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Notes & Queries

W. T. R. will find directions for purifying mercury on p. 131, vol, 30.—T. T. L. should consult a lapidary.—W. T. C. can waterproof his cloth by the process described on p. 347, vol. 31.—M. A. S. can utilize old rubber by the process detailed on p. 349, vol. 26.—W.J. will find directions for bronzing on pp. 11, 85, vol. 33.—E. J. K. should use marine glue. See p. 42, vol. 32.—McG. B. can cement pieces of marble together with plaster of Paris.—W. W. can dye his billiard balls red by the process given on p. 362, vol. 30.—W. T. B. will find an answer to his query as to church ventilation on p. 356, vol. 29.—R. M. C. will find on p. 74, vol. 31, particulars of the lifting power of hydrogen.—H. H. S. can mold rubber by the process given on p. 363, vol. 30.—L. R.'s trouble with the wind wheel is an optical delusion.—W. F. D. W. can anneal his lamp chimneys by the process given on p. 42, vol. 26.—J. G. G. will find a description of the compression engine on p. 66, vol. 34.—L. H. E. will find an answer to his query as to a cannon on a moving car on p. 273, vol. 32.—W. L. G. can unite glass with brass with the cement described on p. 117, vol. 32.—A. S. can paste paper labels on tin with the preparation described on p. 26, vol, 34.—C. D. T. can bleach straw hats by the process given on p. 11, vol. 32.—C. H R will find a full description of felting processes on p. 50, vol. 34.—D. J. I. will find a description of the tallest chimney in the world on p. 311, vol. 32.—W. C R. will find directions for making furniture polish on p. 315, vol. 30.—C. L. B. will find directions for renovating gilt picture frames on p. 27, vol. 31.—F. W K. will find directions for hardening tallow on p. 202, vol. 24.—H. B. L. can remove inkstains from marble by the process described on p. 58, vol. 30.—G. A. R. will find the table of weights of iron castings in proportion to those of wooden patterns in *Wrinkles and Recipes*.—J. W. C. should consult an oculist.—A. M. M. will find an article as to pressure on slide valves on p. 299, vol. 31.—E. N. C. will find a description of a small furnace for melting brass and iron on p. 235, vol. 32.—M. C. will find directions for making a battery for electrotyping on p. 26, vol. 32.—G. M., Jr., will find on p. 75, vol. 34, a recipe for *eau de Cologne*.—H. B. P., A. S., D. K. H., R. J. W., C. A. S, W. W., W. S., J. D. H., J. B B., J.G., and others, who ask us to recommend books on industrial and scientific subjects, should address the booksellers who advertise in our columns, all of whom are trustworthy firms, for catalogues.

(1) G. W. A. says: I am about to put a flag pole on top of our store, and I am somewhat fearful of lightning striking the pole. How shall I arrange it? A. If you have a good lightning rod on the house, provide the pole with a good sized copper wire and connect the latter to the rod.

(2) H. W. G. asks: 1. Can I deposit aluminum or wrought iron by the electro process? A. It is difficult to do Several processes have been published, but they do not appear to be of any practical value. 2. Can I coat wrought iron with the aluminum by melting and dipping, as with zinc? A. We believe this has never yet been successfully accomplished.

(3) X. Y. Z.—You do not furnish sufficient data to have your question answered with any degree of accuracy. To what use is the flow to be put? How thick are the walls that are to support it? If for warehouse purposes, how high is the story to be for which this is to serve as a flow?

(4) J. W. asks: 1. How can I make one of the ink wheels used on printing telegraph instruments? A. Cut circles of beaver cloth, and place them together until the required thickness is obtained. Fasten with a small bolt and nut. 2. How is the ink put in the wheel? A. The wheels are thoroughly saturated with ink at first, and a little added daily while the wheel revolves.

(5) D. A. W. says: You recently described an electric pile in sesquioxide of iron, having one pole formed of a prism of charcoal, containing sesquioxide of iron in its pores. Is the prism composed of common charcoal, and how is the sesquioxide of iron placed in its pores? A. Charcoal or carbon will answer. Try soaking the carbon in an aqueous solution of the sesquioxide.

