Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at the office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) E. A. W. asks: 1. Where can I procure ballooning material, and the tools and materials necessary for generating gas? A. The material for a balloon can be obtained through any dry goods house. Chinese silk or, for cheapness, thin, close muslin unbleached. Linseed oil or rubber varnish will do to make the muslin gas tight. 2. What kind of gas is generally used in balloons? A. Make your hydrogen gas with sulphuric acid 1 part, water 4 parts, in contact with iron turnings or zinc scrap in tight barrels, with a hose attached to the bung, leading to a barrel partly filled with water to catch any acid that may pass over, and from the last barrel to the balloon. 3. Where can I get a catalogue of the course of study and discipline of the military school at West Point, and naval academy at Annapolis? A. You may get catalogues by addressing Registrar, U S. Military Academy, West Point, N. Y., and Registrar, U. S. Naval Academy, Annapolis, Md.

(2) F. R. H.—Barytes is used very extensively in the arts, but almost altogether for purposes of adulteration, for which its leading use (about 90 per cent) is in replacing to a greater or less extent white lead in paint. The only other application that we know of is that sometimes it is used as a pigment in combination with certain other bodies.

(3) J. P. P. asks: 1. Is there anything that will toughen timber in seasoning? A. Thoroughly impregnating the timber with creosote or coal tar will increase its density and durability and probably strength. 2. The amount of water that will discharge from a three-quarter inch pipe under a head of 300 to 500 feet; and how much head at the upper end would be required to keep the pipe full, say three-quarters of a mile up the mountain from the discharge? A. We could not advise a three-quarter inch pipe for so great length, as it would become easily obstructed. A pipe 1 inch diameter under 300 feet head would discharge about 9¾ gallons per minute, and under 500 feet head about 13 gallons. You should have a head not less than 2 to 3 feet over mouth of pipe.

(4) E. N. McP. asks: 1. Can I successfully warm a room with hot water, through a radiator or coil, the water heated in a circulating stove or water heater, when the floor of room where the stove is, is but 1 foot lower than the room where I wish the coil? A. Yes. 2. The number of SUPPLEMENT giving information relative to heating by warm water. A. No. 171.

(5) G. R. M. asks the process of coating labels on the back, which, by passing a hot iron over them, makes them stick firmly to satin and other fabrics. A. Probably sugar.

(6) C. R. asks for a receipt for cleaning old files. A. Boil the files in strong soda water to clear the teeth of grease or oil. Then dip in a bath of nitric acid 1 part, water 6 parts, for a few minutes. The time of dipping you will acquire by practice.

(7) J. W. writes: I have two screws, one two inches in diameter, three threads to the inch, and the other six inches in diameter, with three threads to the inch, with the same length of lever, and same amount of power. Is there any difference in the lifting capacity of the two? A. The large screw will sustain double the load of the small screw. There is theoretically no difference in the power required for a given load with equal leverage. With proper and equal lubrication the largest screw has the most friction for equal loads.

(8) M. E. R. asks if there is any danger in keeping a barrel of 150° test kerosene oil, from which oil is taken through a faucet, in the same cellar with a furnace 15 or 20 feet distant from said furnace. A. We doubt if there is any real danger as long as the fire is kept in the furnace and ordinary cleanliness is practiced in drawing the oil. However, if possible, it would be safer to place the tank a little farther removed.

(9) W. B. T.—A six bladed propeller will not be as efficient as a four or three bladed for a steam launch under any conditions, except at very slow speed.

(10) W. L. W. & Sons ask: Is it practicable and economical to attach spiral steam wings to a saw mandrel incased inside a stationary cylinder with supply and exhaust valves operated by cam attachments, thereby dispensing with ordinary engine belting and pulleys? A. It can be done, but very far from being economical.

(11) C. N. H.—Double hulls or catamarans have been built with the inner sides parallel, but they do not work as quickly, and we think they are not as fast as when built in the usual way.

(12) W. J. H.—Using exhaust steam will be most economical, as the back pressure need be but light. You should have a back pressure valve on the exhaust pipe, so that you can regulate the back pressure to just the requirements for heating.

(13) J. B. J. asks: 1. Will a balance wheel give as good results, when the power is given out by belting direct over it, on to a driven pulley, as it will by belting over a separate pulley of equal size, keyed upon the same shaft, other things being equal? A. Yes. 2. Or, does it deprive a balance wheel of any of its advantages to use it as a driving pulley? A. No.

(14) G. A. H.—For tinning light malleable castings: Clean the castings by boiling in caustic soda water to remove all traces of grease. Then dip in clean boiling water to remove the soda. Then dip in a solution of 1 part muriatic acid to 4 parts water, to which has been added a small piece of zinc and sal ammoniac. Have this solution hot; and dry the work on a hot slab of iron before dipping in the tin bath. Sprinkle a little powdered sal ammoniac upon the surface of the melted tin to clear it before dipping. It is supposed that your castings have been thoroughly cleaned from scale by tumbling, as practiced by the malleable iron works. A fresh tumbling in sawdust will make a smooth surface. Any block tin of good quality will do. Banca tin is best; you can get it of the metal dealers in Chicago.

