

TO INVENTORS.

An experience of more than thirty years, and the preparation of not less than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequalled facilities for procuring patents everywhere. In addition to our facilities for preparing drawings and specifications quickly, the applicant can rest assured that his case will be filed in the Patent Office without delay. Every application, in which the fees have been paid, is sent complete—including the model—to the Patent Office the same day the papers are signed at our office or received by mail, so there is no delay in filing the case, a complaint we often hear from other sources. Another advantage to the inventor in securing his patent through the Scientific American Patent Agency, it insures a special notice of the invention in the SCIENTIFIC AMERICAN, which publication often opens negotiations for the sale of the patent or manufacture of the article. A synopsis of the patent laws in foreign countries may be found on another page, and persons contemplating the securing of patents abroad are invited to write to this office for prices, which have been reduced in accordance with the times, and our perfected facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN.

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 next issue.

Steam Tug Machinery, Engines, Boilers, Sugar Machinery. Atlantic Steam Engine Works, Brooklyn, N. Y.

Jarvis Patent Boiler Setting, same principle as the Siemens process for making steel; burns screenings and all kinds of waste fuel without blower. A. F. Upton, Agent, 49 Congress St., Boston, Mass.

Valves and Hydrants, warranted to give perfect satisfaction. Chapman Valve Manuf. Co., Boston, Mass.

Try the new fragrant Vanity Fair Cigarettes, both plain and halves. Most exquisite of all.

Save Fuel by using Steam Boiler Damper Regulator. National Iron Works, New Brunswick, N. J.

Gold, Silver, and Nickel Plater wants situation. Address Plater, Oakville, Conn.

Small Metal Tubing; Gold and Silver Plated Metal; Hard Solders. J. U. Gerow, 44 State St., Brooklyn, N. Y.

Engines, $\frac{1}{2}$ to 5 H. P. G. F. Sbedd, Waltham, Mass.

Manufacturers of Bag Fasteners will please address, with circular, P. O. Box 757, Carbondale, Penn.

Vertical and Yacht Engines. F. C. & A. E. Rowland, New Haven, Conn.

Patents Sold on Commission.—Describe patent and inclose stamp. Address W. Taft, Tolland, Conn.

Auction Sale.—The well known Hardie's Machine Works, 62 Church St., Albany, N. Y., will be sold March 26, at noon. Address as above for circulars.

Greatest improvement of the age in Artificial Limbs. Perfect-fitting Elastic Limbs of pure dental rubber, made on fac-simile cast of natural limb. Great strength, elasticity, durability, lightness. Address C. T. Mason, Jr., 1320 Chestnut St., Philadelphia.

Amateur Photo. Apparatus, including instructions; outfits complete. E. Sackmann & Co., 278 Pearl St., N. Y.

Wanted—Brown & Sharp Universal Milling Machine, Lath 36-inch swing, planer about 6-ft. bed, upright drill; all second hand. Address Box 4055, N. Y. P. O., with full description and lowest price.

80 H. P. Corliss Engine for sale low, by J. F. Bishop, New Haven, Conn.

New Gear Cutting Attachment for Lathes. Lace Leather Cutter. Something new. Send for lists. Jackson & Tyler, Baltimore, Md.

Outfits for Nickel and Silver Plating, \$5 to \$200. Union Silver Plating Company, Princeton, Ill.

Send for Circulars of Indestructible Boot and Shoe Soles to H. C. Goodrich, 40 Hoyne Ave., Chicago, Ill.

For Sale cheap.—3 H. P. Yacht or Stationary Engine and Boiler, good as new. Aug. Franke, Wapakoneta, O.

Kiuney Bros.' New Cigarette, Sweet Caporal, fine, mild, and sweet, are becoming extremely popular everywhere.

Wanted.—Information of any improved method or machinery for making Vinegar. Address 909 N. 23d St., St. Louis, Mo.

Want—3 Singer Sewing Machines; 1 Watchman's Time Detector. Address Millstone, Indianapolis, Ind.