(6) C. M. B. asks: 1. In constructing a battery, how must I connect the wire to the disk of zinc? A. By solder. 2. How must I connect the insulated wire to the coil of copper wire, and also to the wire leading from the zinc of the next cell? A. The insulated wire may be connected to the wire coil by solder or by twisting the two ends together. It is usual and more convenient to employ binding screws for connecting one cell with another. 3. What is the most readily obtainable form of insulated wire that I can substitute for the gutta percha covered? A. Gutta percha or kerite is the best covering.

(7) E. B. K. says: I am desirous of constructing an electric light sufficient to illuminate a medium sized room. How many cells of Daniell's battery will it require? A. If a steady light is desired, it will be useless to operate without an electric lamp, and this, as usually made, is a costly apparatus. Forty or fifty large sized cells, of the form commonly called the tray battery, will give a good light.

(8) T. M. B. says: 1. I wish to build a small telegraph from one room to another. How can I soften ordinary round iron for the poles? A. It is not absolutely necessary to soften them, but you can do so by heating them red hot and allowing the fire to die out very slowly while they remain in it. 2. How shall I connect them, and what should they be wrapped with? A. Connect by means of a piece of soft iron, and wrap with copper wire covered with silk or cotton. 3. Please give me full directions for making a small sulphate of copper battery. A. See answer to E. M. C. on this page. 4. How many cells shall I need, and how shall I connect the battery with the poles? A. Four or five cells should be sufficient. Connect the zinc of one cell to the copper of the next in order; join the copper of the first cell to one end of the line and the zinc of the last to the other. Insert the coils of the magnets in the line circuit, so that the current shall traverse their whole length.

(9) G. A. T. says: I made a small induction coil for lighting a gas jet. Instead of putting my iron wires in a bundle in the center of the primary coil, I reversed them, putting the wires outside and surrounding the primary and next to the secondary coil. It works admirably. Has it ever been tried on large coils? A. We believe so; at any rate the idea is not new.

(10) E. M. C. says: 1. How can I make a battery for running a magnetic engine? A. A good form of sulphate of copper battery can be made thus: Fill a large jar about two thirds full with water in which about ¼ lb. zinc sulphate has been dissolved. Place a disk of copper, to which a gutta percha covered wire has been soldered, at the bottom of the jar; suspend a zinc casting or plate from the top, and drop a few crystals of copper sulphate on the copper disk. A wire from the zinc and one from the copper form the poles. The plates should expose considerable extent of surface if large wire is used for the machine. 2. What is the best form of such an engine? A. One of the easiest to construct consists of two electro-magnets, between which a piece of soft iron mounted on an upright is made to vibrate. The upright may be suspended or supported on an axis below. It also carries an attachment by means of which the current is shifted from one magnet to the other as it vibrates to and fro. The magnets are thus charged alternately, beginning with the most distant from the soft iron. Expensive machinery is not required for the construction of such an engine.

(11) F. L. H. says: I have a small electrical instrument known as a vibrating shocker. Will such an instrument give a current with Bunsen's cells, strong enough to decompose water? If so, how many cells will be required? A. Such an instrument, with a single cell, will probably decompose water, but we fear the quantity of the current is so small that the process would be a slow one.

(12) M. A. W. says: 1. In a plate electric machine, how large in diameter should the plate of glass be, and how thick? A. The plates are made of various sizes. One of 12 or 15 inches in diameter, and ⅛ or thereabouts in thickness, will be found easy to manage. 2. What would be best to make the cushions of? A. Make them of leather and stuff with horsehair. 3. Would iron wire $\frac{1}{12}$ inch in diameter do to connect the cushions to the ground? A. Yes. 4. Would an iron rod 1½ inches in diameter do to make the prime conductor of? A. Make the prime conductor of brass or tin tube, about 2½ or 3 inches in diameter, and have the ends rounded. 5. What diameter ought the arms to be, that connect the prime conductor and plate? A. About ¼ inch. 6. Of what metal should the points be? A. Any kind of metal will answer for the collecting points.

(13) E. W. asks: 1. Will a common unglazed earthen cup answer for a porous cup for Bunsen's battery? A. Yes, if not baked too hard. 2. How can I make a piece of wood a non-conductor? A. Soak it in melted paraffin.

