seats, screw chairs, and other seats supported on a vertically adjustable screw spindle. It is a spring attachment, which, when the spindle is turned down, acts as a bracing sleeve to strengthen and sustain the spindle, preventing it from sticking, and acting automatically to loosen and slightly turn back the spindle after it has been turned forcibly down.

BANJO.—Charles E. Dobson, New York City. In the head of this instrument the rim is beveled on its inner side at both edges, and tubular rings rest against the bevels, with their outer sides flush with the outer face of the rim and their opposite faces beyond the upper and lower edges of the rim. The device is designed to improve the tone of the instrument and at the same time strengthen the upper and lower portions of the rim of the head without adding unduly to the weight.

INSECT TRAP.—Allen Y. Smith, Eddy, New Mexico. This trap is of pyramidal shape, with smooth funnel-shaped entrance at the top, and wire gauze sides and ends, with removable sliding bottom. It is more especially designed to trap roaches, affording them an easy entrance but preventing their escape.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.

## NEW BOOKS AND PUBLICATIONS.

THE PRACTICAL ELECTROPLATER. By Martin Brunor. New York and London: Emile Brunor. 1894. Price $10.

This work has the advantage over several other volumes published in the same line in being largely the result of the personal researches and experience of the author, many of the processes described being here for the first time given to the public. In Paris, as well as in this country, the author addressed himself to mastering all the details of electroplating as exemplified in the workshop rather than as theoretically set forth. It is, therefore, a book for practical men, giving some two hundred articles and formulas for solutions, describing process for gilding with and without a battery, for oxidizing, fire gilding, etc.

## SCIENTIFIC AMERICAN BUILDING EDITION.

**FEBRUARY, 1894.—(No. 100.)**

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1. Elegant plate in colors showing a suburban dwelling at Plainfield, N. J., erected at a cost of $4,800 complete. Floor plans and perspective elevation. A tasteful design. Messrs. Rossiter & Wright, architects, New York.
2. Plate in colors showing an elegant residence at Pelham Manor, N. Y. Perspective view and floor plans. Estimated cost $7,000 complete. An excellent design.
3. The Jamaica ClubHouse, recently erected at Jamaica, N. Y. Perspective views and floor plans, also an interior view. Cost $9,000 complete. Messrs. Haus & Oborne, architects, Brooklyn, N. Y.
4. A beautiful residence at Portchester, N. Y., recently erected for A. V. Whiteman, Esq. Perspective and floor plans. Mr. Frank W. Beall, architect, New York.
5. Engravings and floor plans of a suburban residence erected at Ashbourne, Pa., at a cost of $4,800 complete. An attractive design. Harrison Allbright, Esq., architect, Philadelphia, Pa.
6. A suburban dwelling recently erected at Edgewater, Ill., at a cost of $10,216. Floor plans and perspective elevation. Mr. F. B. Townsend, architect, Chicago.
7. A colonial cottage at Buena Park, Ill., recently completed for Guy Magee, Esq. Floor plans and perspective elevation. An artistic design.
8. A modern half-timbered cottage at Wyncote, Pa., erected at a cost of $4,250 complete. Floor plans and perspective elevation. Mr. A. S. Wade, Philadelphia, Pa., architect.
9. A modern colonial residence at Oak Lane, Pa., erected at a cost of $6,800 complete. Perspective view and floor plans. Mr. F. R. Watson, of Philadelphia, Pa., architect. An attractive design.
10. The residence of Rev. Samuel Scoville at Stamford, Conn., erected at a cost of $6,616. Mr. W. W. Kent, architect, New York. An excellent design.
11. Examples of interior decoration and furniture in the Moorish style.
12. A Queen Anne dwelling at Jenkintown, Pa., recently completed at a cost of $5,000. Messrs. Burke & Dolhenty, Wyncote, Pa., architects.
13. Miscellaneous Contents: The growth of plants in odd places.—Acoustics in buildings.—Improved steam power brick machine, illustrated.—A new style stamped ceiling, illustrated.—The telethermometer or distant temperature indicator.—The improved Thatcher furnace, illustrated.—Improved sash chains and fixtures, illustrated.—An improved sliding door latch, illustrated.—Aluminite in cement plaster.—Fire losses of 1893.—Graphite paint.—The Columbian sash and door lock, illustrated.—An improved sash lift, illustrated.


