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.

For Sale.—One 25 H. P. second hand straight line engine, made by Sweet. In first class order. W. P. Davis, Rochester, N. Y.

Acme engine, 1 to 5 H. P. See adv. next issue.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J.

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

Screw machines, milling machines, and drill presses. The Garvin Mach. Co., Laight and Canal Sts., New York.

Will sell for $50, 6½ x 8½ photographic outfit, 8 x 10 extension, nearly new; cost, $107. D. M. Wylie, Baltimore.

Centrifugal Pumps for paper and pulp mills. Irrigating and sand pumping plants. Irvin Van Wie, Syracuse, N. Y.

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For the original Bogardus Universal Eccentric Mill, Foot and Power Presses, Drills, Shears, etc., address J. S. & G. F. Simpson, 26 to 36 Rodney St., Brooklyn, N. Y.

Scale removed and prevented in boilers; for each 50 horse, 10 cents a week. Pittsburgh (Pa.) Boiler Scale Resolvent Co.

Price of the Brown & Sharpe No. 1 Universal Milling Machine, $480. With Overhanging Arm, $495. Price of the No. 3 Universal Cutter and Reamer Grinder, $200. Previous prices, $550, $585, and $260. Brown & Sharpe Mfg. Co., Providence, R. I.

☞ Send for new and complete catalogue of Scientific and other Books for sale by Munn & Co., 361 Broadway, New York. Free on application.

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 This is for our information and not for publication.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.

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.

(3575) I. M. S. asks for a red and black copying ink. A. Red copying ink.—Dissolve 50 parts extract of logwood in a mortar in 750 parts distilled water without the aid of heat; add 2 parts chromate of potassium and set aside. After twenty-four hours add a solution of 3 parts oxalic acid, 20 parts oxalate of ammonium and 40 parts sulphate of aluminum in 200 parts distilled water, and again set aside for twenty-four hours. Now raise it once to boiling in a bright copper kettle, add 50 parts of vinegar, and after cooling fill into bottles and cork. After a fortnight decant. This ink is red in thin layers, writes red, gives excellent copies in brownish color, and turns blackish brown upon the paper. Black copying ink.—1. The quality required of a copying ink is that it shall afford one or more copies of the written matter by applying dry or damped paper to its surface, and subjecting it to more or less pressure. The best kinds of copying ink are usually prepared by adding a little alum to an extract of logwood of 10° B., 1·075 sp. gr., or to a decoction of the same, and then to improve its copying power some sugar and glycerine or table salt is added. Such inks have a violet tint, are purple when first written, and gradually darken on the paper. The copies taken from them are at first very pale, and only slowly darken. 2. Mix about 3 pints jet black writing ink and 1 pint glycerine. This, if used on glazed paper, will not dry for hours, and will yield one or two fair, neat, dry copies, by simple pressure of the hand in any good letter copy book. The writing should not be excessively fine, nor the strokes uneven or heavy. To prevent setting off, the leaves after copying should be removed by blotting paper. The copies and the originals are neater than when water is used. From "Scientific American Cyclopedia of Receipts, Notes and Queries." In press.

(3576) D. W. asks if the statement is true as to the frequent falling of Cayuga Lake to such an extent as 50 feet. A. We referred the matter to an esteemed correspondent who resides near Lake Cayuga, and his reply is as follows: So far as those who have lived, for years, about the neighborhood, and on the shores of the lake, are aware, there is no foundation for the story reported by the paper from which the slip is taken. Many houses on the border of the lake are at the water's edge and none has yet been known to be swamped. The city of Ithaca is on the bottom lands at its head, and, in the times of spring freshets, is on a level, in many parts, with the surface of the head of the lake; it has never suffered the fate of Atlantis, and no apprehensions are felt for the immediate future. The lake is deep (435 feet) and cold, and this fact may account for its retention of its prey, as stated, if that be a fact, which we doubt. No living inhabitant has yet seen the bottom of the lake laid bare. The records of Cornell University contain no accounts of such marvels as are described, and that institution has a constant altitude of four hundred feet above Cayuga waters. The small rise and fall actually occurring in either Cayuga or Seneca Lake is simply that due the greater or less magnitude of the streams in times of freshets and in times of drouth.