(14) P. W. M. says: I read an article in your paper on taking life by electric shocks instead of hanging. I have experimented with a rat. I laid him on a table, and took a coil giving an 18 inch spark. I made connections with his mouth and tail, put on 6 large Grenet cells, and left the current on about 5 minutes, and apparently it did not affect him. I then made the connection through his two ears; this seemed to have killed him; but when I put him in the cage, in 5 minutes he opened his eyes and was as wild as ever. Please explain this. A. We are not in favor of practising cruelty to animals, not even to rats; and we do not wonder that your victim was wild. Had you placed him on a glass or ebonite plate, and arranged the connections so that the full force of the machine should be transmitted through him, we doubt if there would have been any occasion for repeating the experiment with that particular rat.

(15) J. S. asks: 1. What kind of a battery will produce the decomposition of water? A. Two or three ordinary Bunsen cells will answer. The same number of Daniell cells might do, but the action would be much less rapid. 2. How large a battery will cause 9 feet of No. 30 platinum wire to get red hot? A. It will probably require forty cells of Bunsen battery of very low internal resistance.

(16) E. says: 1. have an eight day clock which I am causing to make and break an electric current once every second. What is the proper metal or other substance to use in making the points of contact? How can I make and break the contact infallibly? I want to use the force of the current for lifting when I have the contact made. A. Nothing better than platinum is required for the contact points. If the spark arises from the extra current in the magnet coils, it can be cut off by using a condenser or resistance coil, one terminal of which is to be connected on each side of the break. If a resistance coil is used, it must be adjusted for the particular circuit in which it is to be placed. 2. Is the Hill gravity battery the best? A. Hill's is one of the best forms of the sulphate of copper battery. For light, however, or when strong currents are desired, the form known as the tray battery is better. 3. Is a horseshoe magnet the best form for lifting, and what size of wire will be the best? A. Yes. If the cups are connected in series, the resistance of the wire forming the coils should equal about 12 ohms. 4. How can I produce an electric light to illuminate a circle of 3 feet, to be kept going all night in the most simple and economical manner? A. Perhaps a carbonic acid vacuum tube, as arranged by Gassiot in connection with a small induction coil, would answer. It would certainly be the cheapest. See a description in the "Student's Text Book of Electricity," by Noad.

(17) W. C. A. says: How much wire and of what size will I require for a relay of about 120 ohms resistance? A. Nine ozs. of No. 28 pure copper wire will be about right.

(18) W. E. D. asks: 1. Would 6 pairs of magnets 3 inches long, 1½ diameter, with ¼ inch iron for core, covered with No. 23 or 24 wire and placed at equal distances around a revolving wheel be of good proportion and have sufficient power to run a sewing machine if proper batteries were used? A. Ten or twelve bar magnets so placed would answer; we should, however, prefer larger wire, say No. 20, and use six cells, coupled three in series and two in parallel circuit. 2. How does the Eagles metallic battery compare with the Callaud for strength and durability? A. The electromotive force is the same; as a general thing, however, the Eagles battery gives a stronger current on short circuit, in consequence of its lower resistance. 3. Does an ohm denote a unit of power or resistance? A. An ohm is the unit of electrical resistance. 4. In connecting batteries for quantity or tension, would quantity give more power or strength for lifting weights, etc., and tension greater power for overcoming resistance, as on a telegraph line? A. Yes.

(19) H. H. M. asks: How can I fasten pieces of sponge on to rubber, tin, or glass? A. Melt together in an iron pot equal parts of common pitch and gutta percha, and stir well. Use while hot

