

Business and Personal.

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Snug Little Fortunes

may be had by all who are sufficiently intelligent and enterprising to embrace the opportunities which occasionally are offered them. Hallett & Co., Portland, Maine, have something new to offer in the line of work which you can do for them, and live at home. The profits of many are immense, and every worker is sure of over \$5 a day; several have made over \$50 in a single day. All ages; both sexes. Capital not required; you are started free; all particulars free. You had better write to them at once.

Patent Office "Official Gazette," full sheep binding; 1881 to 1885 for sale. "Cheap," 51 John St., N. Y.

Modern Machine Tools a specialty. Abbe Bolt Forging Machines, Power Hammers, Lathes, Planers, Drills, Shapers. Send for estimates. Forsaith M. Co., Manchester, N. H.

Geo. E. Lloyd & Co., Electrotype and Stereotype Machinery, Folding Machines, etc. Send for catalogue. Chicago, Ill.

Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, polishing compositions, etc. \$100 "Little Wonder." A perfect Electro Plating Machine. Sole manufacturers of the new Dip Lacquer Kristaline. Complete outfit for plating, etc. Hanson, Van Winkle & Co., Newark, N. J., and 92 and 94 Liberty, St., New York.

Grimshaw.—Steam Engine Catechism. A series of thoroughly Practical Questions and Answers arranged so as to give to a Young Engineer just the information required to fit him for properly running an engine. By Robert Grimshaw. 18mo, cloth, \$1.00. For sale by Munn & Co., 361 Broadway, N. Y.

The Knowles Steam Pump Works, 44 Washington St., Boston, and 93 Liberty St., New York, have just issued a new catalogue, in which are many new and improved forms of Pumping Machinery of the single and duplex, steam and power type. This catalogue will be mailed free of charge on application.

Haswell's Engineer's Pocket-Book. By Charles H. Haswell, Civil, Marine, and Mechanical Engineer. Giving Tables, Rules, and Formulas pertaining to Mechanics, Mathematics, and Physics, Architecture, Masonry, Steam Vessels, Mills, Limes, Mortars, Cements, etc. 900 pages, leather, pocket-book form, \$4.00. For sale by Munn & Co., 361 Broadway, New York.

Air Compressors, Rock Drills. J. Clayton, 43 Dey St., N. Y. Shafting, Couplings, Hangers, Pulleys. Edison Shafting Mfg. Co., 36 Goerck St., N. Y. Send for catalogue and prices.

Iron Planer, Lathe, Drill, and other machine tools of modern design. New Haven Mfg. Co., New Haven, Conn.

Wanted.—Patented articles or machinery to manufacture and introduce. Lexington Mfg. Co., Lexington, Ky. For Power & Economy, Alcott's Turbine, Mt. Holly, N. J.

Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y.

Send for Monthly Machinery List to the George Place Machinery Company, 121 Chambers and 103 Reade Streets, New York.

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

If an invention has not been patented in the United States for more than one year, it may still be patented in Canada. Cost for Canadian patent, \$40. Various other foreign patents may also be obtained. For instructions address Munn & Co., SCIENTIFIC AMERICAN, patent agency, 361 Broadway, New York.

Supplement Catalogue.—Persons in pursuit of information of any special engineering, mechanical, or scientific subject, can have catalogue of contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free. THE SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

Send for catalogue of Scientific Books for sale by Munn & Co., 361 Broadway, N. Y. Free on application.

Wood Working Machinery. Full line. Williamsport Machine Co., "Limited," 110 W. 3d St., Williamsport, Pa.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 46.

Timber Gaining Machine. All kinds Wood Working Machinery. C. B. Rogers & Co., Norwich, Conn.

Curtis Pressure Regulator and Steam Trap. See p. 350. Iron and Steel Wire, Wire Rope, Wire Rope Tramways. Trenton Iron Company, Trenton, N. J.

Best Automatic Planer Knife Grinders. Pat. Face Plate Chuck Jaws. Am. Twist Drill Co., Meredith, N. H.

Iron and Steel Drop Forgings of every description. Billings & Spencer Co., Hartford, Conn.

We are sole manufacturers of the Fibrous Asbestos Removable Pipe and Boiler Coverings. We make pure asbestos goods of all kinds. The Chalmers-Spence Co., 419 East 8th Street, New York.

Crescent Solidified Oil and Lubricators. Something new. Crescent Mfg. Co., Cleveland, O.

Curtis Return Steam Trap returns all condensations into the boiler without waste. Curtis Regulator Works, Boston, Mass.

Woodworking Machinery, Engines, and Boilers. Most complete stock in U. S. Prices to meet times. Forsaith M. Co., Manchester, N. H.

Emerson's Book of Saws free. Reduced prices for 1885. 50,000 Sawyers and Lumbermen. Address Emerson, Smith & Co., Limited, Beaver Falls, Pa.

Safety Elevators, steam and belt power; quick and smooth. D. Frisbie & Co., Philadelphia, Pa.