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## Notes & Queries

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**References** to former articles or answers should give date of paper and page or number of question.
**Inquiries** not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.
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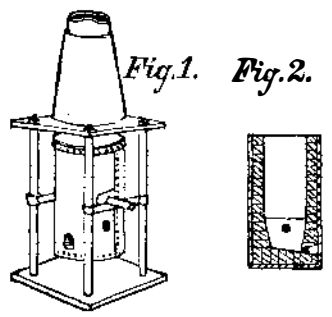
**Scientific American Supplements** referred to may be had at the office. Price 10 cents each.
**Books** referred to promptly supplied on receipt of price.
**Minerals** sent for examination should be distinctly marked or labeled.

(5801) F. W. G. asks: 1. In tin plating iron or steel by immersion in melted metal, what materials are used as a flux and what as the bath after they have been dipped? A. Our SUPPLEMENT, Nos. 92, 130, 849, gives notes on the tinning process. 2. To what resistance should the magnets of an electric bell be wound, for use as signal on a telephone line one-half mile in length, and what size of wire is best suited for winding them? A. The smaller the resistance and larger the wire the better. It is a practical question. 3. How many cells of Leclanche battery at each end of line will be required to work bells satisfactorily where No. 14 iron wire is used with return wire? A. Three or four. 4. How many cells where No. 18 copper wire is used, and how is this determined? A. Threeor four. All depends on the bell, how strong a spring it has and what current is needed to ring it. We recommend for your perusal the following works, which we can supply. Allsop's "ElectricBell Fitting," $1.25; same, "Electric Bell Construction," $1.25; and Bottone's "Electric Bells and All About Them," 50 cents, by mail, prepaid.

(5802) A. M. T. asks: 1. What is gained by winding 750 feet, or 300 of No. 12 double-covered wire, on an armature 6 inches long 9 inches in diameter, with an iron core 1½ inch thick? What will be the difference of the revolutions with the same field in each case? A. If you refer to a motor, the more turns of wire you put on the armature, the lower will its maximum speed of rotation be. There is no absolute gain or loss. The winding must be adapted to the requirements of each case. Roughly speaking the rotations will vary inversely with the length of wire. 2. Will you please state the outside diameter of Nos. 12 and 14 double-covered magnetic wire? A. The wires are 80 and 64 mils in diameter respectively. For covering allow five mils or so.

(5803) C. E. C. H. says: 1. Please inform me as to the best form of reservoir to hold about 60,000 gallons, to be built on the surface of the earth, of brick and cement. How thick would the walls have to be to stand the pressure without fear of rupture, and what is the best form of outlet? A. The reservoir should have a diameter of 40 feet at the water surface and 10 feet deep. Brick is not desirable for reservoir walls, on account of its porous nature, and good hydraulic cement being expensive in Southern California, we recommend earth banks 12 feet high, 8 feet wide at top with banks sloping on inside 45°, outside 30°, making the bank at the bottom level not less than 32 feet wide. A 2 foot puddle wall of good clay and sand should be carried vertically on the line of the inner edge of the top, commencing in a trench at 3 feet below the bottom of the reservoir. A clay and sand puddle lining 1 foot thick should cover the entire bottom and inner slope of the sides. All puddle should be well worked and rammed. The pipe should be laid below the bottom and rising through the puddle and well packed throughout with clay puddle. Valve outside of reservoir. 2. How much hay (weight) will a loft floor bear 16 feet across and 30 feet in length, resting on 2×8 joists 1 foot 9 inches apart? A. The floor will carry 4½ tons of hay evenly distributed with safety.

