Notes & Queries

E. T. M.—The sample of insulated wire sent is rather coarse, but it will answer for the purpose. —J. J. B.—It appears to us that your best course is to seek some position in a telegraph office, in which you will be apt to receive a thorough practical education in the art.—D. W. D.—See p. 165, SCIENTIFIC AMERICAN, No. 11, vol. 35; and p. 229, No. 15, vol. 35. By arranging the slide valve to cut off at about three quarter stroke, the proposed engine would probably answer.—G. D. B. —Gas carbon may be cut into plates by means of a common hand saw.—J. A.—See answer No. 42, p. 396, SCIENTIFIC AMERICAN, December 22, 1877.—F. J. S.—There are a number of treatises on the subject, in addition to the more complete arithmetics, which you should consult as the discussion would be too extended for these columns.—J. H. H.—You can probably obtain this information by inserting a notice in the "Business and Personal" column, which is especially intended for such inquiries.—T. Mf. Co.—You will find a *résumé* of the subject of spontaneous ignition in Bird's "Protection against Fire," pp. 122-137.—E.C.N.—The word "cover" should read "core."—C. H. L.—See answer No. 18, SCIENTIFIC AMERICAN, April 13, 1878.—F. W. S.—The sample of sheet iron inclosed is rather heavy for a telephone diaphragm, but it will answer.—D. B. T.—Consult any elementary astronomy. The discussion would occupy more space than we have at command.—M. V. D.—Perhaps if you will apply to a commission merchant doing this kind of business you may obtain particulars.—D. G.—We do not get a very clear idea of the arrangement from your letter; but if, as we understand, you are trying to overcome what some call the loss of power by the use of the crank, our advice would be to stop trying, as there is no such loss as supposed.—J. F. —The result is certainly unusually good, if there is any proof that the steam was dry.—E. H. L.—You do not send sufficient data about the engine. The flues will answer for boilers if in good order. They can be set in brick, like ordinary cylinder boilers. It might be better to connect one to the other than to set them side by side.—C. E. C.—The details sent are not sufficient. You will find rules in Trautwine's "Engineer's Pocket Book," which will enable you to solve the problem.—W. F. A.—You can make a boiler of copper $\frac{3}{32}$ inch thickness, 4 inches in diameter, and 12 inches long, with rounded heads. You can obtain information as to cost from a coppersmith.—W. J. P.—From the data sent we are unable to explain the matter.—L. G.—See answer to A. B. P., this page.—T. J. F.—You cannot make such an alloy. For mode of boring gun barrels see SUPPLEMENT, No. 25, p. 387.—G. L. D. & Co.—See answer to F. H. T., next page.—R. S. L.—For description of the telephone see SCIENTIFIC AMERICAN, No. 14, vol. 37. The ordinary telegraph wire is the only connection required. See answers Nos. 15, 19, and 22, p. 155, March 9, 1878. The general principle is not patented.—C. C. S.—The only way which occurs to us is to add fillings of metal to the plaster.—C. S.—The word "subornation" does not necessarily mean to cause a person to commit perjury, but in its broad sense "the crime of procuring one to do a criminal or bad action" (Webster), and therefore the phrase "subornation of perjury" is not tautological.

(1) G. H. A. writes: I have a small galvanic battery, the zinc of which is broken. Would the same metal answer, if melted and moulded over again? A. Yes.

(2) L. W. C. asks for a recipe for preparing a gold (or bronze) ink that will flow from a ruling pen and leave a bright clear line. A. Honey and gold leaf, equal parts; triturate until the gold is reduced to the finest possible state of division, agitate with 30 parts of hot water and allow to settle. Decant the water and repeat the washing several times; finally dry the gold, and mix it with a little weak gum water for use.

(3) A. H. L., referring to the article in the SCIENTIFIC AMERICAN of March 30, p. 197, relative to the need of efficient means of destroying dangerous wild beasts, as in India, suggests that placing poisoned meats in the habitats of such animals would be a speedy and cheap means of exterminating them, and more effective than hunting them down.