"How to Keep Boilers Clean." Send your address for free 88 page book. Jas. C. Hotchkiss, 86 John St., N. Y. Barrel, Keg, Hogshead, Stave Mach'y. See adv. p. 76.

Providence Steam Engine Co., Providence, R. I., are sole builders of the "Improved Greene Engine."

Domestic Electricity. Describing all the recent inventions. Illustrated. Price, \$3.00. E. & F. N. Spon, New York.

Patent Elevators with Automatic Hatch Covers. Circular free. Tubbs & Humphreys, Cohoes, N. Y.

Machinists' Pattern Figures, Pattern Plates, and Letters. Vanderburgh, Wells & Co., 110 Fulton St., N. Y.

Brass and Iron Working Machinery, Die Sinks, and Screw Machines. Warner & Swasey, Cleveland, O.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocum & Son's Shafting Works, Drinker St., Philadelphia, Pa.

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

NEW BOOKS AND PUBLICATIONS.

THE MAGAZINE OF AMERICAN HISTORY. Edited by Mrs. Martha J. Lamb. New York: 30 Lafayette Place.

This monthly journal of history upholds the high standard by which it has been marked from its inception, and which was characteristic of all of Mrs. Lamb's preceding work. Its articles are all valuable, evincing sound judgment in the selection of subjects and faithful original research in their elucidation, while there is sufficient variety in the matter to render each number exceedingly interesting to a very wide range of readers. The frontispiece of the December number was a portrait of the late General McClellan, which is accompanied by an appreciative sketch by the editor. The series of articles on our "Historic Homes" is continued, with an illustration of the Brooklyn house of Philip Livingston, one of the signers of the Declaration of Independence, on what is now known as Brooklyn Heights; while there is a valuable article relative to the Massachusetts Constitutional Convention of 1788, a chapter on the Mexican war, and two contributions relative to our late civil war. The January number contains a steel plate engraving of General John A. Logan and a number of wood engravings illustrating incidents in our late war.

LONGITUDE BY LUNAR DISTANCES. By Major H. Wilberforce Clarke. London: W. H. Allen & Co., 1885.

Major Clarke has offered in this volume a method of calculating longitude by lunar distances in which the calculation is simplified by a division into several distinct steps, and is so presented that even the inexperienced traveler can, with a little patience, fix his position upon the earth's surface with precision. The moon has a daily motion among the stars of about 13°. The geocentric angles between the moon's center and certain of the stars and planets are given in the *Nautical Almanac* for every three hours of Greenwich mean time. If at any place the distance between the moon and one of these bodies be determined with a sextant or reflecting circle, and be corrected for semi-diameter, refraction, parallax, and sphericity, the geocentric lunar distance will be obtained; and this, when compared with the distance recorded in the *Almanac*, will give the longitude of the place. But this apparently simple calculation is decidedly difficult, and apt to deter one from making the effort, unless he be aided by some such systematic method as Major Clarke has suggested.

Golden Text Calendar. Selections from the best authors, and International Sunday School Lesson Text for each Sunday. By Mrs. A. C. Morrow. \$1.00. D. Lothrop & Co., Boston.

**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. **Minerals** sent for examination should be distinctly marked or labeled.

(1) **W. M. B. asks** (1) if pine sawdust can be put to any profitable use. I have heard it could be mixed with pitch or resin, and moulded in brick for fuel. I am in the back woods, where several sawmills saw long-leaf pine, and the dust is thrown away. I wish to know what are the best steps to take to make it profitable and put upon the market? A. You can mix your sawdust with a little pitch or resin and mould it into bricks under pressure, to be used for kindling wood, but we doubt if you could make it profitable, on account of the expense of transportation. The sawdust may also be used in the manufacture of pyroligneous acid. 2. I have a lot of black walnut shells I wish to use in making walnut stain without use of water, as, when walnut stain becomes too thick or dark, it is thinned by adding turpentine. Turpentine and water won't mix. Please tell me what to do in this matter. A. Try dissolving out the coloring matter with alcohol or turpentine. 3. I wish to construct some cheap and convenient plan to use steam from a 20 horse steam boiler for steaming plank so as to bend easily for coffin sides. Please tell me how this process is done. A. An ordinary wooden tank or box arranged to use the exhaust steam from your engine will answer your purpose. Care should be taken that the steam pressure does not exceed the resisting power of the box. You will need to steam your plank for three or four hours before bending.

(2) **F. S. asks** the proper way to make a joint in a street main cast-iron water pipe; the proper material for piping leading from the main to the house; the proper depth to lay a main in a street; and whether there is any device for drilling, tapping, and connecting a pipe while main is under pressure? A. Lead is the only proper material for joints of street main pipes—a gasket of hemp being first driven into the bottom of the socket to keep the lead from leaking into the pipe. Then put a putty closure around the mouth of the socket, held to place by a rope, wood, or packed sand, with a hole at top to pour in the lead.

When poured and cool, drive the lead in hard with calking tools. The leaders to houses should be lead or galvanized iron pipe. The connection with the main should be a brass drive cock, or may be made with a screw joint. The proper depth for mains in your State should be at the mid-winter frost line, probably seven feet. There are devices for drilling and driving or tapping under pressure. They may be obtained through the plumbing trade.

