Business and Personal.

The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in the following week's issue

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 This is for our information and not for publication.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.

(5752) C. E. H. asks: I am annoyed constantly with the odor of gas from the ordinary rubber tubing, such as dentists use in laboratory work. Can you suggest a coating for the tubing which will prevent the leakage? A. Possibly inside and outside treatment with shellac varnish would help it.

(5753) L. R. A. asks: 1. I wish to obtain an ink that will be visible for four or five days and then fade entirely away and cannot be restored in any way to vision. What liquid is a solvent for iodo starch? A. Water. 2. If I take an apparatus used for electrolysis which is constructed of a U tube, the ends of which are sealed, and if this current is kept up, the volume of the gases must of course be contracted, for their volume is much greater than that of the H_2O. Will this pressure interfere with the action of the electricity in any way? A. The gases will continue to accumulate until the apparatus bursts? The pressure will not interfere with the electrolysis.

(5754) S. says: Please inform me what is the meaning of three balls over a pawnbroker's shop. A. Money to let. It is derived from the Lombard merchants who used the three balls as a sign. It was also used by the Medici family in Florence.

(5755) B. W. S. asks: 1. Would there be any material difference in winding the induction coil like a spool of thread, insulating each layer with a brushing of paraffine and covering of bond paper, than there would be in the method described in "Experimental Science"? A. Yes. Disk winding is preferable. 2. As an insulator for static currents is shellac better than paraffine or resin? A. It is better than resin and inferior to paraffine. But their relations are affected by impurities, so that for some samples other relations may obtain. 3. What is the maximum primary current that is safe to use with that coil, considering the heating by Foucault currents and the liability of the paraffine to melt? A. You need not fear Foucault currents with the wire core. 4. Would it be a serious shock to allow the current to pass through one's body, similar to the experiments with a frictional machine? A. The coil gives quite a severe shock.

(5756) R. P. E. asks: What power would a spring of water, flowing 40 gallons per minute, with a a fall of 500 feet at two miles from the spring, give? A. By using a 4 inch pipe you can realize four horse power with an impact wheel of the Pelton type.

(5757) O. H. asks: 1. What is the cost of obtaining a knowledge of electrical engineering? Also civil? A. No estimate of cost can be given. Address Armour Institute, Chicago, or Mass. Institute of Technology, Boston, Mass., Cornell University, Ithaca, N. Y., giving courses in both civil and electrical engineering, for their catalogues. The same education will cost one man thousands of dollars and another man almost nothing beyond his time. 2. How long does it take to complete a course of the study in them? A. The college course alone is three or four years. The preparatory course takes one to three years, and after graduation the study should fill a lifetime. 3. What are the prospects for a first class engineer of either branch? For a first class man the prospects are good; but the professions are overcrowded. Few men are really first class.

(5758) H. E. H. asks how to make a storage battery capable of running four 16 candle power 70 volt lamps one hour; also how many gravity batteries will it take to charge the same? A. The manufacture of a large storage battery is attended with so many difficulties that we do not advise it. One is described in the SCIENTIFIC AMERICAN; also see our SUPPLEMENT, Nos. 838, 845, 931. For each storage cell over two gravity cells in series must be provided, and almost any quantity in parallel. As you need 36 storage cells, several hundred gravity cells would be needed.

(5759) C. L. S. asks: 1. How to make a camera obscura. I want one to copy landscapes with from nature. A. See our SUPPLEMENT, No. 158. 2. Also one to enlarge photographs, both by sunlight and lamplight. A. See our SUPPLEMENT, Nos. 276 and 451. 3. What can I apply to windows that makes beautiful large crystals on it? A. Sodium sulphate in hot solution.

(5760) A. S. asks: Supposing a distillery warehouse, in which whisky or spirits are stored, is heated to a temperature of 100° and kept closed for a period of a few weeks, would there be any danger of an explosion from the consequent evaporation of spirits, should someone strike a match or enter with an uncovered light? What percentage of alcoholic vapor in the atmosphere of a warehouse would be likely to cause an explosion? A. There would be such danger. One part alcoholic vapor to thirty to sixty of air would be explosive.

(5761) L. D. M., P. W. T., and many others, say: Please give me a receipt for making a good ink for rubber stamps. Also one for making a good indelible ink for name stamps. A. The usual rubber stamp inks are prepared with water-soluble aniline colors and glycerine.