(5804) C. O. M. asks how to make a small furnace suitable for melting from 10 to 25 pounds of cast iron; what to use to produce sufficient blast. A. The accompanying figures will give a very good idea of a small cupola for melting iron. Fig. 1 being a perspective view and Fig. 2 a section of the cupola. The body is made of heavy sheet iron, lined with firebrick, and provided with trunnions by which it is supported on cross bars in a frame composed of two iron plates about two feet square, separated by four 4½ foot columns of 3 inch gas pipe, the whole being fastened together by four long bolts which pass through both plates and through the columns. The upper plate has a large opening and a flange or collar for receiving the base of the chimney. The cupola has openings on opposite sides to receive the blast nozzles or tuyeres, and a tap hole in front. It should be about 3 feet high, and 14 inches internal diameter. The base of the chimney should have a door through which to charge the cupola. The blast may be supplied with a large bellows, but a small fan blower will answer much better. For the quantity of iron mentioned a cupola two-thirds the size given would answer.




(5805) J. J. W. writes: Is it the practice among land surveyors to describe courses by the compass as the needle now points, or do they make the necessary allowance for the deviation from the true north? If nothing is said, in an old deed, in reference to this matter, which course is to be taken? What is the present correction for Warren County, N. Y.? Has it variedmaterially in ten years? How is the deviation ascertained? A. Surveys of land should have the courses designated from the true meridian, and the declination of the needle stated at the date of the survey in the deed and marked on the plot. The old surveyors were sometimes careless on this point or did not know the deviation of the compass at the time. If the declination is not stated in the deed, old or new, and not marked on the survey plot, the inference is that the compass courses are meant. In a resurvey this should be tried, by running the lines with a corrected compass declination equivalent to the difference of declination from the date of the deed to the present time, and by this means try to find some landmark of the old survey, or make a comparison with adjoining survey lines. The present declination for Warren County, N. Y., is 12 1/6° west. In 1884 it was 11½° west, the increase being nearly 1/6° per annum. The deviation is ascertained by observing Polaris when on the meridian, or at its eastern or western elongation. The method is illustrated and explained at length in "Gillispie's Surveying," by Staley, $3.50 by mail.

(5806) E. J. McC. asks: How would you go to work to figure the pressure per square inch exerted on a cylinder 2 feet long and 4 inches diameter filled with water or oil, if the piston is forced in by a screw of 1¼ inch diameter and 8 threads per inch? The screw is driven by a pulley of 4 inches diameter on which a rope is coiled with a 150 pound weight attached to the end. A. The rule is to multiply the power by the circumference of the screw and divide by the pitch, for the total pressure. The power is the radius of the pulley divided by the radius of the screw, multiplied by the weight. The total pressure divided by the area of the piston in square inches is the pressure per square inch. As in your case the power is $\frac{2 \text{ mch}}{\frac{5}{8} \text{ inch}} = 3{\cdot}2 \times 150$ pounds $= 480$ pounds. Then $\frac{480 \times 3{\cdot}92}{\frac{1}{8}} = \frac{15052{\cdot}6 \text{ pounds}}{12{\cdot}5 \text{ sq. inches}} = 1{,}204$ pounds per square inch pressure, less a deduction for friction of rope, screw and piston.

(5807) E. P. asks: 1. Is steam visible? If not, what is it that is seen coming from an engine? A. No. The white cloud is water in the vesicular condition, or forming minute globules. 2. Where is the fallacy in the following "proof"?

Suppose $a = b$
then $a^2 = b^2$
and $a^2 = a\,b$
and (taking $b^2$ from both members) $a^2 - b^2 = ab - b^2$
factoring, $(a+b)(a-b) = b(a-b)$
dividing by $(a-b)$ and $a+b = b$
that is $a + a = a$
$2a = a$
$2 = 1$

A. The fallacy is in treating $(a-b)$ as a real quantity when it is really 0. You might just as well say $1000 \times 0 = 1 \times 0$, and then dividing by 0, we find $1000 = 1$.

(5808) R. W. M. asks whether it would be advisable m building an ice house and cold storage, if it is necessary to keep the ice room closed. Or can I, by building large, say 2,000 tons capacity, have cold storage under and use the ice from above daily for delivery? Your advice on this subject will be thankfully received. A. The building of a cold storage room in or under an ice house is practicable, with only the precaution to make the ceiling strong enough to bear the weight of ice above, and all parts water-tight by planking and calking or with a galvanized sheet iron covering and sides well soldered to keep the drippings of the ice out of the cold room. A drain around the outside of the cold room, with a connection to the ground to take away the water from the melting ice next to the cold room. The first ice sold should be taken from over the cold room, so that the weight may be lessened, as it will become cavernous and may fall on the roof of the cold room and do damage. Otherwise the ice house may be used as usual in disposing of the ice, but in such a way as to leave the cold room inclosed with ice to the end of the season.