(3) **W. W. W. asks:** What is a good dip for cleaning brass patterns? A. They should not be dipped in any acid. Use only a soft brush dry, or wash with hot water, soap, and brush. This is the practice in the best malleable iron foundries.

(4) **J. D.—You cannot practically operate** a siphon more than 25 feet above the source of supply. All water contains air, which is liberated under partial vacuum, and will stay in the top of the siphon and break the flow. The plan that you have sketched is not practicable.

(5) **O. N. L. asks:** What preparation of glue is most suitable for facing cast iron pulleys? A. Glue, 1 quart, dissolved in cider vinegar; add 1 ounce Venice turpentine; boil gently for 12 hours. If the pulley has been used and is smooth, scratch the surface with a file.

(6) **S. N. P.—For the galvanizing process** see SCIENTIFIC AMERICAN SUPPLEMENT, No. 176. For tinning, to obtain smooth work, keep the surface of the tin bath clear with a little powdered sal ammoniac and doing the work quickly. If the articles are left in the bath too long, the tin absorbs iron and becomes thick, after which the surface of the tinning will come out rough. Smoothness of finish also depends much upon the smoothness of the pieces to be tinned.

(7) **J. B. P.—There is no absolute difference** in the heating power of a ton of anthracite coal, whether it be nut or pea, provided the quality is exactly the same in both. The price is the main point in their economical value as fuel. Formerly there was considerable difference in price, so as to largely favor pea coal where the grate was of the proper kind to prevent waste. There is sometimes much cull and dirt in pea coal, which is a cause of waste. This alone makes the nut coal a favorite among engineers. The whole question of economy turns on relative price, cleanliness, and carbon value, so that a decision cannot be arrived at on the simple question.

(8) **W. D. A.—Copper lined tanks** are often known to give trouble by leaking after a few years, much of which arises from the manner of soldering. Most plumbers use common solder, made of lead and tin. For this kind of work pure tin should be used, and the laps thoroughly sweated through. The nails should be also of copper. We know of no way of repairing for such leaks but to take out the lining and retin all the laps.

(9) **J. M. G.—The rich, deep soils of Kansas** only need thorough tillage for a few years to repress the weeds. Much of this trouble comes from neighboring untilled land, from which wild seed is blown by the strong winds of that woodless country. Too much land planted without the means for thorough cultivation is probably the cause of much of the trouble from weeds in wet seasons.

(10) **R. M. F. (Philadelphia) writes:** We have a large room, 60x100x19 feet, to heat by steam; how much pipe would it require, also how large a boiler? A. For your latitude, 2,500 to 2,800 feet 1 inch pipe, according to exposure, with 110 square feet effective heating surface in boiler, or an 8 horse boiler.

(11) **F. H. H. asks:** Why does not an emery wheel grind as well on the sides as it does on the radius? A. Emery wheels are used on the sides where fine flat surfaces are required. They do not cut as fast because a large surface is in contact with the face of the wheel. The convex surface of the periphery exposes but a small surface in contact at once, requiring but a small pressure to produce a cut.

(12) **C. P.—There are so many ways** in which engine pumps are affected that no proper solution of your troubles can be arrived at without personal inspection. Sometimes the plan of the valves is defective, so as not to allow of their closing at the proper time, either by the flow of water binding them against their guides or want of vent hole in the cap guide. At other times, air gets into the piston chamber and cushions under the action of the piston, and thereby prevents suction. We can only advise you to get some of your neighboring engineers to hold an inquest over the subject.

(13) **T. H. D. S. asks:** What do you think of the practice of some engineers and boiler makers of passing the products of combustion from the furnace of a coal-fired return tubular boiler over the top of shell to stack at rear end of boilers, after it has passed under the shell and through the tubes? Is it injurious to boiler? There is a difference of opinion among engineers as to the economy of passing heated gases of combustion back over the boiler. It is in some cases inconvenient for cleaning both boiler and flues. If the flue is neglected, the accumulation of ashes upon the top of the boiler makes the fancied superheating of steam a nullity. It is but little practiced.

(14) **E. D. H.—In 1812 Samuel Slater** began the erection of cotton mills in Oxford, now Webster, Mass. He had come to this country from England in 1789, when he was 21 years of age, but had then already spent seven years in the cotton mills of Derbyshire, and became familiar with Arkwright's processes. Before going to Webster he operated carding and spinning machinery at Pawtucket, R. I., commencing there in 1790. The machine for making cards was invented by Amos Whittemore, of Cambridge, Mass., and patented in 1797. Previous to 1813, the mills in operation were designed only for spinning, and the twist was sold to weavers. It is said that the first factory in the world conducting all the operations of converting raw cotton into finished cloth was built at Waltham, Mass., in 1813, by Francis C. Lowell, of Boston, this factory having a power loom somewhat improved from the then rather crude model of the British invention.

