

**Business and Personal.**

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H. S. can obtain Faraday's "Experimental Researches" by applying to the booksellers who advertise in our columns.—F. W. M. will find directions for gliding on p. 90, vol. 30. Copies of patents can be obtained at this office.—R. Y. M. will find a description of wooden railroads in the United States on p. 324, vol. 29.

—J. W. had better send us his instrument for finding lead, silver, and gold beneath the surface of the earth.

—J. L. S. will find a description of polish for shirts on p. 27, vol. 30. We do not answer business questions in this column.—B. D. T. will find the statistics of English patents on p. 272, vol. 29.—D. B. will find directions for making paper boats on p. 163, vol. 27.—C. C. A. can preserve eggs by the recipe given on p. 373, vol. 30.—C. C. is informed that one of the best practical works on the steam engine is Bourne's "Catechism."—J. V., who wishes to become a mechanical engineer, should read Mr. Clarke's paper on p. 8 of this issue.—C. E. D. will find a description of the dynamometer he requires on p. 7, vol. 31.—J. R. will find a recipe for a cement for alabaster (which will serve for glass and china) on p. 218, vol. 26.—J. C. C. is informed that wood rollers can be kept from checking by the process detailed on p. 283, vol. 30.—S. R. H. can prevent rust on steel tools by the recipe on p. 234, vol. 27.—H. W. can blue a gun barrel by following the directions on p. 10, vol. 25.—F. J. D. can drive away cockroaches by the means described on p. 107, vol. 30.—R. W. will find full directions for case hardening on p. 122, vol. 30.—O. P. will find a recipe for aquarium cement on p. 90, vol. 30.—J. H. T. should not believe the mineral rod men. There is no truth in any of their pretensions.—We are obliged for A. B.'s reply to the horse and man problem, which we had anticipated in our editorial pages last week.

W. T. R. asks: 1. How are the battery wires connected with an electromagnet, so as to make the armature vibrate as long as the current continues? I wish to attach one to a clock alarm. A. The armature is fastened to a brass rod, as in a telegraph relay; this arm or lever, with the aid of a spring, serves to hold the armature a short distance from the cores of the magnet when the current is not passing. The wire, as it leaves the magnet, is placed in metallic communication with this lever; the wire from the other pole of the battery is attached to a small brass standard, which is placed in such a position that when the current is not passing the spring attached to the small lever draws it back against the standard, thereby completing the circuit, charging the magnet, which in turn attracts the armature, thus breaking the circuit, when the whole operation is again and again repeated. 2. How many feet of No. 15 copper wire will it take to make an induction coil for an electromagnetic machine for medical purposes? What number of wire and what length is best for the primary coil? A. See p. 379, vol. 30.

A. W. says: Can I make cook stove patterns of some alloy, that will run perfectly in molds of plaster of Paris and wood? A. Try white metal as follows: 86 parts by weight of tin, 10 antimony, 3 zinc, 1 copper.

F. T. says: A gentleman having a spring some 60 rods from his house wished me to lay a pipe from it to supply his house and barn. I commenced at the spring to lay the pipe, not letting the end into the water until I had made all connections, and running it to the house with some 30 feet fall. I then carried it into the kitchen over the sink, 5 feet high, bending it in a semicircle and running down again through the floor underground, some 6 rods to the barn, sinking a barrel for it to discharge into after running through the house. On the pipe, 16 inches from the circle or bend, I put a cock to draw for the use of the kitchen, this being on the side next to the spring. But to my surprise, when placing the end of the pipe into the spring, the water would run past the cock which I had inserted below the bend, rise 16 inches higher, and run down the other side of the barn. This I could only remedy by placing a stop cock on the opposite side of the circle and shutting it every time I wished to draw from the faucet. Not one drop of water would come out of the faucet without this. A. Such an occurrence is very common. You have got a siphon there. You can readily fit a two-way cock for the house faucet, which will shut off the discharge into the barn, when opened into the kitchen.

