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

"U. S." metal polish. Indianapolis. Samples free.

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Microbe Killer Water Filter, McConnell Filter Co., Buffalo, N. Y.

Agricultural patent for sale.—P. J. Ebersohl, Centerville Station, Ill.

Cheapest Water Power.—See top of 1st column, page 170. Also top of 2d column, page 239.

Bookbinding.—All classes of work. Magazines a specialty. Haddon & Co., 139 Center St., New York.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

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Patent for Sale—Stall for comfort and cleanliness of milk cattle. Agents wanted at 50 per cent commission. M. Schembri, 396 Van Buren St., St. Paul, Minn.

The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail, $4; Munn & Co., publishers, 361 Broadway, N. Y.

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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 This is for our information and not for publication.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.

(5974) J. E. E. asks: 1. Could storage battery plates be made porous by making them of lead and zinc melted together and afterward eating the zinc out with acid? A. It is doubtful. If you could get an alloy with a preponderance of zinc stable on cooling it might be done. 2. With what number and amount of wire should I wind a bell to ring over 75 rods of No. 12 galvanized iron wire with earth return? And how many cells gravity will it require? A. Use 4 cells gravity battery and wind bell to about 6 ohms resistance, say 4 ounces No. 24 wire.

(5975) I. A. H. asks: Is the electric spark the passage of a mass of electrified matter, or a current through rarefied air similar to a Geissler's tube? If neither, what is it? Is the arc of the arc lamp a similar phenomenon? Is there any work which systematically treats this and allied subjects? A. The electric spark is attributable to the heating of the air, and to the transferal of heated material of the electrodes. The voltaic arc proper is due largely to incandescent carbon vapor. Such subjects as these are treated in different works. No work can well be named which is restricted to such topics.

(5976) H. E. says: Kindly give me a recipe for destroying moths and worms, such as infest upholstered furniture and ruin carpets.

A. Alcohol	500 parts.
Naphthaline	10 "
Carbolic acid	10 "
Camphor	5 "
Essence lemon	5 "
Oils of thyme, lavender and savine (of each)	2 "

This can be used by sprinkling over furs, clothes, carpets, furniture, etc., or, better still, by application by a spray producer.

(5977) P. M. asks (1) if the current from an induction coil would be of any use if it was constant. A. Yes; it might be desirable for some work. 2. Is the current from an induction coil the same as that of an alternating current dynamo? A. It is the same in general, but the form of the wave curve may be quite different. 3. Why cannot an alternating current be used to ring an ordinary bell? A. The alternations are too rapid.

(5978) T. R. E. writes: 1. I have a piece of pyrites I overheated trying to solder a scarf pin to it. Is there any way to get it back to its bright color again? A. You cannot restore the color and luster. Use cement for pyrites, you cannot solder it. 2. How can I drill a hole through it? A. For drilling, use a diamond drill. 3. Suppose a box car is running 20 miles an hour, doors shut tight. A man jumps on the floor with and against the motion; can he jump one way further than the other? A. The person jumping in a car can jump no further one way than another. 4. I have an incandescent 3 candle power lamp. Both wires got blown off close to the glass before using. Can I do anything with it? A. You can only connect with your lamp by arranging to press the ends of your conductors against the ends of the wire.

(5979) E. W. M. asks: 1. Is there any serious difficulty in charging a storage battery of 30 cells, arranged in three parallel series of ten each, and discharging them all in series, provided all the cells are as nearly alike as possible and the several series as nearly as possible of the same resistance? A. There is a difficulty. It is advisable to charge them in three series, one series at a time, if you cannot charge the whole number in series at once. 2. Will not tin plate answer well for the disks of a dynamo armature? Will they be better for removing the tin? A. Yes. They would be better without the tin. 3. If an alternating current at constantly varying E.M.F. be passed through a converter, will the E.M.F. on the secondary circuit be constant or will it vary in proportion to the primary? A. The secondary current will vary with the intensity of the primary current, and, the currents depending on the E.M.F., the potentials will also vary. 4. In what way are low voltage Edison lamps uneconomical, do they require more current or do they burn out quicker? A. They are not uneconomical except as requiring larger conductors for a given candle power.

(5980) W. A. S. asks how to stain a gun barrel. A. Clean the barrel thoroughly, then sponge with the following solution which is made up by weight: Antimony protochloride, 4 parts; sulphuric acid, 2 parts; empyreumatic pyroligneous acid or gallic acid, 1 part. Apply several coats until the barrel is dark enough.

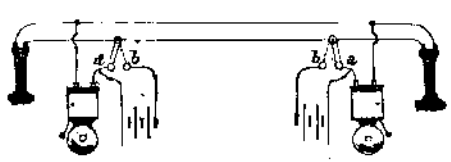
(5981) C. W. T. says: We have a number of small water motors here, and I desire to get at the amount of water used by them. What is the volume of discharge in cubic feet or gallons, due to 50 pounds pressure, or a head of 118 feet, from respectively 1-16 inch, ⅛ inch and ¼ inch nozzles, of the kind usual in small motors? A. The 1-16 inch nozzle will discharge 0·1073 cubic foot or 0·7777 gallon per minute. The ⅛ inch 0·443 cubic foot, or 3·322 gallons. The ¼ inch 1·772 cubic feet, or 13·29 gallons.