(5809) E. E. F. asks: 1. When will the star Myra be visible? A. Myra (*o* Ceti) varies from 1·7 to 9·5 magnitude. Its period is 331½ days, remaining at its minimum magnitude about 231 days, when it begins to brighten, reaching its greatest magnitude in about 30 days, remaining brightest one week, then receding to its minimum magnitude in about 60 days. It is visible to the naked eye about 45 days. We have no record of its date of maximum brightness. 2. I have a constant flow of water that would fill a two inch pipe, with a fall of about 100 feet in 400. Now, would a pipe of say 2½ or 3 inches diameter of that length (400 feet) be large enough to supply a Pelton wheel of about 1½ or 2 horse power? Also size of wheel, number of buckets, and size of nozzle, also same for a 5 horse power wheel. I am glad to see that you have resumed the monthly record of the planets in your valuable paper. A. The amount of water that will fill a 2 inch pipe is not a measure of water flow. If you can measure 60 gallons per minute at the spring you may realize about 1 horse power, with a 12 inch wheel, ½ inch nozzle. Buckets 1 inch by ¾ inch.

(5810) A. H. S. asks: 1. How many cells of storage battery are required to run a one horse power electric motor? A. It depends on the size of the cells. Twelve cells 35 ampere cells give it. 2. Can they be charged by gravity batteries, and if so, how many are required? Supposing the storage batteries can be charged by gravity batteries, how long time will be required? The motor I would run is wound for 110 volts incandescent current. A. Allow two and one-half gravity cells in series for each storage cell, and put as many as possible in parallel. Thus a one or two hundred cell gravity battery would be required to charge a small storage battery. But for your motor you would need 56 storage cells, and to charge these several thousand gravity batteries might be used; gravity battery charging is only applicable to small storage cells. 3. Where can I obtain a cheap practical book treating of storage batteries, their manufacture, care and application to motors? A. See Salomon's "Electric Light Installations and the Management of Accumulators," $2 by mail.

(5811) F. B. asks: 1. How can I find out if there is too much iron in a certain distilled water for good effects in all ordinary photographic processes? A. Test for iron with solution of iron ferrocyanide. 2. What is the approximate resistance, voltage, and amperage of a cell composed of a shallow copper an 1 foot square×¼ inch high and zinc 1 foot square, zinc separated from copper by felt pad three-sixteenths inch thick, saturated with water and sulphate of copper, sulphate pulverized and in excess. A. The voltage would be about 1 volt. The resistance might be a few hundredths of an ohm at starting, bnt the cell would very quickly polarize in use from exhaustion of the solution and poor diffusion. 3. What is the smallest carbon, lowest voltage and amperage that will make sufficient arc illumination to equal a good oil light in an optical lantern for short distance, 5 to 8 feet circles. A. See the SCIENTIFIC AMERICAN, vol. 70, No. 3, page 33. Twenty or thirty volts and three or four amperes would be as good as an oil lamp, but still very unsatisfactory.

(5812) G. A. writes: 1. How can I convert the dynamo described in No. 600, SCIENTIFIC AMERICAN SUPPLEMENT, into a motor? A. No change is necessary—wind shunt and connect wires to suit the voltage at your disposal. As described it is suited for 50 volts. 2. How can I make the same smaller, say ½ horse power, using No. 18 magnet wire on armature and 16 on field magnet? A. Make about nine-tenths its present dimensions. 3. How many storage cells and what size will give me ½ horse power in said motor, the cells to be charged with 6 or 8 gravity battery? A. Allow five 35 ampere storage cells for ½ horse power. The recharging with gravity cells is not practicable. A minimum of 13 gravity cells is needed to charge, and these would be extremely slow. To run as a motor with five storage battery cells, substitute No. 8 wire for the wire given in the article.