(15) **W. D. O. asks:** What is the best composition to remove scales from a boiler? A. Two or three pounds caustic soda dissolved in water and pumped into the boiler, allowing it to remain in the boiler for a day. Next day blow out, at intervals of two hours, one, two, or three cocks as convenient. The second application should be followed by cleaning boiler, if there has been much scale. Extract of tan bark is also used with the soda when it can be had.

(16) **W. B. W.—You can use bevel** wheels at any angle, as you have sketched.—The largest turbine wheels we know of are "Lefel's" 87 inch, of 1,400 horse power, with 40 feet head, using 21,000 cubic feet of water per minute, making 100 turns per minute; 80 to 90 per cent of the total water power is claimed for these wheels.

(17) **W. B. writes:** I wish to make an experimental battery for running an incandescent lamp. How many cells of the battery described in the SCIENTIFIC AMERICAN of April 11, 1885, would be required for a 12 candle power lamp? Would a 3/4 inch rod do for the zinc plate? A. We cannot advise you to try to run a single incandescent lamp by means of a battery. You will require probably 50 cells of the battery referred to. We think a 3/4 inch rod would scarcely give you surface enough.

(18) **W. E. asks** how celluloid electro-types are made, and what is the composition. A. Celluloid is composed of vegetable fiber, such as cotton, dissolved in acids. Celluloid printing plates are made by pressing thin plates of celluloid into contact with type dies with heat.

(19) **Subscriber asks** if the double induction motor run by small water motor (capable of running sewing machine easily) will generate enough current for a small incandescent lamp without any change in present construction of motor. If so, what power lamp. And if change is necessary in the motor, what would it be? A. We think that the motor referred to is so small that when used as a dynamo it would not generate a current sufficient for running a lamp of any kind. 2. Are magnets for magneto bells constructed differently from magnets for common vibrating bells, and if so, which way are they wound (the magneto magnets), and how many layers of what number wire? A. The magneto magnets are permanent magnets. The armatures are generally wound with very fine wire, say 12 or 15 layers of No. 36.

(20) **Reader asks** whether it is feasible to coat a metal speculum with silver by precipitation. The speculum in question is badly tarnished, so much so that to repolish will destroy the figure. Now, if I can precipitate a silver film over the speculum, all difficulties will vanish. Will the silver act the same on the speculum metal as on a ground glass speculum, and if not, what will be the difference? Am afraid to try, lest I spoil the thing altogether. A. We think there would be no difficulty in coating a clean metal speculum with silver in the manner suggested, but we doubt if you can accomplish it with the badly tarnished speculum which you say you have; would it not be better to send your speculum to some reputable telescope maker, and have him clean it, and, if necessary, correct it?

(21) **O. D. W. writes:** We have occasion to stain wood with aniline. Is there anything to coat the wood with, or what ingredient could we use to put in the aniline to prevent the wood from fading, so as to keep its color? A. Dissolve your aniline in alcohol, and add to it white shellac varnish, or apply the alcoholic stain directly to the wood, and afterward apply any suitable varnish.

(22) **H. K. asks:** If a dynamo electric machine as described in SUPPLEMENT, No. 161, be built double the size, will it produce more than double the light, and will it run two 16 candle power incandescent lamps, and will a one horse power engine be sufficient to run it? A. A dynamo twice the size of the one referred to would produce more than double the current, if properly made. It might be arranged to run two 16 candle power incandescent lamps, if wound with wire fine enough to produce a current capable of overcoming the resistance of the lamps. A one horse power engine should run the machine.

(23) **K. A. R. asks** if cannel coal is more valuable than the soft coal so extensively used throughout the United States. A. We do not understand from your query whether you mean to inquire whether cannel coal is more valuable in a pecuniary sense, or as a fuel. Cannel coal of good quality always brings a very high price, and is therefore of greater value than the ordinary bituminous coal, and it is undoubtedly a more efficient fuel than the ordinary soft coal.

(24) **F. W. S.—Electric light carbon** is not adapted to use in the Leclanche battery. You should procure carbon plates about 1/4 inches wide and 1/2 inch thick, made expressly for this use. The common method of connecting the wire with the carbon is to cast a lead cap upon the upper part of the carbon rod. The hissing in your battery is probably caused by the decomposition of the battery solution in the contact between the conductor and the carbon. Copper coated carbon rods are not available for batteries of this kind.—Plaster Paris is unfit for the porous cells.—Paraffine may be dissolved in naphtha or benzole.

(25) **M. G.—We think** your best course to secure an outline for a course in civil engineering would be to write to Cornell University, Ithaca, N. Y., for their prospectus.

(26) **J. G. K.—There is no paint** with which zinc can be coated to prevent its burning. Its melting point is 773° Fah.

(27) **L. J. M. wishes** a receipt for bur-nishing marble paper, such as bookbinders use. A. The paper is first coated with a little size, and the finish produced by friction by means of agate rubbers. Such paper is not made in this country, and cannot be economically manufactured on account of the high price of labor in the United States.