(20) W. M. says: 1. Suppose I have a 100 feet weight at the bottom of a stream 20 feet deep. What amount of hydrogen would it require to bring it to the surface? A. If the iron weighs 100 lbs. in the air, it will weigh only about 87 lbs. when immersed in the water. As iron weighs nearly 8 times as much as an equal volume of water, in order to balance 87 lbs. of the iron we shall have to displace about 696 lbs. of water. If we should measure our water we would find that it required about 28 cubic inches of water to weigh 1 lb., and consequently our 696 lbs. of water would measure 19,488 cubic inches, or about 11¼ cubic feet. An equal volume (19,488 cubic inches) of hydrogen will weigh 417 grains, or about the same as 1·65 cubic inches water. We must, therefore, add to the above quantity (19,488 cubic inches) sufficient measure of gas to displace about 2 cubic inches of water. 2. What amount of zinc and sulphuric acid would be required to generate the hydrogen in two minutes? A. Good zinc and strong hydrochloric acid would furnish hydrogen in large quantity and quite rapidly; but so much depends upon the apparatus employed, the purity of the materials used, and the temperature at which the operation takes place, that we can furnish you with no definite figures.

(21) H. P. B. asks: Can eggshells be utilized? A. We do not know that they have ever received any practical application in the arts. If obtainable in large quantities, they might be employed for fertilizing purposes.

(22) J. S. C. says: I send you a piece of a brown stocking which we purchased for a little girl 2½ years old. She soon complained of feeling badly, and was slightly sick at the stomach. Her mother took off the stockings, found her feet and legs discolored, and washed them off, and put on other stockings, when she felt better. I should not have thought so much about it, but I have heard of a case of decided poisoning from brown stockings, which had been colored with picric acid. A. The specimen seems to have been dyed with one of the aniline colors. If you will send us a larger piece of the material, we shall be happy to give the substance a chemical examination.

(23) B. C. Jr. says: I want a dye for coloring pine wood green, of a shade like that of trees and plants. A. To 3 pints of strong vinegar add 4 ozs. best verdigris, ground fine, ½ oz. sap green, and ½ oz. indigo. Boil the wood in this for several hours.

(24) R. L. L. asks: 1. How can I make a good waterproof boot grease? A. Take ½ lb. of shoemaker's dubbing, ½ pint linseed oil, ½ pint strong solution of india rubber. Dissolve the whole with a gentle heat (it is very inflammable), and apply with an ordinary blacking brush. One application will insure dry feet for several months.

Of what substances and in what proportions is the camphor barometer made? A. See p. 230, vol. 33.

(25) W. T. asks: If an apparatus made from $\frac{1}{16}$ inch sheet iron be galvanized in every part after completion, will it have a tendency to corrode or rust if worked in either hot or cold water? A. Provided the water is pure, and the iron well galvanized, there should be no appreciable corrosion.

(26) J. D. J. asks: How can I make a phosphorus lamp that will work? A. If a strong solution of clear (not red) phosphorus be made in any of the essential oils, and a thin film of the solution be exposed to the air in a dark room, a strong phosphorescent glow will be observed. Advantage has been taken of this slow but luminous oxidation of phosphorus to construct numerous toys

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one of which is aptly termed the phantom lamp. It is commonly a strong solution of phosphorus in olive oil, half filling a small phial having a wide mouth for the admission of air when in use. A better plan is to have a piece of porous earthenware (biscuit) fastened to the lower portion of the stopper and dipping beneath the oil; and when it is desired to use the lamp, the stopper (cork) is reversed, when the whole surface will glow quite strongly with the characteristic phantom light.

(27) C. A. J.—Send us your address; we will be happy to accommodate you as to the Stevens Institute.

(28) B. H. S. asks: Would it be dangerous or unhealthy to sleep in a new bedstead painted with Paris green and varnished over? A. If the wood has been well varnished, we think not; but if the bed has not already been painted, we would advise you to employ some other variety of pigment, that does not contain arsenic.

(29) C. H. R.—We are not familiar with the particular gas machine you speak of. You should state concisely what the mode of operating the machine is, or send us illustrations or drawings of the same. Generally speaking, machines of this character, unless constructed and operated with the greatest care, are not safe.