A. B. asks: How is black copperplate printing ink made? A. Take linseed oil 1 pint, boil out of doors in a dry saucapan till it will ignite on applying lighted paper, let it burn 10 minutes, then put the lid on, and the flame will go out. Stir in 1/4 oz. litharge. When cool, grind into a paste with lamp black, using a muller.

W. H. S. asks: 1. How can I make a white linen or cotton waterproof without covering the texture or discoloring the linen? What kind of varnish or other transparent substance will give linen an durable finishing polish after being thus treated? A. A good colorless varnish is made by dissolving 2 1/2 ozs. shellac in a pint of rectified spirits of wine; boil for a few minutes with 5 ozs. well burnt and recently heated animal charcoal. Add more charcoal if necessary to make the varnish white. Filter through blotting paper. 2. How can I make an adhesive substance that will not discolor white linen? Try gum tragacanth mucilage, adding a few drops oil of cloves to prevent putrefaction.

C. D. R. asks: What are "bastard cut," "smooth cut," "superfine cut," and "dead smooth" files? A. Bastard cut files are coarse ones used for roughing work out. Second cut are for roughing out hard metal. Superfine cut are for making very smooth surfaces. Fine cut are for ordinary smooth surfaces. Dead smooth are for very fine surfaces to be highly polished, the latter saving much labor in polishing.

A. S. & Co. ask: How can we prepare sweet cider so that it will remain sweet for several months? Can it be so prepared that it will bear transportation without fermentation? We notice that cider will ferment in a short time, even in freezing weather, when agitated by the motion of the cars. A. Perhaps the best method is that of thoroughly charring the insides of the casks, and racking off the cider a number of times.

E. A. B. says: Some four years ago the ship Pomona was lying in Montreal deeply laden. Five or six strong to boats tried for three days to tow her up, but were unsuccessful. One of the Allan steamships then took her in tow, as she was going up the current, and, unaided, walked her along without the slightest difficulty. The steamships always ascend the current (which runs at 10 knots) at half speed. The question is: Was not the extra weight of the steamship a power in the case? I should state that the aggregate steam power of the tugs was greater than that of the steamship. To simplify the case, cannot a man in a boat of 25 x 35 feet tow a boat of 12 x 4 feet with greater ease than he can in a 12 x 4 boat tow one of 25 x 35? I know by experience that he can do so, but I should like to know what law of force in motion governs the case. I want to know if inherent weight is not a power in the towage of smaller vessels in which weight is equally concentrated in proportion to the displacement of water? A. We think that the sole advantage possessed by the large steamer was in the fact that her screw, being more deeply immersed, was not working in such a swift current as the smaller ones, and acted more efficiently. There was no gain in the increased weight.

A. D. D. asks: How can I repolish surgical instruments after grinding them on a lead wheel with flour of emery? A. Nothing polishes any metal better than crocus cloth, used on the article until it is covered with a face of the metal itself. The more the crocus is used, the better it is for polishing.

G. A. A. asks: If my lightning rod is painted, does the paint lessen its usefulness as a conductor? A. No.

W. W. asks: 1. Is there any loss in reciprocating motion as compared with rotary motion? If so, how can an engine run half a mile and back in the same time with the same power that another can run a mile ahead? If this is not a fair illustration, will you please explain how it is? A. We do not understand what you mean. 2. Is it not possible that we may have a liquid fuel that will be as cheap and much more convenient than coal, even if it has to be procured from coal? A. It is possible.

H. E. S. says: I have a fish net made of cotton twine, which remains in fresh and sometimes muddy water for two or three months at a time; what should it be immersed in (so as not to lose its flexibility) to best preserve it from decay? A. Steep your net in melted paraffin.

G. R. E. asks: How can I melt white vulcanized rubber in order to make castings? A. You cannot melt such rubber satisfactorily. Dissolve it in naphtha or else use the pure gum rubber.

J. M. E. asks: What is the commercial importance of black lead? A. Largely used in the manufacture of crucibles, lead pencils, as a lubricant, stove polish, etc.