(3577) J. R. H. asks for the best method of keeping cider sweet and drinkable. A. The following is from the "Scientific American Cyclopedia of Receipts, Notes and Queries." In press. A pure, sweet cider is only obtainable from clean, sound fruit, and the fruit should therefore be carefully examined and wiped before grinding. Add ⅛ to ¼ of an ounce of calcium sulphite to each gallon of cider in the cask, first mixing the powder in about a quart of the cider, then pouring it back into the cask, and giving the latter a thorough shaking. After standing bunged several days to allow the sulphite to exert its full action, the cider may be bottled off. The sulphite of calcium (which should not be mistaken for the sulphate of calcium) is a commercial article, costing about 20 to 25 cents a pound. The sulphite will preserve the sweetness of the cider, but unless care is taken not to add too much, it will impart a slight sulphurous taste to the cider. The bottles and corks used should be perfectly clean, and the corks wired down.

(3578) A. W. writes: I would like to inquire in regard to the use of copper in the valleys of a roof, instead of tin. I am building a house and am disposed to have something more durable than tin in the valleys, but some persons suggest to me that the water from a copper roof would be unwholesome and unfit for drinking. Now I can't imagine what there is in the water or air that will form a poisonous compound, and therefore wish to avail myself of your superior knowledge and experience. I expect also to place a tank of about 20 barrels capacity in the attic, lined with lead, and would like your views also in regard to the use of water from that, for drinking and cooking. A. Avoid the use of copper and of lead in connection with drinking water. Salts of both metals are formed, which are soluble in water and are poisonous. Let your copper valley plates be tinned. The metal lining of your water tank also should be tinned.

(3579) A. S. R. writes: Please tell me the formula for a good paste for mounting photographs that will keep without souring.

A. Arrowroot	10 parts.
Water	100 "
Gelatine	1 "
Alcohol	10 "

Soak gelatine in the water, add the arrowroot, which has been thoroughly mixed with a small quantity of the water, and boil four or five minutes. After cooling add a few drops of carbolic acid or oil of cloves.

(3580) G. A. S. asks: How shall I prevent frost from gathering on my outside office window? The house is new and well made. The windows are tight. The room is 10 feet square. It is lighted by two large 4 light windows. The outside windows are screwed on and made reasonably tight. Now, here is what I can't understand. While the north window will remain almost entirely free from frost the winter through, the east window is almost as uniformly covered with frost. A. Not being able to inspect the local details of leakage through the double windows, we can only assume that the dry westerly and northerly winds of winter press against the westerly and northerly side of the house. The leakage of the cold dry air in on this side prevents excess of moisture between the window glasses, and consequently they are free from frost, while for the east window the leakage of the warm moist air is outward, filling the space between the glasses with moisture, which on contact with the cold outer glass covers it with frost.

(3581) N. C. H. asks: Will you please let me know the best way to keep a quantity of American cheese for a number of years, that has been made this year, so as to keep it in its natural condition? A. Cheese should be kept in a dry cool room in boxes through the winter, so as to allow of drying. In the spring and summer the cheeses should be rubbed at least once a month with soft clean tallow, assuming that the cheese comes from the dairy in prime order. Another way is to seal them in tin boxes during dry cold weather, when they will require no further care.

(3582) F. H. C. writes: I have a sail whose height is 14 feet on mast, 20 feet on boom and 8 feet on gaff. The jib is 16 by 8½. Also topsail contains 6 square yards light sheeting. The mainsail and jib are 8 ounce duck. Please state what proportion I had better take to drawing. I would like to know how to restore checked varnish on a mandolin? It does not peel off, just cracks. Please name the best oil for keeping inside of gun barrels from rusting. A. Your sails will be right if you build the ice boat on a scale of ¼ inch to 1 foot from the drawing in SUPPLEMENT, No. 624. You can only revarnish the mandolin. You cannot remove the cracks without scraping the old varnish off. Use vaseline for the inside of your gun.

