireman on a small boat, and give strict attention to all the details of engine, after which you may advance to assistant engineer and so on up. There is also room in such field for all the study for which you can find time.

(54) S. W. R. asks: 1. Is it practicable, with two cells of gravity battery, to remove tin by electrolysis from old oyster cans, scraps of tin plate, etc.? A. No. 2. Is it profitable? A. No. 3. I want to run four electric lamps. Can I generate the electricity as cheaply as the oil costs? A. No.

(55) C. K. K. asks a recipe for making a good fire and water proof roof paint, of which coal tar is the basis. A. Coal tar has been used lately as a waterproof base for fireproof paint. It is no doubt cheaper than oil or other gummy substances, and probably just as good and safe. It is mixed in the same manner as oil, with any cheap mineral pigment or powder, such as asbestos, ground slate, or dry clay pulverized; to which add any dry color that you may desire for tinting. In order to make the best fireproof paint, it is desirable that as little coal tar be used as will just cement the mineral particles, so as to have the paint consist of as much mineral matter as possible. It will therefore be necessary to use turpentine to thin the tar, that you may be able to use a brush for spreading. The quantity of turpentine required depends upon the condition of the tar used, and will require a little practical judgment as a painter.

(56) F. C. S. asks how to take a cast in plaster of a bust, etc., and says he has heard of such being taken by the aid of photography by using, instead of paper to make the print upon, a sheet of gelatine treated with bichromate of potash. A. We know of no means by which you can make a mould of a plaster bust by the aid of photography. You can copy your bust by making a flexible mould in the following way: The materials are glue and molasses; 12 pounds of glue is steeped for several hours in as much water as will moisten it thoroughly; this is then boiled in a hot water bath; when the glue becomes fluid, 3 pounds of molasses is added and the whole is well mixed. The bust is placed in a cylindrical vessel somewhat deeper than itself. The inside of the vessel is oiled, a piece of stout paper is pasted on the bottom of the bust to exclude the mixture. If the bust is of plaster, it is weighted to prevent it from floating. Thoroughly oil the bust and pour over it the melted mixture of glue and molasses, covering the bust to a depth of an inch or so. Let the whole stand for twenty-four hours, after which remove it from the vessel, and by means of a sharp knife cut the mould from the bottom up the back of the bust to the front of the head. It is now opened and the bust removed; the mould is allowed to reclose, and a stout piece of paper or cloth is tied around it to keep it firm. The mould may now be thoroughly oiled, and a thin batter of plaster poured into it and shaken about until the entire inner surface of the mould is covered. The surplus of the plaster is poured out, and when that adhering to the wall of the mould has hardened, the mould may be removed from the cast in the same manner as from the original bust.

(57) B. I. B. writes: I have a small furnace holding a crucible that will contain 25 to 30 pounds, which I use for making brass castings. Now I wish to make a steel casting for experimental purposes, and wish to know whether the same or nearly the same heat that will melt copper will melt steel, and what I shall use to make a strong steel casting. Can get muck bar (puddled) iron such as is used to make boiler plate, and scraps from homogeneous steel boiler plate (ordinary steel boiler plate); which would be the best to use; and how shall I go about it? In short, how can I make crucible steel castings? Can you refer me to any works on the subject that will give the desired information? A. You can melt steel in your brass furnace by applying a blast to it. Steel melts at a considerably higher temperature than copper. You can use scrap steel and wrought and cast iron with manganese and a flux made of common bottle glass and charcoal. The process requires experience and judgment. A recent book on Steel and Iron, by William Henry Greenwood, gives very complete details.

(58) F. D. asks: 1. Which is the shortest and easiest process to obtain the skeleton of small and medium sized animals? Is there any acid or chemical preparation wherewith I can take off the meat without injuring the bones and without having a too great fetor? If so, please give me directions? A. You can remove the flesh from the bones of small animals by boiling. We know of no acid that would remove the flesh without being liable to destroy the bones. A method of removing flesh from the bones of small animals sometimes practiced is to place the animal near an ant hill, when the flesh will be removed by the ants. 2. Is annunciator cotton covered copper wire good enough for a dynamo five times larger, but like the one shown in SUPPLEMENT, No. 161? It is quoted 40 cents per pound. How many pounds of copper wire (about) are there on field magnets and armature of the dynamo in SUPPLEMENT, No. 161? A. Cotton covered copper will answer very well, provided the covering is not too thick. There about seven pounds of copper wire on the field magnets and armature of the dynamo referred to.

