

(28) J. E. M. asks: Is there a non-conductor of magnetism? A. Yes. An interval of space.

(29) C. E. T. says: An "Engineers' Pocket Book" states: "Water may be reduced to 5° Fah. if confined in tubes of from 0.003 to 0.005 inch in diameter; this is in consequence of the adhesion of the water to the surface of the tube, interfering with a change in its state. Is this true, and if so, how do you know it? A. We do not know whether it is true or not. It might be tested by observing whether the water would flow in the tube at this temperature. Probably the author has some authority for his statement, although he does not give it.

(30) T. M. says: 1. I. F. states that, in building a grist mill, to use 48 cubic feet of water per second, with a 48 inch pipe to convey water, the flow must be 4 feet per second, or 240 feet per minute. Would not a larger pipe or penstock give better results with less velocity, say 100 feet per minute? A. There might be some gain, but possibly not enough to pay for the increased price of pipe. 2. What would be the difference in the velocity of water under any head, say 15 feet, with a draft tube (and vacuum pipe) or without one? What is the formula for velocity in a vacuum? A. Without the draft tube, the total head is that of the water. With the draft tube, the head is increased by the weight of the atmosphere, equivalent, for a perfect vacuum in the tube, to a column of water 34 feet high.

(31) M. B. L. says: I am making a magneto-electric machine, in which I have two 9 inch permanent horseshoe magnets. I tried a pair of electro-magnets 1 1/4 inches long, with a diameter of 1 1/4 inches and 1/2 inch core; the resistance of the magnets is 300 ohms (each spool 150 ohms). The current from these could not be felt. Please let me know what the resistance of a pair of spools for such a machine should be. A. The resistance of your spools is correct, and you ought to get a powerful shock from your machine. If you do not get it, the fault will probably be found in your connections.

(32) C. E. A. says: The following is a cheap device for oiling loose pulleys: Cut a shallow screw thread, of 1 inch pitch, right and left hand, nearly the whole length of the eye of pulley hub (the threads can be cut after the pulley is bored and while it is in the lathe). Then it will readily be seen that, while the pulley is in motion, the oil will follow in the grooves from right to left and left to right, nearly the whole length of pulley hub, without any chance to escape, as the groove ends within 1/4 inch from the end of hub. It will be necessary to fit a plug in the oil hole, as the centrifugal force will have a tendency to throw the oil out. A. This is a very good idea where the bearing surface is ample.

(33) J. M. L. asks: How can I make a fluid that, when a stick or paper are dipped into it, and exposed to the air, will take fire? A. Phosphorus is slightly soluble in ether, more so in benzole or turpentine. If a solution of phosphorus be made in either of the above solvents, and a drop of the solution be allowed to evaporate in the air, the phosphorus, which is left behind in a very finely divided condition—thus exposing a very extended surface for oxidation—takes fire spontaneously. If paper or other similar combustible material be moistened with one of the above solutions and subsequently allowed to dry in a warm air, it will become inflamed at the moment of the ignition of the phosphorus; this flame, however, will speedily be extinguished by the coating formed on its surface by the deposition of the white anhydrous phosphoric acid. The best solvent for phosphorus is bisulphide of carbon.

(34) H. B. asks: How can I make hyposulphite of lead? A. Add a slight excess of an aqueous solution of acetate of lead (sugar of lead) to a strong solution of hyposulphite of soda; the white precipitate which forms is hyposulphite of lead. It is very sparingly soluble in water, but dissolves in alkaline hyposulphites with the formation of double salts. It may be dried at 212° Fah. without decomposition; but at a higher temperature it blackens and gives off sulphurous oxide, and leaves a residue of sulphate and sulphite of lead. When heated in the air it glows like tinler.

(35) J. D. B. asks: 1. What will make gelatin insoluble in water, without losing its adhesive property? A. If treated with a strong solution of bichromate of potassa in water, and then exposed to strong sunlight, any form of gelatin is rendered superficially insoluble. Tannic acid renders gelatin insoluble by forming with it an insoluble tannate. Gelatin is also rendered insoluble by solutions of corrosive sublimate. 2. Is glue or gelatin soluble in ether, and how rapidly does it dissolve therein in comparison with water? A. It is insoluble in ether, but dissolves to some extent in a mixture of strong vinegar or acetic acid and alcohol (vinegar 4 parts, alcohol 1 part; heat). 3. What acid is best for etching type metal? A. Use nitric acid. 4. Is kerosene injurious to leather? A. Kerosene is liable to render the leather brittle and reduce its tenacity by removing a part of its natural oil. 5. Inking rollers can be kept soft in kerosene, but will the kerosene have an injurious effect? A. If the rollers are of the same composition as those usually employed by printers, the oil will not injure them.