(30) J. McD. asks: 1. What chemical change takes place in milk when it turns sour? A. When milk is allowed to stand for a short time it sours and curdles, that is, its casein changes from the dissolved to the solid state. This is brought about by a series of interesting changes, originating in the unceasing activity of atmospheric oxygen. Casein is insoluble in water, but in the milk it exists combined with soda, and this compound is soluble in water. When fresh milk is exposed to the air, its oxygen seizes upon a portion of its casein and causes it to ferment; this takes effect upon the milk sugar and converts it into lactic acid, which causes the sourness of the milk. 2. How can it be restored and made sweet again? A. When a sufficient quantity of lactic acid is formed, it seizes upon the soda, takes it away from the casein, and forms lactate of soda. The casein thus set free shrinks in bulk, and gathers into an insoluble curdy mass. This precipitated casein may be readily redissolved by the addition of a little soda; the milk, however, although it may still be palatable, will by no means recover its original flavor, owing to the partial decomposition of the milk sugar.

(31) R. E. D. asks: 1. Will a 6 horse engine do to run a circular saw or a good sized corn mill? A. An engine of the size you mention will run a circular saw from 48 to 50 inches in diameter, or your corn mill. 2. How large a sawmill will it run, and how much lumber will it cut per day? A. If your saw is run at the regular speed, say 9,000 feet per minute at the periphery, every ⅛ inch feed to every revolution will cut on an average 1,000 feet of lumber per day; ¼ inch feed will cut 2,000 feet: 6 inserted teeth in the saw will be plenty to saw this amount of good smooth lumber.—J. E. E., of Pa.

(32) W. A. W. asks: Why, if you make the bottom of a cistern concave, will it present a greater resistance to the action of the water than if it were flat? A. In some localities the water in the ground rises to within a few feet of the surface; and in such places, when a cistern is sunk to a good depth, the pressure from beneath on the bottom is considerable. The sides, being built in arched form, can withstand this outside pressure very well, but the bottom, when flat, has no power of resistance except what is given to it by its weight. When the cistern is filled with water the construction is firm enough, but when it becomes empty, as frequently happens, the upward pressure cracks the bottom, and a movement commences which eventually destroys the work. If, in a dry time, the water then lies lower in the ground, the cistern will leak and become useless. The answer referred to said "that, if the bottom were built concave, it would present a greater resistance to the action of the water beneath." We know of one instance, somewhat in point here, where it cost $1,000, spent in experiments, to protect the bottom of a vault from the upward pressure of water coming from a saturated under stratum.

(33) E. A. K. says: In villages it is possible to arrange, for water supply, a tank of boiler iron to receive the rain water from the roofs; but it is difficult to obviate rust, which discolors the water. To procure an easily working and durable faucet is also difficult. Can you help us to solve these difficulties? A. Cast iron tanks do not rust with the rapidity of wrought iron, and always keep tight. If you use what are called compression faucets, you would not be subject to the other annoyances complained of.

(34) S. F. S. asks: Can you give me a recipe for an ink that will be invisible when written, but which can be brought out by heating? A. Use a dilute solution of chloride of cobalt in water.

(35) W. C. asks: 1. When should timber be cut to give best results against rotting? Is it too late now (March) to cut timber here, where there are 2 feet of snow on the ground? A. Yes: it should be done before the sap begins to flow. 2. What is dry rot? In our mill the floors are constantly damp, our ceilings are (between the doors and ceiling) dripping wet from condensed steam that rises from the drying apparatus. One mill built six years ago is so rotten from foundation up that you can push your thumb into the timber. A. The rotting in your case is not dry rot, but decay of the wood from the constant absorption of water from the surface, and the consequent disintegration of the fibers. Dry rot manifests itself in cases where the material is closely encased in iron, brick, cement, etc., so as to be entirely excluded from the preservative influences of the atmosphere, and is most frequently found at the ends of timbers which have been let into a wall or encased in an iron shoe. A prominent instance of the latter occurred where the tie beams of the principal roof trusses of a church were discovered, from a slight settlement, to have been rotted off at the ends, where they were encased in a very large airtight iron shoe. The remedy in your case would seem to be to protect the wood from contact with the water, and at the same time to give it free access to currents of air; there should be sufficient change of air to carry off all the moisture without depositing it upon the surrounding surfaces of the room. 3. Would good sound and dry hemlock or chestnut, buried in hydraulic cement concrete, be proof against decay of any and every kind? A. No.