(59) D. McP. says: In a garden 100 feet long, 80 feet broad, a gravel walk of equal width is to be made down one side and across one end; what must the width of the walk be so as to take up just half the ground? A. Know of no better way arithmetically than by approximation. The walk will be 25·9686′+ wide.

(60) G. F. R. writes: I have a tank about 10 feet deep by 6 feet in diameter, full of water and open at the top; what amount of power would it require to force one cubic foot of air up through the bottom of this tank, and would it require any particular size pipe for the air to pass through? A. It will require 4½ pounds pressure per square inch to force air through an opening in the bottom of a tank. The size of pipe is indifferent, except that the larger the pipe the greater the quantity of air delivered in a given time.

(61) "Toronto" asks how sheet bluing is made and the composition. A. The ordinary varieties of cake blue consist of indigo and starch. In answer to query 5 in the SCIENTIFIC AMERICAN of April 5, several other formulas are given, which may be used in combination with starch and glue to produce sheet bluing.

(62) J. H. writes: I wish to build a round cistern of brick 13 by 13 feet and 4 inches wall, with an arc one-third the diameter of cistern. Cistern to be located on the side of a main road. Will such a cistern built of good material be a good one? A. We do not recommend you to make less than an eight inch wall for so large a cistern. Lay the bricks in Portland cement well filled and backed. Finish with Portland cement plaster.

(63) G. I. V.—Type metal is simply lead and antimony. If you make the gate to your mould sufficiently deep, it will give the melted metal sufficient pressure to cause it to fill every part of the mould, and so is well adapted for casting many small articles—for images, vases, etc. Tin and antimony form a fine alloy for casting in plaster moulds. Zinc answers a good purpose, and will run sharp if the mould is well dried and vented.

(64) J. W. H. asks for the simplest way to erase rust spots from a white linen duck vest. A. Use warm oxalic acid solution or dilute hydrochloric acid, then tin turnings. 2. How varnish lampblack letters can be erased from Parian marble or alabaster? A. Make a paste with quicklime and water, cover the article well with it, and let it remain all day; wash off with soap and water, rubbing hard the stains; else use dilute hydrochloric acid, having previously removed all dirt and grease. Ground pumice stone may be used to polish the surface of alabaster or marble.

(65) E. L. C. writes: Being a student in the Rensselaer Polytechnic Institute, and finding in the work in drawing much use for an instrument for drawing dotted and broken lines, I have succeeded in modifying one of the ordinary roulettes so that it works very satisfactorily with printer's ink. India of course is much preferred by the professors in all and required in some departments. I am looking for some medium which will carry India ink so that it can be worked about as printer's, and thus combine the usefulness of the instrument with the excellence of India ink. Have experimented some, but have not made the work a success. A. We do not think that you will be able to make any preparation of India ink that can be used in the manner proposed. Such attempts have often been made. A judiciously selected printer's ink should answer very well, except for the most perfect work, for which India ink stands unrivaled.

(66) R. T. D. asks if there is a place in New York city to study mechanical engineering, excluding Cooper Institute. Would like to study it, but will not be admitted to Cooper Institute, being a business man. A. There is no such institution in this city or in this immediate vicinity. Unfortunately, neither Columbia College nor Stevens Institute will admit post-graduate students who have not taken the regular course. Even graduates from other colleges are not admitted for post-graduate studies. Partial courses which you could attend to at night are out of the question. Both these colleges are now so crowded with regular students as to make it impossible to accept others.

(67) J. D. H.—If the person to be lifted weighs 200 pounds, then each one of the four who do the lifting must lift his exact portion of that weight. Whether the lungs be full of air or not has no influence whatever upon the dead weight lifted. But it is a fact well known to every athlete that he can exert himself to better advantage and produce a greater effect by filling his lungs previously to putting forth his strength. The task he is to perform is no easier nor are his muscles any stronger, but by the mere action of holding his lungs distended his entire muscular system may be said to be in a state of severe tension, and when he does exert his strength it is with a concentration combined with a certain unconsciousness of abnormal strain which enables him to perform feats otherwise impossible. When this same degree of concentration is directed toward lifting a weight which he can handle easily under any condition, we can readily comprehend how he may be unconscious of any effort. You will find that four weak people, who cannot individually lift 50 pounds, cannot lift a person weighing 200 pounds under any circumstances—lungs inflated or not.