1. Blue rubber stamp ink:

Aniline blue, water sol., 1 B.	3 parts.
Distilled water	10 "
Pyroligneous acid	10 "
Alcohol	10 "
Glycerine	70 "

Mix them intimately by trituration in a mortar. [The blue should be well rubbed down with the water, and the glycerine gradually added. When solution is effected, the other ingredients are added.]

Other colors are produced by substituting for the blue any one of the following:

2. Methyl violet, 3 B	3 parts.
3. Diamond fuchsin I.	2 "
4. Methyl green, yellowish	4 "
5. Vesuvin B (brown)	5 "
6. Nigrosin W (blue black)	4 "

7. If a bright red ink is required, 3 parts of eosin BBN are used, but the pyroligneous acid must be omitted, as this would destroy the eosin. Other aniline colors, when used for stamping ink, require to be acidulated. 8. The ordinary stamping ink, made by diluting printing ink (which is made of lampblack and linseed varnish) with boiled linseed oil, stands pretty well, if enough is used, but when poorly stamped, will wash off. Dr. W. Reissig, of Munich, has recently made an ink for stamps which is totally indelible, and the least trace of it can be detected chemically. It consists of 16 parts of boiled linseed oil varnish, 6 parts of the finest lampblack, and 2 to 5 parts of iron perchloride. Diluted with ⅛ the quantity of boiled oil varnish, it can be used for a stamp. Of course it can only be used with rubber stamps, for metallic type would be destroyed by the chlorine in the ink. To avoid this, the perchloride of iron may be dissolved in absolute alcohol, and enough pulverized metallic iron added to reduce it to the protochloride, which is rapidly dried and added to the ink. Instead of the chloride, other salts of protoxide or peroxide of iron can be used. From the "Scientific American Cyclopedia of Receipts, Notes, and Queries."

(5762) H. C. S., Iowa, asks what to put in boilers to prevent the formation of a carbonate of lime scale. The water here contains considerable lime and forms a very hard white scale, which I would like to know some way to prevent. A. You cannot prevent the deposit of scale, except by the use of pure water. It can be softened and removed by the application of a half pound of caustic soda to the feed water once a week, two weeks or a month, according to the amount of scale forming. Boil the caustic in the boiler for the working day, then blow down and clean out the boiler. After once thorough cleaning a little caustic every few days and blowing down two cocks a few times the next day will keep the boilers in good order for two or three months when they should have a thorough cleaning.

(5763) C. H. S. asks: 1. How many watts does it take for a 1 candle power? A. 2½ to 3½ watts in an incandescent lamp. 2. Can you give me the drawings or sketch, so that I can make an outfit to put on cart wheel, so that it will register the number of miles traveled? A. Odometers can be bought of dealers in surveying instruments. Consult our advertising columns. 3. Have you "Dynamo Electricity," by Carl Hering? A. We can supply it by mail for $2.50.

(5764) D. S. C. says: Making an allowance of ⅛ for friction how heavy should a weight be to fall 20 feet and furnish ⅛ horse power for one hour of time? 2. It will require a weight of 139,320 pounds. 2. Respectively, what is the horse power of a 10 foot, also a 12 foot wind wheel in an 18 mile wind?—of course the wheels are to be first class, and are supposed to be held squarely in the wind. A. The 10 foot mill should equal one-fifth of a horse power, 12 foot mill, one-quarter of a horse power, in an 18 mile per hour wind.

(5765) W. McV. writes: 1. What is the resistance of a 6×8 Crowfoot gravity battery? A. About 4 ohms. 2. What is the E. M. F. of a battery with plates of carbon and iron? What is the E. M. F. of a battery with plates of copper and iron? A. It depends on the solution. From ½ to 1 volt perhaps. 3. What is the E. M. F. of a thermo couple composed of iron and copper, also iron and zinc, and copper and zinc for a difference of 100° Fah. in temperature between the ends of the couples? A. The relative differences of potential are iron-copper 6·2, iron-zinc 5, zinc-copper 1·2. We cannot give the exact voltages, and the above can only be considered an approximation. 4. Please mention some good work on thermo-electricity and its cost. A. We can supply Rust's "Thermo-Electricity," 78 cents by mail. 5. Are the natives of the Sandwich Islands negroes, or Indians, or neither? A. Neither. They are of the great Malay race.