(28) **J. W. K. asks:** 1. Can you inform me how to make a burglar alarm, also what is the best

kind of battery to use for such? A. A simple way to make a burglar alarm is to construct a spring key with a rounded knob on the top thereof, and set it in the casing of the window, so that the rounded knob projects beyond the casing when the contact points of the key are separated. A cavity is made in the edge of the sash to receive the rounded knob projecting from the back of the key when the window is closed, so as to permit of the circuit remaining open so long as the window is closed. When the window is raised, the engagement of the sash with the rounded knob will push the key forward, bringing its contact point against the fixed contact. The spring key and its fixed contact lead to a battery and a bell, and when the key makes a contact in the manner described, the bell will be rung. If desirable, the wires may also include a part of an annunciator. The key for a door will be arranged with a pin projecting through the door casing, to be engaged by the door when closed, so that it will push the key forward, away from its fixed contact, thus keeping the circuit open while the door is closed. By this arrangement, when the door is open, the pressure on the pin being released, the key will move forward, and make the contact as in the other case. If desirable, two parallel wires may be run to each window and door in a room, and the spring key will be attached to one of these wires, and the fixed contact to the other wire, so that whenever a key is made to complete the circuit, an alarm will be given. The battery commonly used with the burglar alarm is the Leclanche. The Fuller battery is also an excellent battery for this purpose. 2. Would also like to know how to make a simple interrupter for induction coil. A. You can make a simple interrupter for an induction coil by connecting a coarse file with one of your battery wires, drawing the other battery wire along the face of the file. If you desire to make an electro-magnetic interrupter, you may take a small magnet wound with coarse wire, attach its armature to a flat spring, and place a small auxiliary spring on the back of the armature spring. Support in front of the auxiliary spring an adjustable contact point, connect the contact point with one of your battery wires and the armature spring with the other. 3. How is mercury sold, and how much is it worth? A. The price of mercury is 75 cents per pound. It is usually sold in large quantities in wrought iron flasks containing 100 pounds each.

(29) C. W. M. asks: Do you know of any substance that, if placed between a magnet and a piece of steel, will destroy the attraction of the steel to the magnet? A. No substance having the required property has been discovered.

(30) G. L. F. asks: 1. Can hair be permanently removed by electricity? A. We believe it has been done. 2. How is the operation performed? A. By means of a platinum wire made incandescent by the passage of electricity. The wire is thrust down by the side of the root of the hair. 3. Is it painful? A. We believe it is not extremely painful.

(31) L. W. B. writes: 1. I have seen it stated that the rifles used by the sharpshooters in the late civil war weighed as much as a hundred pounds; now, is this so, and where can I learn their construction, etc.? A. They were of various weights, but, we believe, none of them weighed one hundred pounds. There is a good article on rifles in Appleton's Cyclopaedia. 2. In filling the lining of a fireproof safe with plaster of Paris, will it make any difference whether it is put in dry, or mixed with water and poured in? A. It should be put in dry. 3. Where can I find out all about archery? A. You can find out much about it in works on the subject, which are sold at the principal book stores.

(32) W. C. C. writes: We have constructed a number of carbon batteries in which we used red flower-pot clay for our porous cups, the batteries being excited by electro-pion fluid. For a short time they seem to give considerable current, gradually decreasing in quantity. The fluid turns a dark green color, and gives off sulphureted hydrogen gas; at the same time, purple crystals form inside the porous cups. The batteries have been charged as directed; the carbons placed in the porous cups and filled with electro-pion fluid, and the zincs in the outer jar, which is filled with water. A. The green color of the solution indicates that your battery is exhausted, and the generation of hydrogen shows that your zinc is not perfectly amalgamated. The zinc should be amalgamated thoroughly, and the fluid should be changed when exhausted. Possibly your jars are too porous. Try filling a portion of the walls of the jars with paraffine. To accomplish this, you will need to have the jars clean, dry, and hot.

(33) J. D. asks: 1. What will remove from paper the impression in red ink of a rubber stamp? I have tried an ink eraser of two liquids, being, I am told, the first, dilute acetic acid, and the second lime water, but it leaves the impression in pale brown. A. Remove the oily material of the ink with ether or naphtha, then try a bleaching powder. 2. What would be the cost of maintaining an ordinary Edison incandescent lamp by chemical battery? A. We are unable to give the exact figures, but the cost to run a single lamp is much more than that of gas. 3. How many cells, and what kind, would be best, cleanest, and most convenient for a private dwelling? A. This depends of course upon the number of lamps you use, their resistance, and the manner in which they are connected up in the circuit. Probably the bichromate form of Bunsen battery is the best. They work fairly well for one week without renewal.

(34) J. D. C. asks: 1. Does a body passing through air create friction? A. Yes. 2. Is there friction in air? A. Yes.

(35) C. S. B. writes: 1. In the dynamo described in SUPPLEMENT, No. 161, if, instead of the outside of the field magnets being made straight at the lower end, they are made bracket-shape, or provided with outwardly projecting flanges, will the magnetism collect at the flanges instead of where it is needed? A. The magnetism would be liable to be dissipated by the lateral extension of the poles. 2. Which gives the more sound for the same weight of metal—a bell or a gong? A. For the same weight of metal, the gong will give the louder sound.