(3583) H. R. K. asks the speed at which nuts can be punched, ¼ inch U. S. S. Hex., ½ inch U. S. S. Hex., and 1 inch U. S. S. Hex. And also quote papers or books where the subject is treated, so that I can get at the cost of punching, tapping, finishing, and casehardening. A. You will find some valuable experiments in punching iron in SCIENTIFIC AMERICAN SUPPLEMENT, No. 68. The speed for punching nuts is only limited by the strength of the punch. We have no books on the subject.

(3584) C. A. H. writes: There is a span of say 500 feet over which a wire is placed, fastened at both sides of the span. This is supposed to be straight. Now if a weight of say 10 pounds is hung at the center, causing a deflection of two feet, what will be the strain on each or both supports? I should like to know how this is worked out approximately. A. The formula for the weight on a stretched line is figured as follows: $\frac{250 \text{ feet}}{2 \text{ feet}} = 125$, which is the tangent of the greater angle. The tangent of 125 is 89° 32′. The strain on the line = one half the weight × secant of angle, which for 89° 32′ = 122·78 × 10 = $\frac{1227·8}{2}$ = 618 pounds.

(3585) P. H. J. asks how to fill a crack on the top of the oven of a cook stove. That is, what mixture to use, that can be applied, and which will withstand heat? A. A good cement for stove cracks is made by mixing into stiff putty with water:

Wood ashes	10 parts.
Clay	10 "
Quick lime	4 "

(3586) W. B. D. asks: Is there any way of preventing excessive perspiration of machinist's hands and the consequent injury to steel tools? A. We know of no suitable means of preventing perspiration. Can only recommend wiping and oiling the tools.

(3587) E. B. D. writes: 1. About two or three years ago I saw an article, I believe in the SCIENTIFIC AMERICAN, which explained how one could determine the points of compass by means of a watch held so that the sun might shine on some particular point on the circumference of the dial (the point depending upon the time), and the diameter across the dial from 12 to 6 o'clock would then be in the line from north to south. Will you kindly explain in your Notes and Queries column how this can be done? A. When the hour hand of the watch is pointed to the sun, the south will be on a radial line of the dial half way between the hour hand and XII on the dial. This is only approximate for our latitude. 2. Please give directions for making a sun dial. A. You will find a sun dial described in SUPPLEMENT, No. 259.

(3588) A. M. B. asks for receipts for black writing inks. A. 1. An exceedingly fine ink is said to produced by the following recipe: 11 parts galls, 2 parts green vitriol, one-seventh part indigo solution and 33 parts of water. Writing executed with this ink may, it is true, be removed by means of dilute acids, but it may be rendered visible again by chemical means. 2. Arnold's Writing Fluid.—This writing fluid is a mixture of sulphate of indigo and ordinary ink. It flows freely from the pen and at last becomes very black. 3. Aniline Black Ink.—Concentrated solution of borax, 1 part; shellac, 4 parts; boil; add aniline black.

(3589) G. J. E. writes: Can you tell me of a preparation that is inexpensive for staining stone any desired color? That will not wash off. A. We have seen samples of white marble tiles stained in ornamental figures and polished. We suppose the staining is done with aniline colors.

(3590) H. C. K. asks what to mix or use with a potter's clay on cellar bottom while rolling it to make it hard. A. Use Portland or best hydraulic cement 1 part to 2 parts clay. Pulverize the clay dry and mix thoroughly with the cement, then wet with water just enough to make the mixture spread, and roll quickly and smooth with a shovel or trowel.