Brown & Sharpe, Prov. R. I. Best Gear Teeth Cutters and Index Plates at low prices. Send for catalogue.

For Sale.—Brown & Sharp Universal Milling Machine; Cement Profiling Machine; first-class 2d hand Machine Tools. E. P. Bullard, 14 Dey St., New York.

For Sale.—7 foot bed Putnam Planer, \$350. A. A. Pool & Co., Newark, N. J.

Post Hand, Foot, or Power Band Saws, as good as the best, cut $\frac{1}{4}$ in. thick; price \$35. G. W. Baker, Wil., Del.

Bevins & Co.'s Hydraulic Elevator. Great power, simplicity, safety, economy, durability. 94 Liberty St. N. Y.

A Cupola works best with forced blast from a Baker Blower. Wilbraham Bros., 2318 Frankford Ave., Phila.

Shaw's Noise Quieting Nozzles and Mercury Pressure Gauges. T. Shaw, 95 Ridge Ave., Philadelphia, Pa.

For Solid Wrought Iron Beams, etc. see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Vertical Burr Mill. C. K. Bullock, Phila., Pa.

H. Prentiss & Company, 14 Dey St., N. Y., Manufs. Taps, Dies, Screw Plates, Reamers, etc. Send for list.

Case Hardening Preparation. Box 73, Willimantic, Ct.

Hydraulic Elevators for private houses, hotels, and public buildings. Burdon Iron Works, Brooklyn, N. Y.

Presses, Dies, and Tools for working Sheet Metal, etc. Fruit & other can tools. Bliss & Williams, B'klyn, N. Y.

Nickel Plating.—A white deposit guaranteed by using our material. Condit, Hanson & Van Winkle, Newark, N. J.

Galland & Co.'s improved Hydraulic Elevators. Office 206 Broadway, N. Y., (Evening Post Building, room 22.)

The Lathes, Planers, Drills, and other Tools, new and second-hand, of the Wood & Light Machine Company, Worcester, are to be sold out very low by the George Place Machinery Agency, 121 Chambers St., New York.

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing Metals. E. Lyon & Co., 470 Grand St., N. Y.

Solid Emery Vulcanite Wheels—The Solid Original Emery Wheel—other kinds imitations and inferior. Caution.—Our name is stamped in full on all our best Standard Belting, Packing, and Hose. Buy that only. The best is the cheapest. New York Belting and Packing Company, 37 and 38 Park Row, N. Y.

Pulverizing Mills for all hard substances and grinding purposes. Walker Bros. & Co., 23d & Wood St., Phila., Pa. Inventors' Models. John Ruthven, Cincinnati, O.

Sheet Metal Presses, Ferracite Co., Bridgeton, N. J.

Best Wood Cutting Machinery, of the latest improved kinds, eminently superior, manufactured by Bentel, Margedant & Co., Hamilton, Ohio, at lowest prices.

Steel Castings true to pattern, of superior strength and durability. Gearing of all kinds. Hydraulic cylinders, crank shafts, cross heads, connecting rods, and machinery castings of every description. For price list and circular, address Chester Steel Castings Company, Evelina St., Philadelphia, Pa.

Diamond Engineer, J. Dickinson, 64 Nassau St., N. Y.

Elevators, Freight and Passenger, Shafting, Pulleys, and Hangers. L. S. Graves & Son, Rochester, N. Y.

Machine Cut Brass Gear Wheels for Models, etc. (new list). Models, experimental work, and machine work generally. D. Gilbert & Son, 212 Chester St., Phila., Pa.

Walrus Leather, Walrus Wheels; all kinds of Polishing Supplies, in quantities to suit. Greene, Tweed & Co., New York.

Holly System of Water Supply and Fire Protection for Cities and Villages. See advertisement in SCIENTIFIC AMERICAN of this week.

Safety Linen Hose.—New machinery enables us to offer this Hose lower than ever. Greene, Tweed & Co., New York.