(15) M. L. B. asks whether choke bore guns will shoot shot closer? Will they shoot farther? Are they not more liable to burst, and are they really better and more practical for long range than open bore? A. Choke bore guns will shoot closer. There is greater pressure on the barrel than in open bore, but if properly made there should be no danger. They are more effective for a long range.

(16) L. S. C. writes: Two pumps are lifting water 5 feet high each. One discharges at a velocity of 1,600 feet per minute. The other is enough larger to discharge same quantity of water at a velocity of 100 feet per minute. What percentage more power is consumed with the pump of high velocity? A. You lift the same weight of water to the height in both cases, hence the "work" of raising the water is the same. The increased power required at velocity of 1,600 feet per minute is that due to increased head to produce that velocity and friction, and can only be determined by experiment.

(17) J. D. asks how he can fix plane iron or attachment on same for making curled hardwood shavings for packing vinegar generators? A. You can make the shavings curl by setting the plane iron guard close, or about ⅛ in. from the edge of the cutting edge. Make the bevel upon the guard a little concave instead of convex, as they are purchased. Polish the convex part so that it will roll the shavings easily. Cut away the forepart of plane cavity, to give room for the shavings to curl and free themselves.

(18) N. P. B. asks: 1. Will an electro-magnet, facing and near to a coil of copper wire, develop a current in the coil of copper wire, when a galvanic current is passed around it (the magnet)? If so, what proportion will the inducing current bear to the induced current? A. The current will be generated, but its character and quantity will depend on the strength of the magnet and the diameter of the wire of which the coil is formed. 2. If an electro-magnet develops a certain force on being magnetized, will the same current passed around any number of similar magnets in the same circuit develop an equal force in each as in the one? A. No, owing to the increased resistance thrown into the circuit.

(19) F. D. C. asks (1) if shellac varnish is a conductor of electricity. A. Shellac is one of the best non-conductors of electricity. 2. And if it would serve so when put on wood? A. Yes.

(20) J. F. C. G. asks: 1. Will a horseshoe magnet attract a body sufficient to draw at a distance of from two to four inches, and release it when current is broken, said body weighing from two to four pounds? What size magnet and what battery, etc., would be required? A. A very large electro-magnet would be required to draw four pounds four inches. An axial magnet would probably be better for your purpose than a horseshoe. You would probably need a coil formed of No. 14 wire and having about 400 convolutions. Use ten cells of Bunsen battery connected for quantity. 2. Would an instrument with the above power be dangerous to handle? A. No. 3. Will it work in cloudy, stormy, as well as clear weather, if kept indoors? A. Yes. 4. Will it be sure to act at all times? A. Yes. 5. What I am after is this: I wish to turn a three inch crank one-fourth of a circle when current is established, and when broken, the crank properly weighted will turn back of its own accord. To do this, I thought the horseshoe would be best, but not being acquainted with electrical appliances, I come to you. A. By means of a pawl and ratchet you might be able to accomplish the result with a small magnet if you do not care for instantaneous movement.

(21) J. F.—The current passes always in the same direction in lines as ordinarily arranged, so that no matter which way the message is sent the direction of the current is unchanged. This being the case, the message will always traverse the wire. It is doubtful if there is any direct communication between the ground wires.

(22) F. B. asks: 1. What degree of heat is required in a hatching machine, and if the tank with the heated water is under or over the eggs? A. 104 degrees. The tanks are placed over and under the eggs. 2. I have an Edison 10 candle power lamp; I tried it on two cells of bichromate of potash Grenet battery, but could get no light. Please inform me how I could get a light, and what kind of battery to use. A. You will require 35 or 40 cells of a Grove or Bunsen battery to work your lamps.

(23) J. S. W. writes: 1. I wish to ornament white silk with gold or silver; could I do it in the following manner: Draw the design on the silk with a solution of gold or silver, and then pass an electric current through it? A. We do not think your plan for depositing metals on silk practicable. 2. By mixing the silver solution with that of gold could I obtain the doposited gold in different shades of color? A. You can deposit a gold alloy. 3. What form of battery would be the best to use, and should it be connected for intensity or quantity? A. See SUPPLEMENT, No. 310.

(24) G. B. A. asks: 1. At what point should a steam engine, having say 200 square inches area of piston, and 4 feet stroke, with steam at 60 pounds per square inch, and cylinder well protected by non-conductor, cut off, so that steam may escape at the pressure of the atmosphere? A. It depends on amount of condensation in cylinder and contents of openings and clearances; probably between one-fifth and one-sixth. 2. And approximately, with velocity of piston 400 feet per minute, how much power will such an engine give, leaving friction out of account? A. About 24 horse-power. 3. If the weight of steam so used per minute be multiplied by its temperature minus 212°, at which it leaves the cylinder, and this by 772, and the product be divided by 33,000, will the quotient give the number of horse power of such an engine so run? If not, why not, if 772 feet be the equivalent of a unit of heat? A. No, because much heat is carried off without doing work, and thus lost. The difference between the heat units entering and leaving the cylinder at the end of the stroke × 772 should give the work done.