(36) J. A. asks: How can I build a filter on the side of a stream of water which is subject to sudden rises of from 2 to 8 feet, getting at such times very muddy? A. Several attempts have been made to filter large quantities of water from rivers without success; the filter beds were soon rendered useless by the great amount of filtered material deposited into them. The plan that has been adopted after the failure of the filter beds is that of a reservoir with a central dividing wall. One of the compartments thus formed is periodically filled, the water allowed to settle and then drawn off clear into the other, from which a constant distribution is made. The authorities at Poughkeepsie, N. Y., as also the Hudson River Hospital for the Insane, at the same place, have both passed through this experience.

(37) W. S. C. and others.—Wherever the waste water of a house can be conveyed away by a drain, it should be done, instead of letting it stand in a cesspool or suffering it to settle into the ground. Thirty-six feet of filtering material, as you mention, ought to purify the water as far as it can be satisfactorily done by mechanical and partially chemical means, but not wholly; a drain is better.

(38) J. C. asks: Does galvanizing cast iron tend to weaken the iron? A. We think not.

(39) F. P. asks: 1. Will a shaft or a spindle of a machine that is run at 2,000 revolutions per minute take more power than one run at 4,000 a minute. A. No. 2. Is not the balance wheel of an engine merely to govern the motion of the crank shaft? A. Yes. 3. Will a circular saw spring more from not having any set, or will it spring more from heating of the saw mandrel? A. From not having any set. 4. Is it a good plan to give a saw set enough, so that it does not bind on its sides? A. Yes 5. Is an engine which runs at 150, or one which runs at 200, revolutions a minute more economical? A. Quick piston speeds are the most economical.

(40) S. F. B. asks: What are the comparative lasting qualities of upright tubular boilers and those of locomotive or horizontal tubulars? A. So far as we know, there is not a great deal of difference, if the boilers are well built.

(41) A. W. S. says: I have seen several references to cutting copper and other soft metals by means of a disk of iron running at high speed. We have to cut up a great deal of 2½ inch No. 16 gage seamless copper tubing into short lengths; and using a fine saw, we have considerable trouble with its running. Can we cut it in the former way? A. Yes. Use a disk running about 25,000 feet per minute, of about 10 inches diameter, made of best charcoal iron.

(42) W. F. R. asks: What is meant by the axis of a magnet? A. The straight line joining the poles.

(43) A. J. says: 1. I have a 12 x 20 inches engine which will run two planers, rip saw, and scroll saw, with 20 lbs. steam; yet it takes hard firing under a boiler 42 inches x 18 feet, with two 13 inch flues. The engine runs at 125 revolutions per minute. Would it not be better to speed the engine down? A. Yes, if the engine would still be powerful enough for this duty. 2. How should the valve be set to use steam most economically? A. If a common slide valve, set it to cut off at three fourths of the stroke. 3. What would be the proper shape of the furnace? We have a good draft. A. We cannot say, unless we know the description of your boiler.

(44) L. B. C. & S.—There is probably something wrong in the arrangement of your pipes or valves, as the ram ought to do very well under the given circumstances. We think the wheel you speak of will give plenty of power. It would be better to have a valve in the delivery pipe.

(45) F. W. B. asks: What are the objections to the use of clockwork as a motor, to run a churn? A. The principal objection is the labor required to wind the spring. There are numerous light spring motors in the market, and by corresponding with their manufacturers you can doubtless obtain information about details. It has occurred to us that spring motors, suitable for household operations might be devised, to be wound up by a steam engine at some central locality, and distributed where desired.

(46) T. H. asks: How is the water got to the working barrel of a pump? Is it by suction, or atmospheric pressure? A. By atmospheric pressure. See article on "Suction," p. 352, vol. 31.

(47) W. D. M. asks: The grist mill in this place is driven by a 10 x 16 inches horizontal engine. The exhaust comes out on the under side of cylinder into a 3½ inch tin pipe which runs horizontally for about 8 feet, then turns up 2½ feet, and enters the heater. They are troubled by the tin pipe collapsing. This always has happened when starting the engine. What is the cause? A. The steam condenses in the pipe, so that a vacuum is formed. Attach a vacuum valve on the upper part of the pipe near the place where it collapses, or use an ordinary cock, which can be opened on starting the engine.