(4) G. J. S. asks for recipes for making copying, black, and red inks. A. 1. Bruised Aleppo nutgalls, 2 lbs.; water, 1 gallon; boil in a copper vessel for an hour, adding water to make up for that lost by evaporation; strain and again boil the galls with a gallon of water and strain; mix the liquors, and add immediately 10 ozs. of copperas in coarse powder and 8 ozs. of gum arabic; agitate until solution of these latter is effected, add a few drops of solution of potassium permanganate, strain through a piece of hair cloth, and after permitting to settle, bottle. The addition of a little extract of logwood will render the ink blacker when first written with. Half an ounce of sugar to the gallon will render it a good copying ink.

2. Shellac, 4 ozs.; borax, 2 ozs.; water, 1 quart; boil till dissolved, and add 2 ozs. of gum arabic dissolved in a little hot water; boil and add enough of a well triturated mixture of equal parts indigo and lampblack to produce the proper color; after standing several hours draw off and bottle.

3. Half a drachm of powdered drop lake and 18 grains of powdered gum arabic dissolved in 3 ozs. of ammonia water constitute one of the finest red or carmine inks.

(5) C. C. B. asks: What should gold fish eat? I have kept two gold fish for several months in a small glass aquarium, changing the water only once a week, and have not fed them anything. They seem perfectly well and lively. A. In a natural state they live principally on animalculæ. It is best to feed them very seldom, and they are sometimes kept without feeding at all. A little bread or cracker is as good as anything.

1. Does a locomotive drawing an ordinary passenger train use as much power in running 20 miles an hour against a head or quartering wind—blowing at the rate of 20 miles an hour—as one running 40 miles an hour with no wind, other things equal? A. We think not. 2. Which would offer the most resistance, a head or quartering wind? A. A quartering wind, nautically speaking, is one abaft the beam; but, as we understand the question, a wind not quite ahead would probably cause greater retardation than one directly head, owing to the friction caused by the jamming of the wheel flanges against the lee rail.

(6) J. I. asks: Is there any other substance which can be used in place of lime in the oxyhydrogen lights? A. Magnesia alone and with lime—as from dolomite—has been used, but lime is preferable as it is much harder and as refractory.

(7) A. B. P. asks: 1. Will common flowerpots serve as porous cups in a battery? A. Yes; moderately well. 2. Is a two-cell Daniell a good battery for electro-plating? A. Yes.

How can I make sulphocyanide of mercury? A. To solution of potassium or ammonium sulphocyanate (sometimes called sulphocyanide) add solution of mercuric nitrate; mercuric sulphocyanate is precipitated as a white powder. This, thoroughly washed, formed into little cones and dried, constitutes the toys called Pharaoh's serpents.

(8) G. F. M. asks how to make ferric oxalate in small quantity. A. Add a small quantity of neutral potassic oxalate to solution of a ferric salt (ferric chloride answers); the yellow precipitate is ferric oxalate. The same salt is formed by treating ferric hydrate with a quantity of strong oxalic acid solution just insufficient to dissolve it. It is almost insoluble in water; its solution in oxalic acid soon reverts to ferrous oxalate under exposure to sunlight.

(9) W. D. asks: What is ozone and what are its properties? A. There has been considerable discussion about the nature and composition of ozone; but the most trustworthy experiments seem to show that, in whatever way produced, it is merely a modified form of oxygen. Ozone is insoluble in water and in solutions of acids or alkalies, but is absorbed by a solution of potassium iodide. It is decomposed by heat, gradually at 100° C., instantly at 290° C. It is an extremely powerful oxidizing agent, possesses strong bleaching and disinfecting powers, corrodes cork, caoutchouc, and other organic substances, and rapidly oxidizes iron, copper, and even silver when moist, as well as dry mercury and iodine.

