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.

Notes & Queries

HINTS TO CORRESPONDENTS.

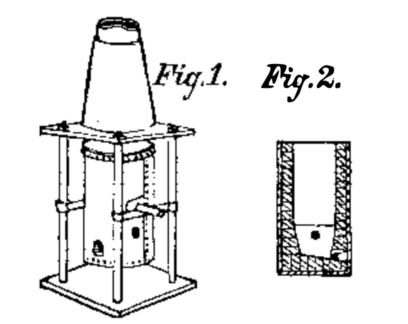
Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information and not for publication.
References to former articles or answers should give date of paper and page or number of question.
Inquiries not answered in reasonable time should be repeated; correspondents 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.
Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.
Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.
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 "Electric Bell 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 varied materially 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$\frac{1}{10}$° west. In 1884 it was 11½° west, the increase being nearly $\frac{1}{10}$° 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 $\frac{2 \text{ inch}}{\frac{5}{8} \text{ inch}} = 3{\cdot}2 \times 150$ 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 $a^2=ab$
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 $1000\times0=1\times0$, and then dividing by 0, we find $1000=1$.

(5808) R. W. M. asks whether it would be advisable in 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, ¼ 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, but 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