(68) H. W. S. asks if colored glass, that is, colored by metallic oxides, can be pulverized or ground, and on being subjected to a proper degree of heat again become transparent and regain its former color? A. Most of the colored glasses could be used in the manner described.

(69) G. A. T. asks for a receipt for a liquid starch polish, such as is used to give gloss to linen collars and cuffs. A. A little paraffine in the starch and a polished iron does the business. Or, procure 2 oz. of fine white gum arabic, and pound it to powder. Next put it into a pitcher, and pour on it a pint or more of boiling water, according to the degree of strength desired, and then having covered it let it set all night. In the morning pour it carefully from the dregs into a clean bottle, cork it, and keep it for use. A tablespoonful of gum water stirred into a pint of starch prepared in the usual manner will give a beautiful gloss to shirts, etc.

(70) J. H. W. writes: Please settle a dispute by telling us whether the Government makes anything by the coinage of nickel 5 cent pieces. Or in other words, is the nickel in a 5 cent piece worth five cents? If not, how much is it worth? Also, is the copper in a copper cent piece worth one cent? A. A copper cent weighs 48 grains, and contains 95 per cent copper and 5 per cent zinc. The 5 cent piece weighs 77·16 grains, and contains 75 per cent copper and 25 per cent nickel. Copper is worth about 13 to 14 cents per pound, and nickel about $3.00 per pound. From the foregoing you can calculate somewhere the exact value of the coins. The Government makes about three-tenths of a cent on the cent and perhaps 2 cents on the 5 cent piece. See [page 52 of SCIENTIFIC AMERICAN for July 26.

(71) T. H. would like to know the method of making what is known in England as the vesuvians, together with the ingredients. Also the best machine for cutting round splints for same, similar to matches? A. The heads of vesuvians are made up principally with powdered charcoal and saltpeter in some such proportions as those in the following: 18 parts saltpeter, 19 charcoal, 7 powdered glass, 5 or 6 gum arabic or gedda; to these are added a little scent, in the form of satin wood, lignum vitæ dust, cascarilla bark, or gum benzoin, which renders them fragrant when burning. The igniting composition is identical with that for ordinary matches. See article on matches, SCIENTIFIC AMERICAN SUPPLEMENT, No. 84.

(72) A. W. A. writes: In front of my dwelling is a tree, the leaves of which fade and drop off every year about the 1st of August, and in two or three weeks it again has new and dense foliage. What is the cause of this? A. We could not assign a cause without knowing more of the facts as to the kind of tree, or whether the same kind of tree acts in the same manner in your neighborhood. If not, it is probably want of moisture at the dry season. Possibly the dryness of the soil may allow gas to percolate from the sewers or mains.

(73) E. J. K. asks: 1. Are there any papers so prepared as to be discolored from an electric spark? If so, can you give the process for making? A. We take the following from Prescott's "Electricity and Electric Telegraph:"

No. 1.

Nitrate of ammonia, about	4 lb.
Ferricyanide potassium, about	1 oz.
Gum tragacanth	4 oz.
Glycerine	4 oz.
Water	1 gal.

No. 2.

Nitrate ammonia	2 lb.
Muriate ammonia	2 lb.
Ferricyanide potassium	1 oz.
Water	1 gal.

No. 3.

Iodide potassium	½ lb.
Bromide potassium	2 lb.
Dextrine or starch	1 oz.
Water	1 gal.

Paper is saturated with either of these solutions. It never becomes entirely dry; the sensitiveness of paper treated with these solutions varies in the order of the above arrangement, No. 1 being the least sensitive and No. 3 the most sensitive. 2. Are there any in the market that can be bought in sheets? A. You can buy the prepared paper in strips, but not in sheets. 3. Is it very expensive? A. No. 4. Will ordinary light effect it? A. Not materially. 5. Is it dry? A. To be effective it must be slightly moist. 6. Does it have to be washed or dipped? A. No.