C. C. M. I. asks: 1. Do you know of a manure or fertilizer which is soluble in water and which is of advantage in growing tobacco? A. We have used sulphate of ammonia to stimulate growing plants, and very successfully. We should therefore suggest its employment for tobacco. Other soluble salts of ammonia would answer, but this has the advantage that it is contained in the ammoniacal liquor of gas works and can be obtained in large quantity if needed. 2. Can you give me a recipe for making an amalgam for an electric machine? A. Melt together in a crucible 2 drams of zinc and one of tin; when fused, pour them into a cold crucible containing 5 drams of mercury. The cushions should be rubbed with a mixture of tallow and beeswax before applying the amalgam. 3. Is it also necessary to have the plate for the machine entirely smooth around the edge? A. Not absolutely necessary. 4. What is the proper temperature of water for bathing? A. A little colder than the temperature of the body.

J. W. P. asks: Why is it that an explosion is liable to take place during the loading of a cannon, if the vent is not closed? A. Explosions of this kind are due to particles of ignited carbon remaining in the gun. The closing of the vent partially stops the supply of oxygen, and this hastens the extinguishing of the carbon. In cases where the firing is continuous and hasty, these premature explosions are liable to occur, even though the vent be closed.

T. J. H. says: 1. We have a tree, the first fork of which is six feet from the ground. As the diameter of that tree increases year after year, will the distance between the ground and said fork also increase or not? A. The increase is only by interstitial lateral growth. The distance from the ground remains precisely the same. 2. It is a settled fact that carrying Irish potatoes in the pantaloons pocket cures rheumatism. Why is this? Why do said potatoes, when so worn, become as hard as stones instead of decaying? A. Curious, if true. Warmth without dampness will gradually desiccate a tuber like a potato, until it becomes very hard. Warmth and moisture will cause decay, and it is to be hoped that these circumstances do not conspire in the case mentioned.

G. S. B. says: I have tried the recipe, given in your No. 20, for making French polish, namely, dissolving shellac and sandarac in naphtha, and I find that naphtha does not have the least effect on either. A. Take the best pure white shellac and dissolve in alcohol (fourth proof); add a little gum sandarac. The fineness of the polish depends entirely upon the manner and skill with which it is applied.

G. H. M. asks: 1. How can I prevent a tea-kettle from turning the water brown by rusting? A. Keep an oyster shell in the bottom of the kettle; and when water is wanted, pour off without agitating the vessel. Be careful also not to let the water stand in the vessel when not in use. 2. What is the weight of one cubic foot of air near the earth? A. 100 cubic inches of air, at 60° Fah. and 30 inches barometric pressure (which may be taken as expressing the mean average condition of the atmosphere at the earth's surface), is 31.074 grains. Hence a cubic foot under the same circumstances will weigh 586.95872 grains.

F. E. C. asks: What metal with which hydrogen gas comes in contact produces flame sufficient to ignite gas? A. Platinum in a state of fine division, when it is called platinum black or platinum sponge.

C. T. asks: 1. How is the paper for printing decalcomans prepared? A. Treat it with albumen. 2. What can I use to make tin look a bright gold color? A. Varnish it with shellac.

G. R. asks: I am manufacturing an article of 100 parts copper and 60 parts zinc. It is just about the quality of brass I require, but it has the appearance of yellow brass. Is there not some metal which I could add to the mixture to give it a richer and more coppery color? A. There is no way except by increasing the percentage of copper.

H. H. H. A. asks: 1. What is a simple way to color or bronze a gun to keep it from rusting? A. Dissolve 2 parts of crystallized chloride of iron, 2 parts solid chloride of antimony, and 1 part of gallic acid in 4 or 5 parts of water. Apply to the gun barrel with a sponge. Let it dry in the air, and repeat the operation several times; then wash with water, dry, and rub with boiled linseed oil. The shade deepens according to the number of times the operation is repeated. 2. What material is the best for gun wads? A. A specially made felt is used for this purpose. 3. How can I make glycerin? A. See p. 347, vol. 30.

L. says: In your issue of March 28, you give a recipe for dissolving rubber in turpentine. I have tried it in turpentine, bisulphuret of carbon, ether, and benzine, hot and cold, in bath and without, and could never succeed. I send you a piece of the rubber. A. Your sample dissolves in all of these, and partially in naphtha and benzine.