For Shafts, Pulleys, or Hangers, call and see stock kept at 79 Liberty St., N. Y. Wm. Sellers & Co.

Howard's Bench Vice and Schuler's Bolt Cutters. Howard Iron Works.

Best Power Punching Presses in the world. Highest Centennial Award. A. H. Merriman, W. Meriden, Conn.

Cutters shaped entirely by machinery for cutting teeth of gear wheels. Pratt & Whitney Co., Hartford, Conn.

Hydraulic Cylinders, Wheels, and Pinions, Machinery Castings; all kinds; strong and durable; and easily worked. Tensile strength not less than 65,000 lbs. to square in. Pittsburgh Steel Casting Co., Pittsburgh, Pa.

Electro-Bronzing on Iron. Philadelphia Smelting Company, Philadelphia, Pa.

Excelsior Steel Tube Cleaner. Schuykill Falls, Phila., Pa.

Wm. Sellers & Co., Phila., have introduced a new Injector, worked by a single motion of a lever.

Portland Cement—Roman & Keene's, for walks, cisterns, foundations, stables, cellars, bridges, reservoirs, breweries, etc. Remit 25 cents postage stamps for Practical Treatise on Cements. S. L. Merchant & Co., 53 Broadway, New York.

Needle Pointed Iron, Brass, and Steel Wire for all purposes. W. Crabb, Newark, N. J.

Two of the handsomest and best Guns ever brought to this country, but little used, for sale for less than half their cost. One a double-barreled breech-loading shotgun, and the other a double express rifle. A rare chance to procure two valuable weapons. See advertisement on back page.

"Vick's Floral Guide" contains a colored plate, 500 illustrations, 100 pages, descriptions of the best flowers and vegetables, and how to grow them; all for 5 cents; in English or German. Add. James Vick, Rochester, N. Y.

Manufacturers of Improved Goods who desire to build up a lucrative foreign trade, will do well to insert a well displayed advertisement in the SCIENTIFIC AMERICAN Export Edition. This paper has a very large foreign circulation.



HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from \$1 to \$5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

(1) H. L. B. writes: In answer to the query of "H. H. H." in the last SCIENTIFIC AMERICAN, I would inform him that the largest steamboat on the Ohio river, at present, is the Southern Transportation Line steamer, Thomas Sherlock, plying between Cincinnati and New Orleans, which is over 300 feet long, measures 133'02 tons, and has a capacity for 2,000 tons. She has frequently had 1,500 tons on board, and at one time carried a cargo of 1,850 tons freight up the river. The steamers Robert Mitchell, Charles Morgan, and Guiding Star, of the same line, are each over 300 feet long and carry from 1,600 to 1,800 tons. The stern-wheelers, Golden City and U. P. Schenck, also carry about 1,600 tons. The Cincinnati and Louisville United States Mail Line steamer, United States, is over 300 feet long, but her extremely sharp model prevents her from carrying a large cargo. The largest vessel on the Mississippi is the St. Louis and New Orleans Anchor Line steamer, James Howard, which is 336 feet in length, 56 feet beam, 10 feet hold, and has a capacity for over 3,000 tons freight. The new lower Mississippi steamers, J. M. White, Ed. Richardson, and Henry Frank, are probably the largest cotton carriers in the world, each having a capacity for about 12,000 bales. The most powerful towboat on the western waters, the Joseph B. Williams, has frequently taken over a half million bushels of coal down the Ohio and Mississippi rivers at one time, and in March, 1878, took from Louisville to New Orleans a single tow of 34 barges, containing 601,000 bushels or nearly 22,000 tons of coal, landing it without loss at her destination. The tow and towboat made a monster fleet nearly 900 feet long and covering over 4 acres.

(2) H. H. B. writes: We have a 12x24 cast iron whistle, supplied by a 2 inch pipe 25 feet long. Under a pressure of 70 lbs. steam we do not get the heavy sound the manufacturer expected. Could we benefit it by shortening the supply pipe? A. If you desire a deeper tone lengthen the bell. The thickness of the bell may have some influence on the quality of the tone, but it does not affect the pitch. The difficulty may be in the adjustment of the bell.