(3591) L. W. B. asks for match composition. A. The following is one of the best receipts for composition match tips without phosphorus. It is the same as that used in preparing the well known U. and P. matches and does not require a separate rubber or prepared surface:

Potassium chlorate	26 oz.
Manganese, black oxide	25 "
Potassium bichromate	20 "
Lead cyanide	20 "
Antimony oxysulphide	20 "
Glass powder	4 "

These substances are first powdered separately and then gradually mixed into a solution of 1 lb. gum in 4 lb. water, to form a thick, smooth paste; with this paste the dry wood splinters are tipped, and after about eighteen hours' exposure to the air in a drying room, kept at about 80° Fah., the matches are ready for boxing. To render the matches non-absorbent of moisture or waterproof, they are momentarily dipped into a liquid composed of:

Shellac, best white	1 lb.
Alcohol, or wood naphtha	1 qt.

digested together in a closed vessel for several days with occasional agitation, then strained through fine linen cloth. Use red lead to color.

(3592) N. S. F. asks: 1. In construction of Mr. Hopkins' telescope, in what respect is a meniscus better than a double or plano-convex lens? A. The meniscus lens gives a flatter field than the convex. 2. I thought of using a "cosmorama" lens, such as is sold for about $1.50; 3 to 4 in. diameter, 48 to 60 in. focus. Would double convex or plano-convex be best? A. A plano-convex lens will be preferable, but neither of them would be very efficient as a telescope objective. 3. How would a 4 in. by 60 in. telescope with such a lens compare as an astronomical with an ordinary spyglass with 1¼ in. objective? A. We think that an ordinary spyglass with a good achromatic inch and a half objective would be preferable. 4. What would be the best combination for a celestial eyepiece for above mentioned lens? A. For information on celestial eyepieces, we refer you to an article on "Telescopes for Amateurs" in SUPPLEMENT, No. 252. 5. How would a double concave eye lens answer with such an objective? A. A double concave eye lens would answer very well with a common plano-convex or meniscus lens as an eyepiece, as it has necessarily a very low power, but with a good telescope objective it is of no value. 6. Could the eyepiece of an ordinary spyglass be separated, and either the eye or field combination of the two lenses be used as a celestial? A. Yes.

(3593) L. W. asks how to make a preparation which applied to leather will dry quick and leave a hard coating and elastic? A. Dissolve shellac in a saturated solution of borax and water. The solution is effected very slowly, and to accomplish it, it is necessary to allow the ingredients to stand for several days, occasionally shaking them. When the shellac is entirely dissolved, add fine bone black until the blacking has sufficient body to cover well. If the blacking is too thick, it can be thinned with the borax solution.

(3594) G. W. W. asks: Can you inform me through your Notes and Queries column of a method of determining the displacement of small sail boats from drawings or plans of same? Also whether the water line can be accurately ascertained by calculation, and rule for same. A. There are rules for computing the displacement from the drawings. In general terms they require the water line to be assumed on the drawing, and below this line compute each cross section as many as laid out on the drawing. Add all the areas together and divide by their number, which will give a mean. If in inches, should be divided by 144 for feet; multiply the mean area in square feet by the length on the water line in feet, which equals the displacement in cubic feet, which multiply by 62½ and divide by 2,000 for net tons. The actual weight of the boat subtracted from the displacement gives the tonnage at the assumed water line. The water line can be computed by approximating the actual weight of the material in the boat and the required tonnage to the corresponding displacement computations.

(3595) F. R. C. says: A considerable body of solder, composed of lead and tin, rather more lead, which it is necessary to keep at a reddish heat for hours together, yields up a yellowish power which rises to the surface. What is this powder? Can it be reduced to metallic state again? If so, how? A. The yellow powder is the oxide of lead, with a possible mixture of the oxide of tin. It can be reduced to the metallic state by mixing with pulverized charcoal, placing in a crucible and heating to a red heat; stir the mass and pour off the lead.