(10) F. R. McG. asks how to make an aquarium watertight. A. A good cement is composed of 3 ozs. of linseed oil, 4 ozs. of tar, and 1 lb. of resin. These are allowed to melt together over a gentle fire. If too much oil is used, the cement will run down the angles of the aquarium; to obviate this, it should be tested before using by allowing a small quantity to cool under cold water, and if not found sufficiently firm, allowing to simmer longer, or have more tar and resin added. The cement should be poured in the angles of the aquarium while in a liquid state, but not when boiling, or it would most assuredly crack the glass. The cement will become firm in a few minutes, and the aquarium may then be tilted up in a different position while a second angle is treated likewise. This composition adheres firmly to the glass, is so pliant that it may be pressed into any shape by the fingers, and it does not communicate any poisonous quality to the water.

(11) J. C. E. writes: When an electric current is passed through water decomposition takes place. Is there any liquid which will conduct electricity (with great or little resistance) without decomposition? A. Mercury.

(12) A. B. asks for a cement to join leather. A. Ten parts of carbon disulphide and one part oil of turpentine are mixed, and as much gutta percha added as will readily dissolve. The surfaces of leather must be freed, with a hot iron, from grease or oil, and the parts once joined should be well pressed until they are firmly united.

(13) J. P. S. asks: 1. What can I melt or mix with asphaltum to make it tough enough for water pipes for use on my farm? A. Fine sand, lime, and straw or other vegetable fiber have been used in this connection. 2. In digging a well I struck a vein of gas 15 feet beneath the surface. If I bore down 50 or 60 feet further, will the flow of gas be likely to increase? A. It is uncertain. 3. Is there any danger of my losing it by boring? A. No. 4. Can it be used to advantage for lighting a dwelling, and also for fuel? A. You will find a reference to this subject on p. 52, present volume of the SCIENTIFIC AMERICAN. 5. Close by the gas well are a number of asphaltum springs. Are the asphaltum and gas an indication of petroleum? A. Not necessarily.

(14) A. M. H. asks: 1. Does prepared sulphate of nickel and ammonia need the addition of cyanide or anything else to make the bath for nickel plating efficient? A. No. 2. Can brass articles freshly turned and perfectly cleaned be nickel plated without first copper plating them? A. Yes; better pickle them in dilute acid first. 3. In gilding watch cases, is it first necessary to copper plate them, no matter what the metal may be? A. No. 4. Please tell me how the inclosed pieces of plating are done. A. The pieces appear to have been electro-plated. Consult Napier's "Manual of Electro-Metallurgy."

(15) E. J. R. asks: 1. What cement is used in mending rubber shoes? A. Incorporate by fusion equal parts of gutta percha and genuine asphaltum; use warm. 2. What will mend china and glassware so as to stand ordinary dish-washing? A. 1. Isinglass dissolved in spirits of wine to a thick paste, 2 ozs.; pale gum-ammoniac (in tears), 10 grains; triturate together until solution is complete. Then add six large tears of gum mastic dissolved in the least possible quantity (over a water bath) of rectified spirit. 2. Boil 4 ozs. of shellac and 1 oz. of borax in water till dissolved; concentrate to a paste by heat.

(16) G. D. asks: How are the hypophosphites of iron and soda made? A. Hypophosphite of soda is formed by boiling a grain or two of phosphorus, a few grains of sodic hydrate, and about a quarter of an ounce of water until phosphureted hydrogen (spontaneously inflammable) ceases to be evolved. The mixture filtered, yields solution of hypophosphite of soda. Care must be taken against explosion. Hypophosphite of iron is formed by dissolving ferric hydrate in cold aqueous hypophosphorous acid, and evaporating the solution.

(17) G. D. asks whether dynamite is as "harmless as putty," and whether there are any well authenticated cases of its exploding in an unexplained manner. A. Dynamite, as it is now made, is recognized as among the safest of all explosives. It would be absurd to call it as harmless as putty, but, when handled carefully, there is slight danger. When ignited in the open air it burns quietly, and neither light, electricity, nor ordinary shocks cause it to explode. The chief dangers are in connection with the fulminates used to explode it, and in the possibility of the exudation of nitro-glycerin from careless manufacture or as a result of thawing after freezing. However, although dynamite in its various forms is used extensively in mining, we know of no recent accidents in which the cause was not directly traceable to carelessness; and not long ago, during a fire in San Francisco, a large quantity was burned without explosion.