(25) H. G. asks: How are small metal articles, as hooks, eyes, buttons, etc., to be lacquered or japanned in a practical manner? A. Small articles that can be strung upon a small wire streched tight, as a bow string, so as to keep the articles from sliding together, may be dipped in thin japan and hung in the oven to dry. Make the bones of stiff wire, and stretch the fine wire, which should be as fine as a thread. If any of the articles run together in dipping, separate them with a small wire after hanging up.

(26) J. S. B. writes: Please accept my thanks for your reply (No. 38, Notes and Queries, April 5) to my queries. In it you state: "The annual mean pressure for Washington for 1879 and 1880 reduced to the sea level was 30·107 inches." Please explain. A. In order to make the barometric observations at all stations comparable in regard to the relative pressure of the atmosphere, a common datum is required. This is found to be what is called the sea level, or mean tide. The datum for Washington and Alexandria is the mean tide level at the respective places minus the height due to the flow current of the Potomac from Washington to the sea. Thus, the requirements of barometric observations all over the United States shall also be accompanied with the height of the barometer above the sea, when the correction is readily made.

(27) Dr. J. C. H. asks: What would probably be the greatest lifting power of a permanent magnet one inch square at ends, and six inches long? A. The lifting power of the magnet depends entirely upon its construction and the material of which it is made. A compound magnet formed of a number of magnets will lift more than a magnet containing the same amount of material in a single bar. The lifting power of a magnet is inversely proportional to the square of the distance. A good compound permanent magnet six inches long should lift twenty pounds.

(28) L. W. D. asks: 1. What would be the cost of deep sea sailing vessels and ships (iron built) of say 1,000, 1,500, and 2,000 tons burden? A. From $80 to $95 per ton, carpenter's tonnage, completely rigged, sails bent, and all outfits ready to receive cargo. 2. Would ink made of galnuts, green vitriol, and gum senegal spoil by freezing? A. We do not think that the ink would be seriously affected by freezing. The following, however, is the formula of an ink that will not freeze: Aniline black, 1 drachm; rub with a mixture of concentrated hydrochloric acid, 1 drachm; pure alcohol, 10 ounces. The deep blue solution obtained is diluted with a hot solution of concentrated glycerine, 1½ drachms, in water, 4 ounces.

(29) W. C. McC.—1. Artificial marble can be made by soaking plaster of Paris in a solution of alum; bake it in an oven, and then grind it to a powder. In using mix it with water, and to produce the clouds and veins, stir in any dry color you wish. This will become very hard and susceptible of a high polish. The process of artificially coloring marbles is too lengthy to be reproduced here, and we refer you to Spons' Workshop Receipts, 1st series, page 391 *et seq.*, where the details are fully given. 2. Extract of vanilla: cut one ounce vanilla into small pieces, and triturate with two ounces sugar to a coarse powder; put it into a percolator, pour on it diluted alcohol until one pint has run through, then mix with one pint sirup. 3. Extract of lemon is prepared by exposing four ounces of the exterior rind of lemons in the air until partially dry; then bruise in a Wedgwood mortar, add to it two quarts deodorized alcohol of 95°, and agitate until the color is extracted; then add six ounces sweet oil of lemon. If it does not become clear immediately, let it stand for a day or two, agitating occasionally. Then filter.

(30) H. C. A. asks for a good whitewash for fences. A. For one barrel of wash: Take half a bushel white lime, 3 pecks hydraulic cement, 10 lb. umber, 10 lb. ocher, 1 lb. Venetian red, ¼ lb. lamp black. Slake the lime; cut the lamp black with vinegar; mix well together; add the cement, and fill the barrel with water. Let it stand 12 hours before using, and stir frequently while putting it on.

(31) H. B. L.—Recipe for marine glue: Try either of the following: 1. Dissolve by heat 1 part of pure India rubber in naphtha; when melted add two parts shellac; melt until mixed. Pour while hot on metal plates to cool; when required to use, melt and apply with a brush. 2. Caoutchouc, 20 grains; chloroform, 2 fluid ounces; dissolve, and add 4 drachms of powdered mastic; let it macerate for a week; must be kept cool and well corked. We do not know of any one who has marine glue already prepared for sale.

(32) W. H. S. asks for the formula for making paste blacking, the same as Bartletts and Miller manufacture. A. We are not familiar with the special preparations mentioned, but an excellent formula for a blacking is given in answer to query 5, in SCIENTIFIC AMERICAN of March 3, 1882. 2. Formula for a shoe dressing for ladies' kid boots, the same as is manufactured so largely in the United States. A. For the dressing, take ¾ pint alcohol; 5 pints white wine; ½ pound powdered gum senegal; 6 ounces loaf sugar; 2 ounces powdered galls; 4 ounces iron sulphate. Dissolve the sugar and gum in the wine. When dissolved, strain, then put it on a slow fire, being careful not to let it boil. In this state add the galls, iron sulphate, and the alcohol, stirring it well for five minutes. Then remove from the fire, and, when nearly cool, strain through flannel, and bottle for use.