(36) W. S. V. says: O. W. J. can preserve citron by boiling the sliced fruit, in enough water to cover it well, until tender; then to 2 lbs. fruit add 1 lb. sugar (A) and 1 lemon, sliced, and cook until the sirup is thick. The first water should be poured off, and as much more added before adding the sugar, etc. The better the sugar, the better the sauce.

(37) Professor C. W. MacCord says: You give place to the statement that the curve de-

scribed by a point in the connecting rod, between the centers of the crank pin and the crosshead journals, is a perfect ellipse: This statement is correct if the length of the connecting rod be equal to that of the crank, and the stroke of the crosshead four times as great, that is, twice the throw of the crank, but not otherwise.

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

J. H. P.—No. 1 is sulphuret of iron. No. 2 is graphite in quartz rock.—J. B. P.—The markings are a thin coat of oxide of manganese, formed by deposition between surfaces nearly in contact.—E. A. C. D.—It is carbonate of soda mixed with some sulphate of soda.—A box, with no name or address on it, contains one of the *opetra*—large garden spiders.—O. S.—The gelatin sent is prepared from the finest material, tinted with one of the aniline colors, by passing it, while in a viscid condition, between rollers.

T. H. B. asks: How can rice imitations of alabaster ornaments be made?—A. R. asks: How can I brighten bronze castings?—J. K. asks: What paint is the most durable for coating mirrors over the silvering?—W. D. asks: Why, in English coaches, are the hind wheels turned in at the base instead of being at right angles with the axle?

COMMUNICATIONS RECEIVED.

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

On the Trisection of an Angle. By A. B., J. B., and H. A. H.
On the Russian Frost Plant. By J. S.
On the Sun's Retrograde Motion. By J. H.
On Measuring the Width of a Stream. By W. A. D.
On the Canadian Patent Office. By F. L. J.
On the Sun's Heat. By H. S. W.
On the Ball Puzzle. By J. D.
On Hats and Bald Heads. By J. H.
On Professor Huxley's Lectures. By W. M.
On Land Waterspouts. By S. McD.

Also inquiries and answers from the following:
W. W. P.—C. F. G.—J. W. H.—R. J. L.—J. K. F.—C. M.—W. K.—N. J.—J. C. D.—G. L. P.

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 sells the best utensil for steaming cattle fodder, etc.? Who makes machines for making square biscuit tins? Who sells phosphor bronze? Who is the best apparatus for extracting lead from ores?" 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.

VALUE OF PATENTS,

AND

How to Obtain Them.

Practical Hints to Inventors.

PROBABLY no investment of a small sum of money brings a greater return than the expense incurred in obtaining a patent, even when the invention is but a small one. Large inventions are found to pay correspondingly well. The names of Blanchard, Morse, Bigelow, Colt, Ericson, Howe, McCormick, Hoe, and others, who have amassed immense fortunes from their inventions, are well known. And there are thousands of others who have realized large sums from their patents.

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HOW TO OBTAIN PATENTS.

This is the closing inquiry in nearly every letter, describing some invention, which comes to this office. A positive answer can only be had by presenting a complete application for a patent to the Commissioner of Patents. An application consists of a Model, Drawings, Petition, Oath, and full Specification. Various official rules and formalities must also be observed. The efforts of the inventor to do all this business himself are generally without success. After great perplexity and de-

lay, he is usually glad to seek the aid of persons experienced in patent business, and have all the work done over again. The best plan is to solicit proper advice at the beginning. If the parties consulted are honorable men, the inventor may safely confide his ideas to them; they will advise whether the improvement is probably patentable, and will give him all the directions needful to protect his right.

How Can I Best Secure My Invention?

This is an inquiry which one inventor naturally asks another, who has had some experience in obtaining patents. His answer generally is as follows, and correct:

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