(5982) F. M. B. asks how to make a cheap single coil electric sounder and the materials needed. A. Make a core of bits of iron wire each 2 inches long, the bundle being ¼ inch thick. Glue paper around it and wind with four or five layers No. 20 wire. As armature use an iron nut soldered to the end of a spring. Bend the lower half inch of the spring at a right angle and screw to base board. Mount the magnet horizontally on a block screwed to the board.

(5983) A. M. R., Toronto, asks for the best method of dealing with water supply pipes to prevent condensation of moisture in passing through warm apartments, or secondly (if it cannot be prevented) the best plan to protect wall or ceiling from the dripping of the water. A. Thorough felting of the pipes, the same as with steam pipes, will prevent dripping of water.

(5984) J. K. asks: If the balance wheel on machinery run by an electric motor was changed from the main shaft as now run, making 40 revolutions per minute, to the intermediate, making 120 revolutions per minute, what would be the gain in power to overcome loads suddenly thrown on the main line, as compared to the present arrangement? A. It would have nine times the energy.

(5985) F. H. W. asks if there is any way that two hand telephones (receivers) can be connected by two wires only, and no ground, between two stations, and to signal with a two-point switch at each station, without using a push button with the battery and bell call; there are to be a set of batteries and bell at each station. What I want to accomplish is to have or give the signal to the distant station by simply moving the switch over and back. As the line is not very long (about 100 feet), I do not care to use a magneto, and if it can be done by only two wires, and no ground, with a two-point switch, I should like to know the way; otherwise I will use three wires, as there is no good means to make a ground connection. A. The annexed cut will give you an idea of the method of connecting up the required circuit. The normal position of the switch would be on the



point, *a*, connected with the bell. When it is desired to call, the switch arm is moved over to the contact, *b*; after the call is answered, the switch arm at either end of the telephone line is thrown off from the point, *b*, and left open. As soon as the conversation is finished, the arms are returned to the point, *a*.

(5986) C. W. H. asks (1) whether a magneto telephone will work on the same line with an electric telephone? A. Yes. 2. Also please give a diagram of a magneto telephone on a line 1,000 feet long with common electric bells for calls. Please give the diagram with the smallest number of line wires possible. A. See reply to query above.

(5987) J. S. M. asks: 1. On a common slide valve engine, cylinder 12+18 inch, how large ought the steam and exhaust pipe be? Is it best to have the exhaust pipe larger than the steam pipe? If so, how much larger? A. The speed of the engine is also an indication of the size of the steam and exhaust pipe. If your engine is to run at 80 revolutions and under a 2½ inch steam pipe and 3 inch exhaust pipe will be the proper size. If a high speed engine of from 125 to 150 revolutions per minute, a 3 inch steam and 3½ inch exhaust pipe will be the proper sizes. 2. How fast can a cast iron band wheel 7 feet diameter, rim 14 inches wide, and 1⅛ inch thick, be run with safety? A. The band wheel as stated, if a solid casting and sound, may be run at a velocity of 400 revolutions per minute with safety. If a split pulley with a bolted rim, it should not be trusted for more than one-half the velocity above stated. 3. Will lime in a boiler cause the tubes to leak? If so, what is the best remedy? A. Lime does not make boiler tubes leak, unless it should become so thick as to cause the tubes to become overheated and by their expansion disturb the joints. Boilers in limestone districts should be treated to a dose of caustic soda or lye, say at the rate of a pound for each 5 horse power, as often as once a month, kept in the boiler for a day's working and the boiler then thoroughly cleaned. See Davis' book on "Boiler Incrustation," $1.50 by mail. 4. Some boiler makers tell me that in putting new tubes in a fire box boiler it is best to let the tubes extend out past the tube sheet ⅛ or ¾ inch; expand to them without beading them. Others say it is best to have them the proper length and bead them down on tube sheet. Which is the best and most durable way? A. Tubes of locomotive boilers at the fire box end, if well expanded and projecting ends turned slightly out, should project no more than ¼ of an inch. If left longer, they are liable to be burned and become ragged on the edge. Close beading the end of the tube is old style, and should be abandoned. The beading tends to disturb the perfect joint made by expanding. 5. What is caustic soda, and where can I get it? There is not a merchant in all this country that can tell what it is or where it can be bought. A. It is sold as caustic lye or caustic potash. It is sodium hydrate.

(5988) W. W. W. asks: 1. What is the principle on which cream separators work, that is, how is the milk separated from the cream? A. The difference in specific gravity causes the separation. Long standing or centrifugal force may be applied. 2. What is the best way to learn electrical engineering—to take a college course or to enter an electrical establishment? If the latter is the better, please tell me what course to adopt to get into one. A. Go to a college. For courses in factories apply to the General Electric Co., Lynn, Mass., and Schenectady, N. Y. 3. Where is Lake Copais, spoken of in your last SCIENTIFIC AMERICAN? A. Lake Copais is situated in Greece.

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April 17, 1894,

AND EACH BEARING THAT DATE.

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