(48) W. A. says: I am making some experiments with a machine in which I wish to light kerosene in a place inaccessible with a match: is there not some cheap magnetic machine by which I can accomplish it? A. Yes. Two or three cells of Bunsen battery will heat a short length of No. 36 platinum wire red hot, if the resistance of the circuit is not too great.

(49) J. H. S. asks: What is the best method of renewing a carbon plate used in an electrotype battery? A. Soak the carbon in warm water. If it is to be used in the porous cup of a bichromate battery, you will find it slightly advantageous to place it for a short time in nitric acid.

What is the proper proportion of zinc to muriatic acid in making a soldering solution? A. Add zinc until the acid is nearly exhausted.

(50) J. L. asks: 1. Must steel be tempered before being magnetized? A. Yes. 2. At what heat does steel lose its magnetism? A. At a red heat.

(51) J. H. says: 1. What is meant by the brass rim of the lens, which the pieces of looking glass are fitted into, in your description of a home-made microscope of October 30, 1875? A. Magnifying glasses are usually mounted in a brass or hard rubber ring. We presume such is the rim referred to. 2. Where can I procure the lenses required? A. At any optician's. 3. Would the same sized stand do for a microscope to magnify 1,000 to 1,500 times? A. Yes.

(52) H. S. T. says: In regard to propellers, I used a two-bladed, one of the ordinary kind, for two seasons, and the vibration was very unpleasant; but for the last two summers I have used a modification of Dr. Collis Browne's (illustrated in the SCIENTIFIC AMERICAN some time ago); with that, the speed was increased about one third and all vibration ceased, and she glides along with all the smoothness of a sail boat. I make my propellers with cast iron hubs, into which I screw wrought iron arms and rivet on sheet iron blades, making very cheap and efficient wheels.

(53) R. W. R. says, in answer to W. H.'s query as to the tension of a cotton rope: Midway between the two buildings is a post holding 2 idler pulleys, elevated 20 feet, over which the rope runs. The sag of the rope, which is about 3 feet out of a straight line on each side of the idlers, keeps up the tension when the rope stretches.

(54) H. S. T. says, in answer to many correspondents: I will give you my experience with a small boiler. I constructed a boiler for a steam carriage; it is 15 inches in diameter and 30 inches high. The firebox is 14 inches in diameter and 12 inches high, with 207 copper tubes ½ inch in diameter and 10 inches long. Plates are only $\frac{1}{16}$ inch thick, of the best steel. Total weight, including all fixtures, is 200 lbs. It made steam for 2 cylinders of 3½ inches bore by 10 inches stroke, and ran the carriage (weighing 550 lbs., complete) on a smooth road a mile in 4 minutes, with one person and fuel and water. I have the boiler now in a boat, 21 feet long and 5 feet wide; it drives two cylinders of 2¾ inches bore and 5 inches stroke. Propeller is 22 inches in diameter. It makes plenty of steam, and, with good dry wood, I have the furnace door open much of the time to keep down the steam. I usually run at 60 lbs., and at that pressure it runs the boat about 7 miles per hour with about a bushel of wood.

(55) L. L. L. says, in answer to E. P.'s query as to printing in gold and bronze: To print clearly, use the finest quality of powder and size: use as little size as possible, and distribute it well; roll it thoroughly on the type, use only two sheets of smooth paper on the platen (for blanket), place five or six thicknesses of soft paper beneath the form, pull a light and quick impression, apply the powder carefully, and dust off thoroughly with a camel's hair pencil.

(56) C. R. L. says, in reply to T. C. M., who states that, in a sheet copper vessel, the sulphate of copper solution, after being allowed to stand for a few weeks, has deposited a hard, greenish coat, which prevents the working of the battery of which it forms a part, and asks how it can be removed: This is by no means unusual where the copper salt is very impure or contains a considerable excess of sulphuric, nitric, or acetic acids. When a piece of sheet copper is placed in a solution of sulphate of copper, already saturated with the salt, and containing a free acid in excess, a thick scum of copper salts soon forms on the surface of the copper, which, if allowed to remain or accumulate long enough, not only very materially weakens the current (in case the copper plate is a negative element in a battery) but offers a nearly perfect protection to the copper, so much so that the addition of strong nitric acid is without action, or nearly so, upon it.