(36) Miss A. C. asks: 1. What kind of coal produces gaslight? A. Bituminous. 2. How is gas secured? Is it by propelling it into a gasometer, or by what process? A. Gas is made by distilling bituminous coal in a closed retort, conducting the gaseous products through a washing and purifying machine to a gasometer. It is forced through the main and service pipes by the pressure of the gasometer. Coal gas, when very poor in carbon, is sometimes carbureted by the employment of gasoline or naphtha. 3. Does any other matter mix in with the gas while securing it? A. See answer to No. 2. 4. When in general gasometer, how is gas propelled into the houses? Since the gasometer is filled, how can the gas be prevented from receding? A. The gas is prevented from receding by valves or water traps. The pressure created in the retorts is sufficient to carry the gas into the gasometer against the pressure of the gas contained by the gasometer; but in most gas works a machine called a gas exhauster is employed to take the gas from the retorts, and force it into the gasometer. 5. And is there any danger of explosion from overpressure of gas? A. There is no danger of explosion from overpressure of gas, as the pressure is very slight—the greatest pressure being equal to a column of water 1 to 2 inches high. Gas when mixed with air forms an explosive compound, which is sufficiently powerful, when ignited, to destroy the gasometer. 6. Has the gasometer any compartments? A. Generally, gasometers have no compartments. They are sometimes, however, made in two sections arranged telescopically, so as to increase the capacity of the gasometer without making the water reservoir too deep.

(37) W. A. D.—We think the statement of the experiment of causing an iron beam to swing to and fro by hitting it with pith balls is a little fanciful. No doubt the iron beam could be set into vibration by means of the cork pellets, if thrown at regular intervals, and synchronously with the vibrations of the bar; but we do not think that any tremendous results would be secured by bombarding an iron beam with pith pellets.

(38) G. A. H. writes: I have a clinical thermometer which from frequent use has become almost illegible, from the wearing off of the black markings of the scale. Will you please give me a recipe for a permanent preparation by which I can mark it again? A. Probably the marks on your thermometer are engraved, and the black filling has been removed. You can refill the engraving marks by rubbing the scale over with asphaltum varnish, leaving the varnish only in the engraved marks. The surplus on the surface of the scale may be removed by a cloth wet with a little turpentine.

(39) R. L. N. asks what the red substance is that dentists use for plates for artificial teeth, and how it is worked. Will you also state what book will give me some information on dentistry? A. The substance referred to is rubber colored with vermilion. Previous to vulcanizing, it is very plastic, and may be forced into warm moulds. For dental work the moulds are generally made of plaster of Paris. After the mould is filled and secured, it is placed in a vulcanizer, which is simply a small steam boiler, and is allowed to remain in the vulcanizer under a steam pressure of 100 pounds, or a temperature of 320°, for one hour.—You can procure books on Dentistry from any of the dental depots in this city or in Philadelphia.

(40) B. A. L. asks: Can you give me a receipt for a lacquer or varnish for varnishing an old theodolite? Would one of shellac varnish colored with lampblack be suitable? Would it stand wear any length of time? A. You can color the brass parts of your instrument black, by dipping them in a solution consisting of sulphate of copper ¼ ounce, hyposulphite of soda ¼ ounce, dissolved in one pint of water. Clean the articles thoroughly, and heat them in the solution. More hyposulphite of soda renders the articles darker, and the addition of more sulphate of copper renders the color gray. Another method of giving brass articles a dark color is to dip them in a solution of arsenic and muriatic acid. These articles, after being colored, may be protected by a very thin coat of shellac varnish or lacquer. Either of the above stains for brass wears well.

(41) W. T. P. writes: I wish to construct a pair of cylinders to condense oxygen and hydrogen gases for lime light use. What thickness should one 16 inches in diameter and 48 inches long be made of, either steel, iron, or copper, to hold a pressure of 250 pounds per square inch? A. Your cylinders should be made of three-sixteenths steel riveted and brazed. We think you have selected a size larger than is necessary for ordinary use. If you make your cylinders 12 inches in diameter, and 3 feet high, they will contain about 24 feet of gas each. Your cylinders, if made of the dimensions given, have a capacity of 558 cubic feet each. 2. How many cubic feet of gas would such cylinder hold at above pressure? A. At 250 pounds pressure, each cylinder will contain about 90 cubic feet of gas. 3. Please give a rule to find the pressure for each doubling of the cylinder's capacity. A. When you have created a pressure in your cylinder of 15 pounds, it will contain 558 feet of gas; when you have doubled the pressure, it will contain 1116 feet. When you have increased the pressure to 60 pounds, it will contain 2232 feet, and so on.

(42) P. S. K. W. asks what to use to make a thin coating on wood so that hot oil will not penetrate it. A. Use an alcoholic solution of gum shellac.

(43) A. R. asks how to obtain instruction book on mechanical drawing. A. Probably in no other work is there so much furnished for the price as in Professor MacCord's papers, published in the SUPPLEMENT. We have these papers, containing 450 special engravings, stitched in paper, for \$2.50, or bound in cloth for \$3.50.