(33) W. L.—Gun barrels are made blue by applying nitric acid and allowing it to eat into the iron a little; then the latter will be covered with a thin film of oxide. Clean the barrel, oil, and varnish. See also article on Bronze Powder and Bronzing, page 229 of SCIENTIFIC AMERICAN, for April 14, 1883.

(34) C. R.—The best method of preparing "Purple of Cassius" is as follows: Two solutions of tin are required. The first consists of a neutral solution of one part of tin in nitric acid. The second is made by dissolving two parts tin in a mixture of one part hydrochloric acid with three parts nitric acid. A little heat may be cautiously applied toward the end of this process, to prevent any protoxide of tin from remaining in the solution. Next dissolve seven parts of gold in an aqua regia composed of six parts hydrochloric acid, and one part nitric acid, and mix the solution at once with 3,500 parts water; then add the whole of the second tin solution, subsequently by degrees the first tin solution, ceasing the moment the right color is obtained. Its preparation is one of great nicety, and is liable to fail even in the hands of the most experienced. Too little will produce a violet color, too much a brown. Wash the precipitate very quickly, and dry. Stannic chloride is tin perchloride ($SnCl_4$); the stannous chloride is the protochloride ($SnCl_2$).

(35) C. K.—Zinc is cleaned by being passed through a boiling solution of caustic lye, without remaining too long in it, because it may be corroded, and even dissolved; after rinsing it is plunged for a few minutes into water containing from one-tenth to one-twentieth of sulphuric acid, then rinsed in plenty of warm water, and, when necessary, brushed with a stiff brush and pumice stone dust, or scratch brushed.

(36) I. T. E. asks (1) how he can dissolve India rubber for casting rubber stamps from plaster of Paris moulds. A. Rubber can be dissolved in carbon disulphide, benzine, or chloroform, or perhaps best of all in a mixture of methylated ether and petroleum spirit. 2. How is it dissolved, and what kind of rubber is used, and what kind is cheapest? A. Use vulcanized rubber.

(37) J. V. S. asks: 1. What is the rule for finding the proper size and number of square feet of a condenser for a steam engine, both surface and jet? A. The usual proportion for surface condensers is about three-fourths the heating surface of the boiler. Many engineers make it equal or nearly equal to the heating surface of boiler. The capacity of a jet condenser is not a fixed quantity; usually from one-half to three-fourths contents of cylinder. 2. Can you give a recipe for making genuine Farina cologne water, and the so-called Florida water? A. The following is given as Farina's receipt: Dissolve 2 ounces by weight purified benzoin, 4 ounces oil of lavender, and 2 ounces oil of rosemary, in 9 gallons 95 per cent fine cologne spirits. To this solution add successively 10½ ounces each of the oils of neroli, nerolipetit grain, and lemon; 20½ ounces each of the oils of sweet orange peel, limes, and bergamot, together with tincture of rose geranium flowers sufficient to suit the taste. Macerate for some weeks, then fill into flasks. Florida water is prepared by dissolving in half a gallon 90 per cent alcohol 1 ounce each oil of lavender, oil of bergamot, and oil of lemon, and oil of cloves and cinnamon 1 drachm each; add 1 gallon water, and filter.

(38) H. H. asks where he can buy, or what are the ingredients used in preparing a cement or paste suitable for pasting satin on to felt. A. We think either of the following will accomplish your desires: 1. Carbon bisulphide, 4 ounces; India rubber in fine shreds, 1 ounce; isinglass, 2 drachms; gutta percha, ½ ounce; dissolve. The parts must be thinly coated with the solution, which is then left for a few minutes to dry, and finally brought together and pressed out by means of a hot iron. 2. Make a mixture of 2¼ pounds of wheat flour, 2 tablespoonfuls powdered resin, and same amount of fine alum. Add water, and rub to a uniform paste, then transfer to a kettle, heat over fire, and stir until perfectly homogeneous, without lumps. This paste is applied in thin layers over the substances to be united, and pressed with a hot iron.

(39) W. D. S. asks: Is there an instrument made as a guide for the filing of small saws? A. There is no instrument to gauge the filing of a saw; it is the work of skill and judgment. 2. Can a saw be retempered and straightened when it is drawn by heat? A. A saw can be as readily retempered as originally tempered, and be straightened in the usual way, by hammering on the anvil.

(40) W. P. asks: 1. What sort of glass should be used in the construction of the Holtz machine described in SUPPLEMENT, No. 279? Would common window glass do? A. Yes. 2. Would it affect an electro magnet if the iron core itself were made part of the circuit? A. No. 3. How much wire should there be in the secondary coil of an inductorium, which would give one-quarter inch spark? A. It depends on the construction of the coil; try about 200 feet of No. 36. 4. Is gasoline as good as coal gas to burn in a Bunsen burner? Are not the heating effects about the same? A. About the same.