(18) B. W. S. asks: How can I remove ink stains from a book cover, common cloth binding? A. Try a weak solution of oxalic acid; dry with warm blotting paper or pipe clay.

(19) H. L. B. asks: What is the best and cheapest way of polishing a hard wood floor? A. After it has been planed as smooth as possible, rub down with sand paper, and then oil.

(20) P. L. W. asks: How do scientists prove that the ether (which conducts light and heat from the sun) is imponderable? Or what reason do they have for believing that it is? A. The existence of the ether is assumed to account for various phenomena, but has not been proved by any physical tests. "Energy cannot exist except in connection with some material substance," says Dr. Maxwell. Hence, since in the space between the earth and sun, the luminous and thermal radiations possess energy, the amount of which can be measured, this energy must belong to matter existing in the interplanetary spaces. By imponderability is meant, not absolute absence of weight, but want of appreciable density, as is shown by the fact that the ether does not sensibly retard planetary motions.

(21) D. E. J. asks: How can I make a mirror? A. It is more advisable to purchase one already made, but you may proceed as follows: On a perfectly level, smooth piece of marble, spread a piece of pure tinfoil, smoothing out every wrinkle and crease. Pour a little clean mercury on the foil, and spread it quickly and uniformly by means of a roller of woolen stuff; then pour mercury in the middle until the foil is covered to a depth of $\frac{1}{32}$ of an inch, and slide the glass plate (previously thoroughly cleaned and dried) on the table in such a manner as to carry off the supernatant mercury. Place a weight on the glass, and slightly tip the table to allow the excess of mercury to run off. The plate must then be covered with thick cloths and heavily weighted for several days.

(22) W. T. R. asks: How can the scraps of waste leather produced in the manufacture of boots and shoes be utilized? A. Chips, parings, etc., of shoe leather having the grain on are about valueless; they are sometimes mixed with superphosphates for fertilizing purposes. Leather shavings free from grain can be used in glue manufacture or made into so-called leather board or pancake leather, used for brush backs, inner soles, heels of shoes, etc. These shavings bring in the market from $15 to $20 a ton, dry.

(23) T. T. R. asks: What will cause the wrought iron arms of a light cast iron pulley wheel to adhere and prevent it from blowing or casting hollow? A. Dry the moulds and heat the arms before running the metal.

(24) P. B. C. asks: Is there any rule for setting the valves on locomotives while on the road, without taking the chest cover off? A. They can be set by trial, opening the cylinder cocks, and turning the wheels, so as to move the piston. Or the valve stem, shaft, or eccentric may be marked in the shop, so that the adjustment can readily be made.

(25) J. R. S. asks: Is a two-bladed propeller 30 inches in diameter, 44 inches pitch, run at 300 revolutions, likely to do as good work with a boat 30 feet long as one of 3 or 4 blades, same diameter and pitch? Which will shake the boat most? A. The three bladed propeller gives steadier motion, and is usually more efficient than the one with two blades.

(26) W. S. N. asks: What is meant by a miner's inch? A. The miner's inch is the amount of water flowing in one second from an orifice 1 inch x 1 inch, under a head of 6 inches, measured from the upper side of the orifice.

(27) B. W. writes: After one melting, silver works very easily under the hammer; after re-melting two or three times it becomes quite brittle and cracks when hammered. What are the cause and the remedy? I melt in sand crucibles with a little borax. A. It probably requires to be annealed.

(28) C. M. B. asks: Is there any way to prepare vulcanite set squares, etc., so that they will not soil the drawing paper, without altering the exactness of the squares? A. Clean them frequently with a little pure benzole and chamois skin.

(29) P. C. asks: What is the cause of the cracking of marble, as seen in the monuments in our cemeteries? The same thing is not observable, at least to an equal extent, in the blocks used in building. A. It is usually due to the action of frost and storms. The monuments are ordinarily more exposed than the stones of buildings.

(30) H. S. T. asks how the common nickel salts are formed. A. Chloride of nickel is formed by dissolving metallic nickel or its oxide in hot hydrochloric acid and evaporating the solution (after filtering) to complete dryness, redissolving the residue in