(5813) J. B. A. asks: 1. Let me know a simple and efficient storage battery to be used in connection with a two horse power motor to run a 27 foot by 6 foot launch. A. We do not advise the construction at home of storage batteries. See our SUPPLEMENT, No. 845. For two horse power you must have about 1,500 watts; allow 4 amperes per square foot of positive plate, and base the number of cells on the voltage required. 2. Also please let me know a simple and efficient plunge battery, to be used for the same purpose. A. For a plunge battery see our SUPPLEMENT, No. 792. The size for a steam launch will be prohibitive. 3. Also, what size propeller and propeller shaft could I use on a 27 foot by 6 foot launch, to give the best results? A. Use a 24 inch propeller, 1½ inch shaft. 4. Could I maintain a speed of about 10 miles an hour with a two horse power motor and proper size propeller? If not, what would be the best speed I could maintain? A. No. Possibly 5 miles per hour.

(5814) C. L. K. asks: 1. How many watts per candle power are required in the most economical incandescent lamp? Does it vary much in practice? A. Two and one-half watts, but this is at the sacrifice of durability of the lamp. It varies from this to 3 watts. 2. Is the number of volts and amperes required to heat the carbon fiber to incandescence determined empirically or theoretically, and how determined? A. It can be calculated, but the data for calculation are based on experiment. Practically speaking, it is determined empirically. 3. What books would give the best information on the above and allied subjects? A. Sloane's "Arithmetic of Electricity," $1 by mail. Also Day's "Electric Light Arithmetic," price 50 cents.

(5815) C. J. M. writes: 1. Does a common copper and zinc and blue vitriol battery require an induction coil for the purpose of doing electrotyping on a small scale? A. No. The induction coil would prevent the proper action. 2. What is the best metal to have your wax matrix on for electrotyping, and how do you determine the direction the current runs? A. There is no best metal, practically speaking. For direction of

current test with two electrodes in the bath. 3. Is a single cell battery sufficient to do electrotyping at all? A. Yes. 4. What should be the respective sizes or weights of the metals in the battery? A. There is no fixed ratio. See SUPPLEMENT, No. 310, for details of electro-plating.

(5816) C. R. H. writes: I have a six candle power lamp which I would like to light for four hours each evening. 1. What kind of batteries should I use and how many? A. Use a secondary battery of 5 or 6 cells. 2. Would large size plunge battery described in "Experimental Science" do, or would it have to be replenished too often? A. It would require replenishing too frequently. 3. How long would plunge battery of same pattern run simple electric motor described in same book? A. It might run it for a couple of hours.

(5817) C. F. M. asks (1) how to make a spark coil? A. Make a bundle of pieces of iron wire, the whole one-half inch thick and eight inches long. Wind it with No. 22 wire to a total diameter of two inches. 2. How many batteries sal ammoniac will it take to light three burners? A. Two or three.

(5818) M. asks: Is there any way of communicating by the voice between places 250 feet apart, other than by a regular Bell telephone? Would a string telephone such as I have seen boys use answer for the purpose? And if so, how are they made? Will they work if the string rests on anything, or must it hang clear between the transmitters? A. An acoustic telephone can be used. Picture wire is good for the line, and for receiver and transmit er use parchment drum heads to whose center the wire is attached. The wire must touch no inflexible object. Lea it by loops of muslin around corners, etc., so as to keep a strong strain on it.

(5819) B. M. C. asks: 1. Is it true that the Bell telephone patent runs out January 30? A. See the SCIENTIFIC AMERICAN, February 3, 1894. 2. Is the Burnleydry battery suitable for running the Blake transmitter? A. Yes. 3. Is it any better or any cheaper to maintain than the Disque Leclanche battery? A. The cost of either is trivial, and one is about as good as the other for the purpose. 4. Would one cell of either battery operate the Blake transmitter one mile and a half? A. Yes. 5. Is a cipher called a figure? A. According to recent authority, the cipher 0 is not a figure.

(5820) J. A. B. asks: Does electricity travel on the surface of a wire, through the center of it, or is it equally distributed in every part of the wire? A. The current intensity for given conditions varies directly with the cross section of the wire. The best illustration of the action of the wire is to assnme that it opens a path through the ether, a path in which there is no restitutive medium for wave formation. As the transfer or electric energy involves no transfer of matter, and as electricity is not matter, we cannot directly answer your query. The best theory of the transfer of energy assumes that the ether surrounding the wire does the work. Electricity as such can only be stored on the surface of conductors.