(41) A. M. W. asks: 1. Will an induction coil work an incandescent lamp? A. A very large coil will work an incandescent lamp. 2. If so, how large a coil would it require to work an incandescent lamp of 16 candle power? Please give dimensions of coil required, size of core, diameter of coil, length of coil, size of wire of primary coil, size of wire of secondary coil. How many cells of carbon battery would it take

to operate above coil, the size of plates being 5x7 inches? A. We do not know that this point has been determined. 3. Would two carbons and one zinc in a battery give better results than a pair, and what should be the thickness of each? A. Two carbons and one zinc are better than one carbon and one zinc; one-fourth of an inch is a good thickness for each. 4. How is the length of a spark of an induction coil measured? A. The length of a spark of an induction coil is the distance between the points from which the discharge takes place.

(42) J. H. asks if a building roofed with iron is any more liable to be struck by lightning than one built of wood. A. An iron roofed building is no more likely to be struck than one of wood. The iron roofed building is the safer if struck; especially so if the roof is well connected with the earth by rods.

(43) G. J. S. asks if lightning would be carried into a house by a copper wire soldered to a copper lightning rod a few feet above ground, so as to form a ground connection for the telephone described in SUPPLEMENT, No 142? A. If the ground to your lightning rod is insufficient, the lightning would probably follow the wire into the house, provided it could find better ground thatway. 2. Would an acoustic telephone work better with brass than with copper wire? A. A light twisted wire cable is said to be the best conductor for the acoustic telephone.

(44) J. W. B. writes: Suppose an endless iron chain should be revolved through a longitudinal helix, charged with electricity from a galvanic battery, would I meet with as much resistance in revolving the chain either way as I would in extracting a straight bar magnet suspended within the same helix? A. The resistance will be less than that of the magnet, but it would still be considerable.

(45) J. M. K.—We do not recognize the kalamein process. If you refer to carbonizing the surface of iron, we think it compares favorably with galvanizing.

(46) H. E.—Electric light carbons will answer for telephone transmitters. The French is the best. Polish the carbons by rubbing them on the finest French emery paper.

(47) J. R. F. asks how he can find the prices for which some of the principal American patents on dynamo electric machines and arc lamp regulators have been sold. A. We know of no means of getting at the prices of dynamo patents. The sum mentioned in the assignments is generally nominal. The real price is a secret.

(48) J. R. W. asks: 1. Is there a self-closing telegraph key in successful operation? If there is, can you give a description of it? A. We are unable to find any self-closing telegraph keys in actual use. 2. Would a key of this kind be of any value if a success? A. It would depend somewhat on the manner in which it operates. We could not tell without seeing a sketch or description of it.

(49) L. C. B. asks what to line silver and nickel plating tanks with, so they will not leak—something that will last? A. Coat the inside with good asphaltum, applied in the melted state. See article on Electro Metallurgy, SCIENTIFIC AMERICAN SUPPLEMENT No. 310.

(50) W. A. R. asks: Why is it that with a steam fire engine you can create a greater pressure in the air chambers than the pressure of steam which is in the boiler? It is a piston engine, with the steam cylinder on one end of the piston, and a plunger pump on the other. And yet 80 pounds steam pressure will work up 150 pounds water pressure. A. Because the steam piston has a larger diameter than the water piston.

(51) W. M.—The method of removing superfluous hair by electrolysis is described accurately in Duhring's Diseases of the Skin, 3d edition, page 425. Dr. J. Magee Finny, of Dublin, has been very successful in using this method.

(52) C. C. B. asks: What causes the report on firing a gun? In a controversy on the point, a man in this shop claimed that it was caused by the air rushing back into the barrel of the gun, and was not made till the air reached the breech on its return. I maintained that the outrush of gas dealt the outside air a blow, projecting the sound waves in advance of it, and that the air did not rush back into the barrel at all, as the barrel is already full of the gas caused by the combustion of the powder, and a comparatively slow change of place, or endosmose and exosmose, takes place between the gas and the outside air. A. It is the blow of the explosion on the air. Your views are correct.

(53) J. W. asks: 1. Does it make any difference as to the amount of wire you use for the secondary coil of an induction coil to obtain a spark? How much battery power for one three inches long? A. Up to a certain limit the more fine wire you use the better; but when the wire of the secondary coil is too far removed from the influence of the primary and its core, the wire becomes useless. One cell of Grenet battery should be sufficient to operate a coil of the size given. 2. Is it necessary to have a commutator for a dynamo machine? A. We know or no practical dynamos that operate without a commutator.

(54) H. D. writes, asking for a little information in regard to lining up a propeller engine shaft; some of us here differ in regard to the right way of finding this out. A. If you know that the cylinder is in line, draw a line through it and down past the shaft; by traveling the crank pin to the upper and lower center, you can see if is true to the line of the cylinder; then to test it at half stroke, draw a line at right angles to the general fore and aft center line, and travel the pin to it.