(57) J. G. V. says, in reply to W. A. F., who asks for a plan for straightening wire: Fix three collars on a frame, two on the same level and the third one above and between the others This last one can be moved up and down by screws. The lower ones should turn freely on their centers, but have no other motion. Grooves of different sizes are cut on the rollers, and the wire is passed between the rollers in the groove nearest to the exact size of the wire.

(58) L. S. W. says, in reply to J. C. W., who asks how large a cube can be cut out of a ball 12 inches in diameter: The largest cube has for one of its sides the side of a square inscribed in one of the large circles of the ball. If x is this unknown side, $x = R\sqrt{2} = 6\sqrt{2}$, that is, $x = 8{\cdot}485281$ inches. The volume of this cube is 610·4026 cubic inches.

(59) J. H. asks: What cement is the best to harden quickly and resist the action of dampness the longest, without losing its firmness? A. Portland cement.

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

G. G.—It is iron pyrites.—W. H. S.—It is lignite containing iron pyrites.—A. J.—One is quartz, and the other is iron pyrites in limestone.—A. W. S.—No. 1. The shining particles are scales of mica. No. 2 is crystallized carbonate of lime. No. 3 is quartz. No. 4 is impure limestone. No. 5 is gneiss rock.—C. M. D.—It consists of carbonates of soda and lime.—I. R.—It is a variety of brown ocher. It is of no particular value.—J. L. I.—They all consist of clay and sand cemented together by a small amount of oxide of iron. They are not iron ores.

J. J. W. asks: How are glass marbles of different colors made?—J. I. asks: How can I preserve speckled or brook trout in cans, etc.?

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On a Raft in a Stream. By R. K. B.
On a Scroll Saw. By C. A. S.
On Barbecues. By C. S.
On Incubation. By G. N. S.
On Man in Limestone. By M.
On Small Engines. By J. S.
On Sailing Faster than the Wind. By J. G.
On Italy. By C. E.

Also inquiries and answers from the following:

C. B. H.—A. B.—W. K.—J. H. M.—W. S. G., Jr.—P. C. N.—H. B.—E. E. E.—M. B. H.—E. W. N.—R. C.—B. P. K.—L. & W. W.—E. F. W.—J. E. W.—R. G.—H. J. G.—J. C. W.—B. F. M.—S. M. G.—L. B. S.—T. S. L. G.—F. McD.—E. M. L.—A.—W. H. M.—W. H. S., Jr.—J. N. H.—J. D. G.—C. F.—E. B. R.—R. S., Jr.—J. M.—C. C. R.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Enquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "Who makes elevators, worked by hydraulic power? Who sells waterproof matches? Who sells cracker-making machinery? Who makes chilled iron or cast steel balls, turned up to a perfectly spherical shape?" All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

March 21, 1876,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specification and drawings, will be furnished from this office for one dollar. In ordering, please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city

Alarm, burglar, P. Abrell	174,997
Auger, earth, J. Campbell	174,945
Baking powder, C. Arnois	174,890
Ball and socket joint, A. P. Webber	174,990
Barrel, H. C. Sheffield	175,177
Base ball cover, M. S. Ryan	175,172
Battery, galvanic, F. C. Kinemund	175,112
Bedstead, cot, G. L. Unverzagt	175,211
Bedstead fastening, J. W. Strong	174,984
Bedstead, sofa, D. Lovett	175,123
Bee hive, O. Colvin	175,034
Bird cage, A. B. Hendryx	175,089
Bit brace, Ives & Rutz	175,105
Bit brace, F. P. Pfleghan	175,151
Blind slats, tenoning, W. H. Doane	175,054
Boat-detaching hook, R. & A. McMaugh	175,130
Bobbin, I. Cundey	174,947
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Boot counters, skiving, O. Littlefield	175,121
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Bridge, J. J. Reicherts	175,145
Bridge, flying, D. M. Pfaurz	175,150
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Bucket ear, F. L. Roy	174,980
Burial case, Case & Richardson	175,030
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Button polishing machine, P. Cahill	174,89
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