C. S. asks: 1. How is milk brought into a state of fermentation? A. After the milk has curdled, add powdered chalk until all the lactic acid is taken up and repeat the operation as the fermentation proceeds. 2. How can butyric acid fermentation be stopped? A. Try powdered alum.

G. R. asks: How can I dissolve boracic acid so that it will remain in solution? I tried 1 part acid to 8 of boiling water, but it precipitated on cooling. A 100 ozs. of water at 75° Fah. will dissolve 1 3/4 ozs. of boracic acid. Your other queries were answered last week.

T. C. H. asks: In doing fine work such as engraving, will it be more injurious to the eyes to use spectacles of tolerably strong magnifying power, than an ordinary eye glass and stand, such as is generally used for that purpose? A. Whenever strong magnifying powers are used, the eyes require corresponding long periods of repose to prevent injury.

A. T. B. asks: How is phosphorus dissolved previous to being applied to the match? How are the matches dipped? Is there any danger in the process? A. The preparation is different according as they are chemical or lucifer matches. For chemical matches, put 40 grains of phosphorus in a wide-mouthed bottle. Add enough oil of turpentine to cover the phosphorus; then mix in 10 grains of flowers of sulphur. Put the bottle into hot water until the phosphorus is entirely dissolved; stop the mouth of the bottle with a cork, and well shake the whole until it has become cold; afterwards pour off the supernatant oil of turpentine. Into the mixture of phosphorus which remains in the bottle, dip the extremities of the matches; and after some time, when they have become dried, drop them into the following mixture: Dissolve 30 grains gum arabic in a small quantity of water; add to it 20 grains of chloride of potash, and mix them intimately together; then add 10 grains of soot previously mixed with a few drops of spirits of wine. In about 20 hours, the matches will be perfectly dry, when they will ignite on rubbing them over a rough surface. For lucifer matches, use one third of phosphorus, and the remainder of gum arabic, water and coloring matter like mtlum or Prussian blue. Mix in a water bath and miller carefully. The dipping is performed in the following manner: The melted composition is spread upon a board covered with cloth or leather, and the workman alternately dips the two ends of the matches, that are fixed in a frame. The fumes are very poisonous.

H. L. E. says, in reply to P. S. S. who asked whether Cornell University is a good school for mechanical engineering: There is connected with Cornell an extensive mechanical and machinery department, fully equipped with some of the finest machinery and tools to be found in any shop in the country, and where instruction in practical mechanics is given by the most efficient professors. The study forms an important part of the course required of the student, and gives a proficient an opportunity to earn something towards his own support.

**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 Color of Light. By M. O. N.
- On Veaucellier's Parallel Motion. By S. N. M.
- On the Transit of Venus. By R. D. W.
- On Screw Propellers. By J. E. W.
- On the Sun's Attraction. By C. T.
- On the SCIENTIFIC AMERICAN. By K. M. J.

Also enquiries and answers from the following:

H. P.—T. J. W.—S. L.—J. C. C.—F. H. D.

Correspondents in different parts of the country ask: Who publishes a book on raising gold fish? Who sells a motor for light machinery, other than a steam engine? Who sells small engines for boats, so simple that an amateur can run them? Who makes adding machines? Who makes the best brick machine? Who has a patent apparatus or system for blasting rock? Who makes the best turbine water wheels? Who sells the best lathe for turning hammer handles? Who makes stump pullers? Who makes steam engines, as small as 2x3 inches in the cylinders? Who sells machines for forming and coating pills? Makers of the above articles will probably promote their interests by advertising, in reply, in the SCIENTIFIC AMERICAN.

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.

Several correspondents request us to publish replies to their enquiries about the patentability of their inventions, etc. Such enquiries will only be answered by letter, and the parties should give their addresses.

Correspondents who write to ask the address of certain manufacturers, or where specified articles are to be had, also those having goods for sale, or who want to find partners, should send with their communications an amount sufficient to cover the cost of publication under the head of "Business and Personal," which is specially devoted to such enquiries.