(55) J. R. J. writes: I wish to make a soft porous paper one-sixteenth inch thick as fireproof as possible, and also make it as hard as possible without destroying porosity. What chemicals or ingredients can be combined, and what proportions, to accomplish my object? A. Paper can be made fireproof by dipping it in a solution of alum and then drying. Newspapers are rendered fireproof by dipping into a solution of soluble glass of 25° Baume, then neutralizing by diluted hydrochloric acid of 10° B. while hot, and drying in the atmosphere. Fireproof paper is generally made by using fireproof materials, such as asbestos. See also SCIENTIFIC AMERICAN for November 10, 1883, and *Journal of Society of Arts*, vol. xxxi., pages 880—96.

(56) C. W. asks whether it makes any difference if the layers of wire used in the primary coil of the "Little Giant Battery" are not wound tightly, and the wires of each layer are very close together. He says he has wound one, using 1 ounce No. 38 silk covered wire. Is this is a sufficient amount to use? A. We do not recognize the "Little Giant Battery" by name. The wires of your coil should be carefully wound. One ounce of No. 38 wire should be sufficient.

(57) H. B. asks (1) how the porcelain that is put into iron kettles is put on. Is a brush used, and then is it put into a kiln and baked? A. Iron ware is enameled with porcelain by first cleaning the surface free from moulding sand, then heating the articles in an oven to a low red in the dark, or what is called a black heat, to slightly oxidize the surface and free it from grease. Then brush the powdered enamel mixed with water, and dry quickly. Then bake with a red heat. 2. How is the porcelain mixed? Is it a powder, and mixed with water or some other liquid? Please inform me how to make the liquid or composition. Also where I can get the porcelain. A. For the second or finishing coat, brush on the glaze coat and treat as the first. For the first coat make a mixture of 66 parts calcined flint ground to a powder, 34 parts borax. Melt these together and pulverize, then add 12 parts potter's clay. Mix the whole with water to the consistency of paint, and apply as above. For the glaze coat take 15 parts borax, 73 parts powdered glass, 12 parts soda. Mix and melt, then pulverize and apply with water. Bake at a red heat.

(58) F. A. L.—The oil of bergamot is obtained from the fruit rind of *Citrus bergamia*, and is extracted by expression. The oil of Portugal is similarly obtained from the rind of the sweet orange, and the oil of canella is procured from the aqueous distillation of the *Canella alba*. Opium is the juice obtained by cutting the unripe rind of the white poppy, and hardened by exposure to the air.

(59) W. P. W.—The following is the formula for Batchelor's Hair Dye: No. 1. To 1 ounce pyrogallic acid dissolved in 1 ounce alcohol add 1 quart soft water. No. 2. To 1 ounce nitrate of silver, dissolved in 1 ounce of concentrated ammonia, add 4 ounces of soft water. Apply each number alternately with separate brushes. The nitrate of silver is worth $1.25 per ounce, and the pyrogallic acid 50 cents per ounce. The remaining ingredients are inexpensive.

(60) D. G. asks: Can canvas be made fireproof, that is, to a certain extent, so it will not ignite from sparks from a boiler used at a portable saw mill? A. A coating of soluble glass will answer, provided it is not exposed so as to be washed off by rain, etc. SCIENTIFIC AMERICAN SUPPLEMENT, No. 245, gives a number of recipes for the purpose of rendering fabrics fireproof.

(61) J. R. M.—For mahogany staining make a madder containing ½ pound of madder, 2 ounces logwood chips boiled in a gallon of water; brush this over the wood while hot; when dry go over this with a solution of pearl ash, 2 drachms to 1 quart of water; size, and polish. The wood is then carefully washed, dried, and polished in the usual manner. The above or in fact any desired stain can be placed outside the rug. A figured border can be put on by means of a stencil, that is, staining or the reverse such parts as are not protected by the plate.

(62) S. O. asks for a good varnish or polish for pianos or finish on furniture. A. Try the following: Put in a bottle 2 ounces gum sandarac, 1 ounce shellac, ½ ounce gum benganium, 1 ounce Venice turpentine, and a pint spirits of wine. Color red with dragon's blood or yellow with saffron. Stand in a warm place till gum dissolves, then strain for use.

(63) D. W. De S. asks for a receipt for sheeting and preparing wax for flowers. A. Wax that is used for modeling is generally the white variety, which is melted and mixed with lard to make it malleable. In working it the tools and the board or stone are moistened with water to prevent its adhering; it may be colored to any desired tint with dry color. To make it into sheets it may be run into suitable moulds.

(64) D. W. W. asks (1) if a dynamo electric machine is not an equivalent of a galvanic battery as electric generator for medical and surgical puposes. A. The current from the dynamo electro machine is substantially the same as that produced by a battery. 2. Cannot one man furnish the power with a dynamo constructed for the purpose, to bring the usual cauterizing electrodes to a white heat? A. It would require rather more than one man power to bring the cauterizing electrode to a white heat. 3. Would not the same dynamo operate a faradic coil with an automatic current breaker precisely as a battery does? A. Yes. 4. What percentage of corn is starch? A. The average quantity in flat American maize is 50½ per cent. In the flat white and yellow varieties 54¾ per cent is obtained. Indian corn contains 67·55 per cent of starch. 5. What proportion of the stock does a distiller succeed in converting, or how much starch remains unconverted? A. The amount distilled is limited only by the quality of the apparatus and perfectness of the method employed. 6. What is the reason for part of the starch remaining unconverted, or what stands in the way of total conversion? A. Theoretically, there is no reason why the entire amount of starch should not be converted, but practically there is always means of loss which cannot be avoided.