(5766) J. N. F. writes: I would like to know the exact number of inches and fraction that a body will fall in still air the first second of time. The philosophy states that a body will fall without resistance 16 feet 1 inch the first second. The encyclopedia states that it will fall 16·1 feet the first second. Which is correct? What does "without resistance" mean, in still air or in a vacuum? A. The distance varies with difference of location. On the equator a body falls a less distance than at the poles. Without resistance means in a vacuum.

(5767) F. M. C. asks: In a ball bearing of a bicycle, which will run the easiest by applying the least power? I mean one with eight five-sixteenths balls or one with eight one-quarter inch balls? What effect would increasing the number of balls have? A. There should be no difference of any amount between the sizes named. A rough surface for the balls to roll upon would make the larger balls superior to the small ones. Increasing the number of balls would have little or no effect.

(5768) G. B. asks: 1. How would electricity compare to gas at $2 per M for cooking purposes in regard to cost? A. 50 watt hours would heat a maximum of 175 pounds of water one degree Fah. This is the most you could do with electricity. In practice it would be much less. Gas would be far cheaper. 2. Is it practicable for cooking in a private house, and would it be an expensive means? A. Yes; it is practicable, but expensive.

(5769) A. M. G.—The following is a receipt for stereotyper's paste. To 1½ gallons water add 2½ pounds of Peter Cooper's glue. Allow to stand overnight, after which place it on the fire and cook slowly for two hours. Take ½ pound of best English Paris white and one pint of flour, packed tight in the measure. Place them together in a basin and add sufficient water to make the mixture the consistency of buttermilk; add this to the glue when cooked as above, and allow the whole to cook for one hour, when it will be ready for use.

(5770) T. P. A. asks: 1. In using the earth as part of an electric circuit, what is the resistance per mile? A. The resistance is zero. There is resistance at the grounding points, varying according to the nature of the soil and area of ground plates or equivalents. 2. Will a straight electro-magnet, wound with very fine wire, operate a bell (only one end of the magnet to be used to attract the armature) through a line one mile, with ground return, and using one sal ammoniac battery? If not, how many batteries would be required? A. A vary feeble ring could be thus produced. Five or six cells would not be too many. The resistance of the circuit and quantity of current required to ring the bell determine the cells needed.

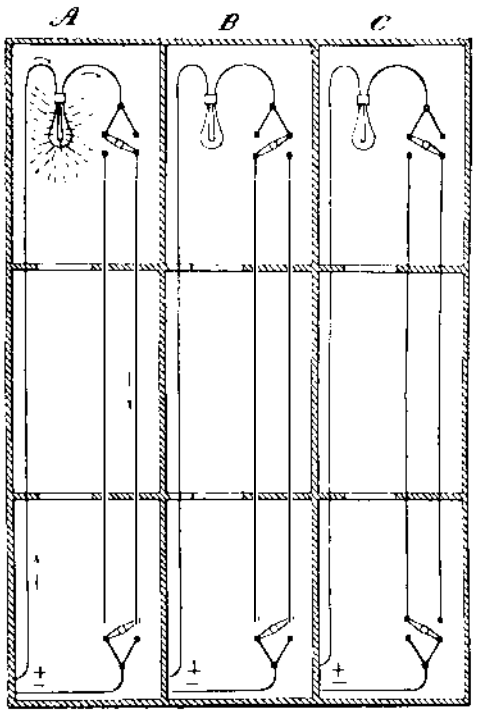
(5771) G. L. R. asks for the best fluid batteries for operating electro-motors under one-eighth horse power. A. The bichromate batteries, Bunsen or plunge type, See SUPPLEMENT, 792, are the best of the primary batteries. Secondary batteries are preferable and are far more economical. See SUPPLEMENT, Nos. 838 and 845.

(5772) A. M. H. asks: Cannot a "coil" be put into a kitchen stove for the purpose of heating another room, on the principle of the article on "Combined Water Heating and Hot Air Furnaces," described in SCIENTIFIC AMERICAN, page 19, January 13, 1894? Could not the pipes used to heat water for kitchen and other purposes be used to heat air for another room? A. The heating of a room above the kitchen can be done by a coil in the stove and a suitable radiator coil in the room, with an expansion tank above, on the same principle as in greenhouse heating. The water from a kitchen boiler can also be circulated in a coil above for heating purposes.

(5773) C. D. asks: 1. What are the elements and exciting acid in a chloride of silver dry cell? A. Metallic silver and zinc are the electrodes, silver chloride the depolarizer, and ammonium chloride solution the exciting fluid. 2. Can such cells be recharged, and how? A. They can be cleaned out and new silver chloride and solution introduced. 3. What is the voltage and amperage of a cell 2 inches long and ¾ inch wide? A. E. M. F. 1·03 volts. The amperage cannot be exactly stated—perhaps ½ ampere at first.