(74) A. C. asks: 1. What is gas carbon? Is it any different from carbon? Where can it be obtained? A. Gas carbon is the form of carbon deposited on the surface of gas retorts. It can be obtained at any of the gas works. 2. How can an electrical turntable be made, cheaply, by an amateur? A. Apply to the motor described in the article on an "Electric Cabinet," in SUPPLEMENT 191, a table, and you will have an electrical turntable. 3. Cannot the ordinary "Crowfoot battery" be used for experiments in place of the Grove or Bunsen battery? As near as I can understand, all that is required is a current of electricity, no matter what kind of a battery generates it. Is not this correct? If this idea is wrong, which is the cheapest battery—Grove's or Bunsen's? A. You are correct in regard to batteries, but the gravity battery yields a comparatively weak current, and you would require a large number of them to do the work that could be performed by a few Grove's or Bunsen's cells. 4. Which gives the strongest current? A. There is very little difference, but the bichromate form of Bunsen's battery is preferable. 5. What is a good book for one just beginning to study electricity? A. Ganot's "Physics" and "Electricity, its Theory, Sources, and Applications," by John T. Sprague.

(75) H. C. K. asks if there is any acid or similar liquid for etching on hard rubber or gutta-percha. Also the way of using. A. We know of no liquid that can be used for etching hard rubber or gutta-percha. These substances may, however, be etched by means of a sand blast, or they may be stamped or shaped by means of warm dies.

(76) L. H. N. asks for a cheap means by which to obtain a high polish on black walnut. A. Take equal parts of rather thick alcoholic shellac varnish and boiled linseed oil, mix them well together, and apply to the wood with a cotton cloth pad. Rub the wood briskly until a desired polish is secured. The mixture must be well shaken before using.

(77) A. J. W. writes: 1. Would the dynamo machine described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 161, with one-half horse power, develop sufficient light with an Edison lamp to light a room 12 by 13? A. Yes, if driven with sufficient speed. 2. What would be the power of the light compared with an ordinary kerosene lamp? A. Quite equal to an ordinary kerosene lamp. 3. Have you ever published directions for making a photometer in the SUPPLEMENT? A. For photometers consult SUPPLEMENTS 283, 270, 204, 8, 237, 379, 284, 387, 250, 393, 220, 421. SUPPLEMENT 250 gives instructions which will enable you to make a simple photometer.

(78) J. W. writes: In the SCIENTIFIC AMERICAN SUPPLEMENT, No. 166, I saw in your description of the electric pen that you would have to use an induction coil; now what I want to know is, how large an induction coil should I use, and how much wire you have to use for the secondary coil. Would 1 oz. do? A. An induction coil that will yield a one-eighth inch spark would answer your purpose; you will probably require two or three ounces of fine wire for each coil. For information on induction coils consult SUPPLEMENT, 160.

(79) J. J. W. writes: 1. Can you inform me how to purify the ordinary sheet zinc so that it can be used for a zinc in a battery? A. Ordinary sheet zinc will answer very well for a battery, when melted and cast in a proper form. 2. Is there any way to color gold solution so as to make it plate darker? My solution is of pure gold. A. For information on electrometallurgy consult SUPPLEMENT 310.

(80) M. M. B. asks how to mould petroleum wax. Of what material should the moulds be made, and what will prevent the wax from sticking? A. If by petroleum wax you mean paraffine, plaster of Paris moulds will answer very well. Powdered soapstone or starch would probably prevent the paraffine from sticking to the mould.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

J. P. T.—The mineral you send is a clay iron ore, and may contain manganese. In order to determine the presence of manganese, a chemical analysis will be necessary, costing $5 00. Cane sugar has the composition $C_{12}H_{22}O_{11}$. The action of bone black is not chemical, but mechanical. It removes the color, and absorbs other soluble matters.—G. C. W.—The specimen is pyrite, or iron sulphide. Its value is dependent upon its carrying gold. In order to ascertain this circumstance, an assay costing $5.00 will be necessary.—W. O. C.—The specimen is hematite, or specular iron ore, and its value depends upon its purity, that is, its freedom from deleterious constituents such as sulphur and phosphorus. An analysis costing $15.00 will give you better information.

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