(65) J. E. asks: 1. What is the difference between a low pressure and a high pressure boiler? A. The old distinction was that in the low pressure engine the steam was exhausted into a condenser, and in a high pressure engine exhausted into the atmosphere. In the former the pressure of steam was usually from 25 to 40 pounds, and in the latter from 60 to 100 pounds; but the distinction of the two is of late years being worked out, as we have engines working under 80 to 100 pounds pressure which exhaust into a condenser. 2. Also for a work in that line. A. We would recommend to you Roper's Engineer's Handy Book, Haswell's Engineer's Pocket Book, and Perry's Elementary Treatise on Steam.

(66) O. Z. writes: 1. I have made an induction coil according to directions given in one of your SUPPLEMENTS, but instead of using the naked copper wire for the secondary coil. What is the cause? A. Possibly your wire is broken or short circuited. 2. I have constructed a battery on the Grenet principle; but it worked for about two hours, then it failed. A. A Grenet battery is not adapted to continued use. It runs down in a short time. 3. How much battery power would be required to work a small electric light (arc light carbons a quarter of an inch, and incandescent lamp of small size)? A. 20 to 25 cells of Bunsen battery will operate a small arc light. It requires from 40 to 60 cells to run an incandescent lamp.

(67) G. A. W. asks: Which is the strongest (that is, support the greatest weight)—a six inch solid iron column, or a six inch hollow column two inches thick? The length of the columns immaterial. A. The solid cylinder will sustain the greater load.

(68) J. D. B. asks: 1. With what velocity does air move to fill the vacuum created by the passage of lightning? And how fast would it move in a tube previously exhausted? A. The theoretical velocity of air flowing into a vacuum is 1347·4 feet per second. Into an exhaust tube it would flow with about 0·7 of the above velocity. 2. What is the best rule to determine the speed of vessels propelled against or from a current? A. For obtaining the actual speed of a boat in a current, add the velocity of the current to the shore rate when running against the current. Subtract the velocity of the current from the shore rate when running with the current. 3. What degree of heat would friction of the air cause on a smooth surface moving at the rate of 600 feet per second? A. We have no data as to the amount.

(69) W. O. M. asks: 1. Will wood expand by heat? A. We doubt if there is any practical expansion of wood by heat. 2. If water is running over wood, will the wood soak in any of the water? A. Yes.

(70) G. L. F.—For copper dipping solutions use 3½ ounces sulphate of copper, 3½ ounces sulphuric acid, 2 gallons of water. Dip no longer than to obtain a thin coat of copper. If left too long in the dip, the copper will be spongy and muddy, and will rub off. Another plan is to tumble the small work in saw dust wet with the above solution.

(71) E. L. D. asks: What metal will stand the most degrees of heat, and how many degrees it is? A. Platinum has a melting point of 2,600° Centigrade, or 3,080° Fahrenheit. The melting point of iridium may be slightly higher, but practically platinum is the highest-melting element.

(72) J. M.—The great trouble in hardening mill picks, especially the solid picks, arises from unequal heating. More picks are destroyed by overheating the corners than by anything in the nature of the hardening or the bath that they are hardened in. The lowest heat that will harden, in clear water with a little salt in it, is all that is needed. Never plunge the point into the fire, but heat from the eye. Leave the point in the cool part of the fire until the body is hot. If the hardening is well done, the pick should stand well with very little drawing of temper—only to a straw color.

(73) E. F. B. writes: In your SUPPLEMENT No. 425, page 6783, Feb. 23, 1884, is a cut of an incubator heated by electricity. Please tell me if the application is patented; if not, where can a thermometer be obtained with a cut-off attachment? A. The electrical incubator illustrated in the SUPPLEMENT is a German patent. We could not inform you whether it was patented in this country or not without making a search. For further information on incubators, etc., address Perfect Hatching Co., Elmira, N. Y.; A. M. Halstead, Rye, N. Y.

(74) G. V. A.—For gilt lettering upon wood print the letters upon the wood with yellow ink. Then brush gold bronze powder upon the printed work with a fur brush. The bronze will stick to the ink. Hard wood is more difficult to print upon than soft, and may require type of harder metal than ordinary. You may try it with printing type. You can get the yellow ink from a printer, and the gold bronze from a painter.

(75) S. G.—We fear that your photographic lens is of too short focus for a telescope. An object glass of the diameter that you name should be about 3 feet focus. If the lens is achromatic, it will make a very fair telescope if only 2 feet focus. For eye pieces, you will see a full description in SCIENTIFIC AMERICAN SUPPLEMENT No. 399.