(44) J. K. M. S. desires a receipt for some liquid which, if applied in small quantities, will kill a tree. A. Use kerosene or turpentine around the roots.

(45) R. V. G. asks: 1. Are there any lead pencils made so that the marks will not rub off if you varnish them over? A. Ordinary pencil marks can be preserved by coating them over with a solution of collodion to which 2 per cent of stearine has been added. 2. Have you any book treating on the subject of acids? A. Fownes' Chemistry, which is an excellent authority, we can send you for \$3.50. 3. A recipe for putting metal leaf on wood. A. Coat the wood with a size made as follows: To ¼ pound parchment cuttings or cuttings of white leather add 3 quarts water, and boil it in a proper vessel till reduced to nearly half the quantity; then strain through a sieve.

(46) E. A. B. desires the receipt of a good glue for pasting labels on the backs of library books. A. Strong glue, 50 parts, is dissolved with a little turpentine in a sufficiency of water over a gentle fire; to the mixture is added a thick paste made with 100 parts of starch. It is applied cold, and dries rapidly.

(47) L. N. T. asks: What preparation is used to gild the edges of writing paper, and how is it applied? A. A camel's hair pencil is dipped into white of egg mixed with water, and with this the dry edges of the paper are moistened; gold leaf is then taken up on a tip brush, and applied to the moistened edge, to which it instantly adheres. When all three edges have been gilded in this way, and allowed to remain a very few minutes, take a burnisher formed of a very smooth piece of hard stone, and rub the gold very forcibly, which gives a high degree of polish.

(48) K. H. H. desires a receipt for a freezing mixture—one that will freeze or bring water as near the freezing point as possible, and be capable of being re-used several times, so as to render its cost as inexpensive as possible compared to the practical results to be attained therefrom. A. Use:

Nitrate of ammonia.....1 part.
Water.....1 ..
The mixture should be made in a thick vessel, well clothed, to prevent the accession of external heat; and the substances to be acted on should be contained in a very thin vessel, so as to expose it more fully to the action of the mixture. See also Freezing Mixtures, in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 89, 252.

(49) S. R. B., Jr., desires a recipe for polishing horns. A. First scrape with glass to take off any roughness, then grind some pumicestone to powder, and, with a piece of cloth wetted and dipped in the powder, rub them until a smooth surface is obtained. Next polish with rottenstone and linseed oil, and finish with dry flour and a piece of clean linen rag. The more rubbing with the stone and oil, the better the polish. Trent sand is used in the Sheffield factories. It is a very fine and sharp sand, and is prepared for use by calcining and sifting.

(50) H. W. O. writes: 1. I wish to mix graphite and pulverized asbestos with lead. Is there anything that I can add to make them adhere when the lead is heated to a low state of fusion? A. Nothing but a mechanical mixture of these three ingredients can be made. 2. I would like to granulate the lead at low heat without hardening it. Antimony and tin both make it hard, and for this reason cannot be used for the purpose required. A. The addition of bismuth, tin, and cadmium will lower the fusing point of lead.

(51) G. H. desires (1) a recipe to bleach fish scales. A. The application of hydrogen peroxide (see SCIENTIFIC AMERICAN SUPPLEMENT, No. 339) would bleach the scales, provided that fat and oily matter was first removed by washing with alkalies. 2. What is magic compound to clean carpets? A. Carpets are frequently cleaned by the following process: Take a pailful of clean cold spring water, and put into it about 3 gills of ox gall. Take another pail of clean cold water only. Then rub the carpet with some of the ox gall water, using a scrubbing brush, which will raise a lather. When a convenient sized portion is done, wash the lather off clean with a rag or cloth dipped in pure water. When all the lather has disappeared, rub the part with a clean dry cloth. The magic compound probably consists of a concentrated solution of ox gall.

(52) M. C. B. asks (1) what the process is for extracting the oil from the PalmiChristi bean? A. The beans are heated in an iron tank and then pressed. 2. Whether the cake or residue is of any value after the oil is expressed? A. The cake is frequently used as feed and for a fertilizer. 3. Are there any manufacturers in the United States? If not, where are they located? A. St. Louis is the center of the castor oil industry in this country. Information as to the cultivation of the bean is given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 186, under title of "The Castor Bean Plant."

(53) J. A. T. asks: What will remove or prevent the collection of coating in hot beer pipes commonly called beerstone? A. The pipes may be cleaned by washing out with a strong hot solution of soda.

(54) R. E. M. asks a receipt for preserving the juice of lemons for six months or longer. A. Add a small quantity of benzoic acid or salicylic acid. Either of these agents will prevent decomposition.

(55) A. I. asks for a paint that will resist the action of a strong solution of sulphuric acid, and where it can be purchased. A. A coating of liquid asphalt, made by melting asphaltum, will resist the action of sulphuric acid. This substance can be procured from dealers in tar and like materials in your city.