(5821) C. G. W. asks: Is a copper wire woven (flexible) cable as good a conductor of electric current as a solid wire? A. Very nearly as good, if of the same aggregate cross sectional area. The bending of the wires would tend to increase the specific resistance of the copper.

(5822) H. asks: I wish to know if the common rubber belting would be a good and safe insulator between conductors carrying high power and the metal supports for the same. Cannot use covered wire, and the insulator must be flexible. If belting will not do, can you name an article of moderate cost that will answer the conditions? A. Rubber belting will be a very good insulator, especially if shellacked to prevent the accumulation of hygroscopic moisture. 2. What is the width of slot in cable subway? Is it sufficiently wide to allow the grip to be taken out at any point? A. About ¾ inch, not enough to permit the grip to be removed.

(5823) G. L. H. asks: At what meridian does the day begin? A. The meridian at which the day changes is 180 degrees from Greenwich, England; from which place longitude for navigation is reckoned. The day meridian is an ocean line from just west of Behring Strait, passing east of New Zealand to the southern continent.

(5824) H. W. asks: What is the difficulty of the underground system of electric car traction? A. In securing good insulation. Water, dirt, ice, and snow work into the conduit and occasion great loss of current.

(5825) S. H. asks: Is there any method of determining the voltage of a magneto-electric battery? A You can get at the average by a Cardew voltmeter or similar apparatus depending on the expansion of a metal by the heat produced by the current. The current is alternating and the voltage varies from zero upward.

(5826) T. R. asks how to construct a dry battery. A. For dry batteries we refer you to our SUPPLEMENT, Nos. 157, 767, and to the SCIENTIFIC AMERICAN, No. 2, vol. 67, and No. 7, vol. 68.

(5827) E. S. S. asks: 1. When I heat my soldering iron with natural gas through a Bunsen burner, a deposit is left by the flame, which of course has to be scraped off before the iron is used, causing great inconvenience. Can you tell me of any way I can prevent this deposit and still use gas? A. We can only suggest that you try a regular solderer's gas furnace, or use a brass tube kept hot by the flame and place the iron in it. It may be very thin and fit the iron closely. If surrounded by fire brick, giving about an inch space, you will get better heat. 2. What are the principal reasons that the electric cars cannot be supplied with current from below instead of from the overhead wire? A. Leakage of current owing to grounding caused by water, dirt, and condensed moisture. 3. What is the main point preventing economical use of the storage car system? A. The batteries are too heavy. 4. I have heard that in the human body there is some chemical that is worth nearly four hundred dollars an ounce. Can you tell me its name and the reason it cannot be extracted from a corpse? A. The metal calcium is quoted at $310 an ounce. This is present in the cheapest materials also. 5. When two trolley cars are fed by the same wire and are both between the same feeders, why does not the current all go through the car nearest the power house? A. This would be contrary to the law of branch circuits. The current follows all possible paths and is distributed in proportion to their respective resistances. 6. What is the reason that the block system on railroads is not more extensively used? A. It is very expensive. 7. I have the dynamo described in SUPPLEMENT, No. 161. With the H armature I get scarcely enough current to ring a bell. What should be the voltage and amperage of that dynamo, if properly constructed and run at the speed stated? Would a drum or laminated armature give any better result? A. It should give sixor eight volts, and a laminated drum armatnre would give better results. See our SUPPLEMENT, No. 599. 8. Does not the number of ohms resistance of a piece of wire increase as the pressure and amount of current is increased? A. No. Your ninth query admits of no answer.