(76) E. L. K.—The mounting of a parchment diploma may be done in the same manner as pictures or map work. Upon a clean sheet of paper lay the diploma face down upon a flat table; brush good, clear paste over the back evenly. Upon this lay a piece of thin white muslin a little larger than the parchment. Smooth the muslin down with the hand, and cover with one or two thicknesses of thick wool cloth or a blanket, and press with a flat board and a weight; let it dry over night, then trim the edge for framing.

(77) J. C. H. asks: 1. The number of cubic feet a ton of anthracite coal, chestnut size, should measure? A. For Lehigh coal, 40 cubic feet to a gross ton. For Lackawanna coals 42 to 45 cubic feet per ton. This is for egg size. Add 5 per cent for chestnut. 2. Is there any cheaper material with which ground or flocculent asbestos can be mixed and fashioned into sheets of a firm and stiff consistency, which will form a waterproof composition? And if so, and tanks of the same be made, what substance should be used to cement the laps at the corners? A. Asphalt melted with the asbestos, or shellac varnish makes good waterproof material, as is also paraffine. The first is the cheapest, and will probably give satisfaction.

(78) F. M. writes: I am troubled with using well water, and it is very salty; is there no remedy to make the water soft like rain water? A. We know of no remedy for well water that has salt in it. Water that is hard from lime may be made soft for washing purposes by soda, borax, or ammonia. Such water is not suitable for drinking. If you wish to obtain pure water for drinking, you can make a simple still and condenser. Blow air through the condensed water to make it palatable.

(79) M. L. W.—The stenograph or short hand reporting machine is a French invention, and may have been made in the United States. It has a telegraphic alphabet. Is described in Knight's "Mecbanical Dictionary," article "Stenographic Machine." Also back numbers of SCIENTIFIC AMERICAN SUPPLEMENT.

(80) R. H. L. asks where the most strain would come on the steel spokes of an expert Columbia bicycle, above or below the heel?—supposing the rider weighed about 150 pounds, and it being a 54 inch machine—and where when it was without rider? A. The greatest strain or tension upon the wire spokes will be in the same position whether the machine loaded or not, and is supposed to be at an angle of about 25° from the point of contact with the ground.

(81) R. H. K. asks: 1. How he can loosen the shutters on outside blinds without taking the whole thing to pieces? They have been stuck by paint, I suppose. A. If the paint cannot be cut out with a knife, you can take off the whole of the paint with strong potash. We think the only proper way is to take the shutters apart and ream out the holes, and scrape off the excess of paint from the leaves. 2. Also how to prevent a botany box from rusting? A. Clean your botany box thoroughly and paint with Prince's metallic paint and boiled linseed oil, and dry in the sun.

(82) W. J. A. writes: I have heard of a chemical or paint works in New York, in which not one of the employes (it is said) has died of consumption during a space of 25 years; it is also stated that persons going there to work afflicted with lung diseases have been completely cured. A. One of the oldest and largest paint manufacturers in New York thinks he heard some such report as you mention, years ago, about curative effect of work in paint and chemical establishments. He says it was obviously untrue so far as paint business was concerned, and it seemed to him, as it does to us, ridiculous as to chemical works, as it certainly would be if said in regard to white lead, zinc white, sulphuric acid, etc.

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

T. C.—It is impossible for us to give information relative to ingredients of an iron ore, unless it be submitted to chemical analysis. The expense of such an examination would be about $15.00. From the appearance of the specimen received, we would hardly recommend you to have it analyzed.—A. M. F.—The sample is pyrite (iron sulphide) of no apparent value. —R. T. B.—No. 1 is a close grained silicious rock. No. 2 consists essentially of hornblende and mica. The specimens have no value for economic purposes as far as their metallic ingredients are concerned.—J. T. C.—The specimen is pyrite (iron sulphide) of no economic value except in the manufacture of sulphuric acid.—V. W. P.—The specimen is pyrite (iron sulphide). It may carry gold, and an assay costing $5.00 will be necessary to determine the value, if any.—B. A. B.—The specimen is known mineralogically as chalcopyrite. It is a mixture of copper and iron sulphides, and sometimes carries gold.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

May 13, 1884,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Alloys for safes, metallic, J. Farrel 298,365
Animal trap, P. R. Erling 298,361
Anvil, C. Fisher 298,567
Axle box, car, M. R. Carey 298,552
Bale tie, A. E. Russell 298,410
Bale tie, J. White 298,645
Band tucker, W. M. Kealen 298,389
Barrel trussing machine, J. Reid (r) 10,479
Bathing cabinet, folding, R. A. Horning 298,585
Beer and other alcoholic liquors, apparatus for preserving, C. E. Haynes 298,578
Bench dog, R. Doty 298,560
Billiard and pool bridge, G. Borst 298,342
Billiard table time register, E. B. Pope 298,402
Bit brace, C. H. Amidon 298,542
Black leading machine, G. E. Lloyd 298,595
Blast furnace bell and hopper mechanism, F. W. Gordon 298,370
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Blocks, stones, etc., making artificial, L. Rosenthal 298,505
Blower, rotary, J. L. Newman 298,492
Board. See Ironing board.
Boat. See Dumping boat.
Bobbin winder, G. W. Clapp 298,554
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