(3596) E. D. C. asks: Can you refer us to a receipt for making type-writing ribbons that will copy? A. Melt vaseline on a water bath or slow fire, and incorporate by constant stirring as much lamp black or powdered drop black as it will take up without becoming granular. If the fat remains in excess, the print is liable to have a greasy outline; if the color is in excess, the print will not be clear. Remove the mixture from the fire, and while it is cooling mix equal parts of petroleum, benzine and rectified oil of turpentine, in which dissolve the fatty ink, introduced in small portions by constant agitation. The volatile solvents should be in such quantity that the fluid ink is of the consistence of fresh oil paint. One secret of success lies in the proper application of the ink to the ribbon. Apply the ink, after agitation, by means of a soft brush, and rub it well into the interstices of the ribbon with a tooth brush. Hardly any ink should remain visible on the surface. For colored inks use Prussian blue, red lead, etc., and especially the aniline colors.

Aniline black	½ oz.
Pure alcohol	15 "
Concentrated glycerine	15 "

Dissolve the aniline black in the alcohol, and add the glycerine. Ink as before.

(3597) J. S. L. asks: How much of the force that is expended in starting a piston and crosshead from one end to the center of the cylinder, is given out again in stopping the same from the center to the other end of the cylinder? A. All the force put into the piston is given out in stopping, save the friction.

(3598) T. T. says: I wish to know whether in looking at any particular object from 2½ miles up to 4 miles on a clear day, what kind of a glass is the best in the world, the binocular telescope or the spy glass? Are imported field and spy glasses, also binocular telescopes better than ones made in this country? In looking at any particular object, 25 miles distant, can a person see as plainly with the best binocular telescope as he could with the best spy glass? A. Binoculars are made for the convenience of light and perspective and for more exact judgment of distance. They are used for military and other special purposes, and not of great power. For their size they should define as well as the best spy glass or more properly telescopes of their size. The binocular field glasses are mostly imported and are considered first class. If you want fine definition and power for distant objects, the larger telescopes of from 2 to 3 feet in length are the best suited for the purpose.

(3599) F. C. P. asks: 1. I have a brass tube 1¼ inch diameter, 9 or 10 inches long; if I fit a piece of wood on each end, can I wind it for an induction coil, or would it be better to start winding on a very thin cylinder of wood and fill the brass tube with soft iron wires for a helix (I think that is the name of the inner rod). What size wire to use on the inner winding, and how many layers, also on the outside? What size wire, and must I put any insulation between the primary and secondary, or simply wind one over the other? A. A brass tube will not answer as a foundation for an induction coil, because it will absorb the energy which should pass into the secondary wires. Better use wood or rubber for the spool. Use for the primary wire 2 layers of No. 16 magnet wire. For the secondary wire, 8 or 10 layers of No. 36 magnet wire. 2. How do I get high amperage on this coil? A. What you gain in voltage you lose in amperage in an induction coil. If you secure a high amperage, you must expect a low voltage. 3. Must I insulate each layer of wire, or will the cotton covering do? A. It is well to put a thickness of paper between the layers. 4. Have you a SUPPLEMENT that fully describes induction coil winding and mounting, what number? A. For information on induction coils we refer you to SUPPLEMENT, No. 229. 5. If I make a camera of wood and use a pin hole lens, must it be set at an angle to the face of the plate or perfectly square? A. The surface in which the pinhole is made should be parallel with the plate. 6. Have you a SUPPLEMENT describing a small camera, both wood and bellows? A. For instruction on making camera bellows we refer you to SUPPLEMENT, No. 625. The only SUPPLEMENTS we have on cameras are No. 746, machine camera, panoramic camera, No. 507, photographic gun, Nos. 332, 336.

Enquiries to be Answered.

The following enquiries have been sent in by some of our subscribers, and doubtless others of our readers will take pleasure in answering them. The *number* of the enquiry should head the reply.

(3600) J. S. writes: Will you please give the following problem to your readers, requesting an arithmetical or algebraic solution of it? A, B and C are points on a straight line and ten miles apart; *m* is at A and *n* at B; *n* starts at 7 A. M. to go to C and travels at the rate of one mile per hour, arriving at 5 P. M.; *m* starts after *n* at 7 A. M., catches him and turns back, reaching B at 5 P. M., having also traveled just ten hours. Where was *n* when *m* caught him? Or how far and at what speed did *m* travel?