(56) W. H. S. writes: I have some valuable papers from which ink stains were taken by means of acids, but by so doing ruined the finish or enamel. How can I reglaze it? A. The sizing of paper consists of a mixture of glue and alum water. For your purpose a little gum arabic dissolved in water and passed over the erased surface is perhaps as good a remedy as you can easily try.

(57) J. A. H. asks for a varnish or coating that may be used to prevent wood from absorbing moisture in refrigerators. A. Use shellac varnish prepared by dissolving white shellac in alcohol. 2. A

recipe for a varnish of a light shade, that will bear washing off with water, to be used on muslin or linen, and berolled and unrolled often without cracking? A. The addition of a small amount of glycerine to the foregoing can be used for the purpose mentioned, but it is not very satisfactory. The waterproof flexible varnish is generally prepared by dissolving 1½ ounces pure India rubber in 1 pint of chloroform, ether, or carbon disulphide.

(58) E. C. M. gives the following description of a simple open circuit battery devised by him: Take an ordinary fruit jar and place in it a number of pieces of broken electric light carbons, hundreds of which can be picked up in the street after the lamps have been trimmed. One of the bottom pieces is securely bound with one end of a gutta percha covered wire, which, going up to the top, makes the connection with binding screw on cover, the cover being made of wood or hard rubber. Next an ordinary Leclanche battery zinc is suspended from the cover of the jar, reaching down to within an inch or two of the carbons. The exciting fluid is a solution of sal ammoniac and water. E. C. M. says he now uses this battery in connection with a burglar alarm which works very satisfactorily. [We presume uncoppered carbons are used in this battery, as sal ammoniac would attack the copper, and the solution would be weakened.]

(59) J. H. L. asks: If a rocket was fired in a vacuum, would it rise or remain stationary? The rocket is supposed to be an ordinary practicable rocket, and the vacuum an infinite theoretical vacuum. A. It would remain stationary.

(60) J. N. B. writes: Some time ago some one asked for a simple method of filling barometer tubes so as to get the bubbles out, without boiling the mercury. For ordinary weather glasses, I have had fair success as follows: Place a little tuft of raw cotton (clean and fine) in the bottom (i. e., top when filled) of the tube, to which is tied a small thread; then fill the tube as full as possible, and pull the tuft of cotton out slowly. All air bubbles in the mercury will condense into the cotton, and a clean solid tube will appear. After the cotton is out, fill up to overflowing, press a small piece of thick leather over the end, and invert into a cup of mercury, etc.

(61) W. G. T. writes: Will you please inform me if at any time the SCIENTIFIC AMERICAN or the SCIENTIFIC AMERICAN SUPPLEMENT has given directions for the construction of an electric motor of about one-half horsepower or over? If so, please inform me when it was issued. A. You will find descriptions of electric motors in SUPPLEMENT, Nos. 323, 212, 267, and 259. The dynamo electric machine described in SUPPLEMENT, No. 160, will answer for a motor, if you wind the armature with No. 16 instead of No. 18 wire, and wind the magnet with No. 14 wire, employing only about four layers.

(62) W. H. B. says: Will you please tell the cause of the following: In one corner of our cellar the concrete floor has been thrown up, just as though there had been an eruption under the floor. The floor is 4 inches thick, and we cannot find out why it has acted so. A. This may be caused by the upward pressure of water in the ground or by the lateral expansion of the concrete. Even if water is not shown, the air under the pavement may be subjected to a great pressure by the increased amount of water below it, the height of the latter being constantly changed by wet or dry states of the weather.

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

B. E. N.—No. 1 is magnetic iron sand, and may be valuable as an iron ore. An analysis, costing \$15.00, would be necessary to determine this. 2. The red particles may be fragments of garnets or colored quartz. The sample is sand containing iron.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted, December 22, 1885, AND EACH BEARING THAT DATE. [See note at end of list about copies of these patents.]

Acid, alpha-naphtholsulphonic, Vollbrecht & Mensching.....	333,810
Acid, manufacture of beta-naphthylamine sulpho, H. Prinz.....	332,829
Acid, nitronaphtholsulphonic, Vollbrecht & Mensching.....	333,836
Air and gas compressor valve, W. H. Worthen....	332,888
Alloy or compound in producing the same, metallic, H. J. F. Niewerth.....	332,736
Anchor bolt, W. S. Craig.....	332,701
Ankle support, G. C. McEwen.....	332,727, 332,728
Annunciator, D. S. Foote.....	333,063
Annunciator and circuit, telephone, J. Houlehan.....	333,814
Axle box, L. Leirer.....	332,809
Axle nut, adjustable, J. H. Steen.....	333,039
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Back band, J. W. Gardner.....	332,888
Bark cutter, J. C. Hagerty.....	332,797
Bark cutting machine, J. C. Hagerty.....	332,796
Bark mill, W. A. Woods.....	332,854
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Boiler water tube, Wetmore & Bratt.....	333,843
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Bolt blank machine, J. R. Blakeslee.....	332,839
Bookbinding, manufacture of compound fabric for, S. Barlow.....	332,778