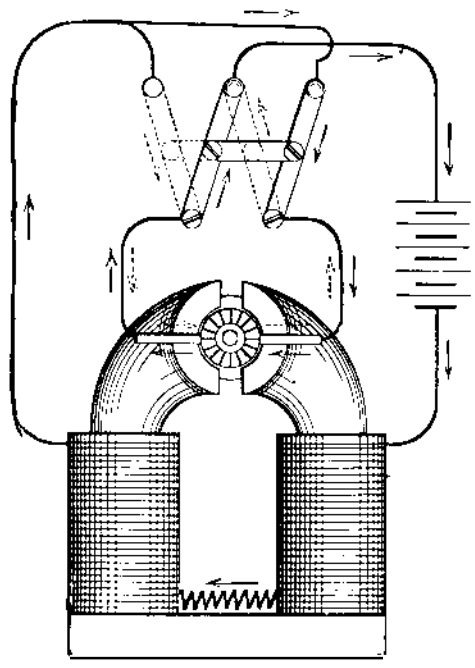
(5774) G. W. C. asks: 1. How many storage batteries will a 25 volt 8 ampere dynamo charge, and how long would it take? A. It depends on the size. It will charge eleven in series, each having 200 square inches area of positive plate. 2. What is the voltage and amperage of simple electric motor used with cast iron fields? A. 7·2 volts and 4 amperes for field. The armature can absorb 5 amperes at 7·2 volts. 3. Will the SCIENTIFIC AMERICAN give me a comprehensive description of the Niagara formation, also of the rocks of the Upper Silurian period? A. The Niagara formation is the first period of the Upper Silurian. It includes the Oneida conglomerate, shaly sandstones of the Medina group, hard sandstones, flags and shales of the Clinton group, and shales and limestones of the Niagara group. The Upper Silurian includes four periods—the Niagara as above, the Salina, Lower Helderberg, and Oriskany. The Salina rocks are sandstones and shales; the Syracuse, N. Y., salt wells derive their brine from rocks of this period. The Lower Helderberg rocks are mostly limestones The Oriskany beds are rough sandstones. The Niagara and Lower Helderberg rocks abound in fossils, radiates, trilobites, brachiapods, and other mollusks. The above refers to the American rocks.

(5775) C. T. V. writes: Can you give me a diagram of a circuit using the multiple system, where, by placing a push switch in hall of first floor, a lamp on second floor can be lighted, and upon arriving at the top the lamp can be extinguished, and then by going down stairs again you can go through the same operation without having made any change? A. The diagrams show how this can be done. In A, the lamp



has been lighted from the lower floor. In B, it has been turned out from the upper floor. In C, it has been turned on below and then turned off above, leaving it out finally. By this arrangement it can be turned on and off from either floor.

(5776) A. C. C. writes: I have use for a reversible electric motor that I could run with two or three gravity batteries. Will you give me some light on this subject? A. Construct exactly as an ordinary motor, but arrange a pole changer so as to be able to change the direction of the current in the armature alone or in the field magnet alone. By changing the direction of current in one of these, only the motor will reverse. Use carbon brushes, pressed end on by springs against the commutator. Make connecting bar of a non-conductor. The cut



gives the connections necessary for a reversing motor. You must let it come to rest before reversing, as otherwise there is great danger of burning out the armature.

(5777) F. H. W. writes: 1. I have constructed the motor of which drawings are given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 641. I wish to construct plunge battery to run same. Will you kindly inform me what size cells to use, how many, and also how to connect them? A. The dimensions of the proper battery are given in the article in SUPPLEMENT, No. 641. For description of a plunge battery, we refer you to our SUPPLEMENT, No. 792. 2. Will the same rules apply in regard to winding for 110 volts? What number of wire on field, and also what number and amount on armature? A. See answer to query 5692. You need not use No. 32 on the armature—No. 29 would be fine enough. Always use a rheostat in starting the motor.

(5778) D. & C. write: 1. We are building simple electro-motor described in SUPPLEMENT, No. 641, to run from a 110 volt incandescent circuit. Should any change be made in winding of fields or armature? A. See query No. 5692. You may use No. 29 wire on armature. 2. What power will said motor develop on