(5828) H. L. asks: 1. How many cells of Edison-Lalande battery, phonograph motor type, would be required to run the motor described in SUPPLEMENT, No. 759? A. Twenty cells should give good results. It would probably be better to wind it for lower resistance. 2. How many hours will it run with one charging? A. It gives 300 ampere hours. Dividing by 6 gives 50 hours. 3. How coupled? A. Couple according to the resistance of the motor, which is determined by the winding. 4. How many and what size cells of storage battery will it take? A. Three or four 35 ampere cells. 5. How many and what size cells Crowfoot battery to charge the same? The motor to be nsed say 5 to 8 hours, and balance of time to be spent in charging. A. Eight in series and forty in parallel would charge 3 cells. 6. Which will be the least expensive to maintain, counting only the cost of materials used, not allowing for labor? A. Probably, all things considered, the Lalande-Edison battery would be the best and cheapest. 7. Have you a description of a storage battery that I could make myself? A. For a description of a storage battery see our SUPPLEMENT, Nos. 838 and 845. The diagram of connections you send is all right.

(5829) H. B. writes: Are there sufficiently correct surveys of Florida to enable you to determine whether artesian water could be had by boring at Tampa or not? Could a heater for a forty gallon water boiler be successfully constructed and operated from a 500 volt street railway current, and who could furnish such a heater? In a steam dry kiln for drying brick, at what intervals should a fan be capable of having removed or removing the cubic contents of the moist atmosphere in the kiln, or at what periods should it be removed in order to insure a proper state of atmosphere? Has colonization or missionary efforts done more for civilization? Is colonization induced by a Christian spirit or desire of pecuniary remuneration? Would a ball fired directly upward go a greater distance from the muzzle of the gun (on account of decreasing resistance of atmosphere, etc.) than if fired at 45 degrees? A. We have no record of artesian wells in the southern part of Florida, but from the well known slope of the water-bearing strata of the Cretaceous period, on the Atlantic border from New Jersey to Florida and along the Gulf and its supposed extension under the Atlantic Ocean and Gulf of Mexico out to the deep sea border, there can be but little doubt as to the flow of artesian wells up to or near the surface in all the northern and central parts of Florida. It may require considerable depth at Tampa, probably over 2,000 feet, to obtain a large quantity at a near surface flow, with also a possibility of a mineral characteristic, arising from its great distance from the source of supply, which are the uplands of Georgia. An electric heater can be made for the purpose described, but would be very expensive in cost of plant and for running. They are now used on a small scale by the Electric Heater Company, Havemeyer building, N. Y. The moist air in a drying kiln for brick should not be removed until the brick are thoroughly heated, so as to drive the moisture from the inside before the outside becomes dry enough to crack. The ventilation may then proceed to a degree not to lessen the temperature until there is no more evaporation or moisture arising from the brick. Fan blowers are not needed where natural draught for ventilation can be had. Intermittent ventilation as named is liable to make surface fracture and poor brick. Colonization has proved itself the great basis of civilization, and with few exceptions pecuniary gain has been the essential aim. A ball fired from a gun will rise higher on the vertical than at 45°.

(5830) Y. says: What is the composition of the bath to remove from engravings the water stains that they get from hanging on damp walls, and what length of time are the engravings left in the bath? A. Ozone can be used for removing mildew and other stains from engravings that have been injured by hanging on the walls of damp rooms. The engraving should be moistened and suspended in a large vessel. The ozone may be generated by putting pieces of clean phosphorus in the bottom of the vessel partially covered with water, or by passing electric sparks through the air in the vessel. Keep the engravings exposed to the ozone until thoroughly bleached. Phosphorus is very dangerous.

(5831) L. T. asks: 1. Are the stars commonly called second magnitude those between magnitudes 1 and 2, between 1·5 and 2·5, or between 2 and 3? A. The magnitudes of stars as generally designated are that all above 1½ are designated as of first magnitude, and those between 1½ and 2½ as second magnitude and so on. Astronomers now designate the magnitudes by differences of one-tenth of a magnitude. 2. Suppose a person to be moving away from the earth at a speed faster than light travels. A says that to see the earth he must be looking toward it, B claims that he must be facing away from it. Which is right? If B is right, would he not see an inverted view of it, as if reflected from a mirror? A. A person moving away from a light faster than the velocity of light would see no light in either direction. 3. In a house heated by the hot water system, if all the radiators but one are shut off, will that one become hotter, or does the circulation of the water and consequent heat of the radiator depend only upon the rapidity with which the latter is cooled? A. The shutting off of all but one radiator would slightly increase the temperature of the water in the circulating radiator, due to the saving of heat radiated by the closed radiators

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