(3) B. C. M. asks: 1. Is there any way to prepare paper so that it will be colored by passing a current of electricity through it? A. Saturate the paper with a solution of potassium iodide in ten parts of thin starch water well boiled, and dry; or use a solution of about 3 parts of potassium ferrocyanide in 20 of water. It is best to slightly moisten these papers before using; the latter requires an iron or steel pen or style. 2. Is it possible to adapt a carbon battery, such as is used with Edison's electric pen, so that it can be used for the electric pen described in a recent number of your paper? A. Yes.

(4) F. F. H. asks: How is "gilder's wax" made to color gold? A. Oil, 25 parts; yellow wax, 25 parts; acetate of copper, 13 parts; red ochre, 37 parts. The whole is melted, and stirred until cold.

(5) E. O. D. asks: Will plaster of Paris answer as material for making porous cells for Bunsen batteries? If so, how do such cells compare with those made of fine clay? A. It has been used, but cannot be recommended. Porous clay cells are to be preferred to anything else.

(6) W. H. H. asks: Can you refer me to a good book on refining crude petroleum oil? A. "A Practical Treatise on Coal, Petroleum, and other Distilled Oils," by A. Gesner.

(7) W. B. P. asks: Can rubber be melted and run into moulds like lead or any metal, and get a correct and true copy, such as would do for rubber stamps? A. No; rubber when melted loses its character by partial decomposition, and remains soft and sticky on cooling. Unvulcanized caoutchouc can be softened by a gentle heat, so as to copy a mould when pressed into it. See articles on vulcanized rubber, pp. 48 and 105, vol. 39, SCIENTIFIC AMERICAN SUPPLEMENT.

(8) C. H.—We think MacCord's drawing lessons contained in the SUPPLEMENT will answer your purpose. For drawing materials address dealers who advertise in our columns.

(9) E. C. R. and F. N.—For process of ebonying wood, see vol. 39, p. 411 (2), SCIENTIFIC AMERICAN.

(10) L. H. L. asks: How much power will a current wheel give, that is 10 feet in diameter, 20 feet long, with the paddles 18 inches deep in the water? A. Multiply the weight of water in pounds passing by the immersed section of the wheel per minute, by the speed at which it moves in feet per minute, and divide the product by 55,000.

(11) J. W. T. asks: 1. Where to obtain latest and best information on the following: How to analyze soils, manures, foods, etc.? A. Fresenius' "Quantitative Analysis," contains full and complete directions for the analysis of soils and manures. There is no work having special reference to the analysis of foods. Consult also, "Agricultural Qualitative and Quantitative Analysis," by G. C. Caldwell. 2. What book or books best suited to assist in gaining a knowledge of agricultural chemistry? A. "Agricultural Chemistry," by James F. W. Johnston, F. C. S., is a most thorough and complete treatise on this subject.

(12) J. D. writes: We desire to know what is the best method for separating gold and platinum filings, our object being to get the gold. A. Cover the scraps with warm aqua regia (nitric acid 1 part, hydrochloric acid 3 parts) and digest for an hour; pour off the solution and repeat the digestion with fresh acid as long as any residue remains undissolved. Evaporate the acid solutions nearly to dryness, dissolve the residue in warm water slightly acidified with hydrochloric acid, and add strong aqueous solution of sal ammoniac in slight excess. Collect the precipitate (ammonium platinum chloride) on a filter, wash it with water, and to the warmed filtrate (with washings) add excess of aqueous solution of copperas (ferrous sulphate). Collect the finely divided gold precipitated, dry, mix it with a few fragments of borax, and melt in a small black lead crucible. Mix the platinum precipitate with a few fragments of zinc and dilute hydrochloric acid, and when all the metal has been precipitated dry, and fuse it in a small shallow lime crucible by means of the oxy-hydrogen blow pipe.

(13) W. S. asks how to groove the edges of the spectacle lenses so as to put in the frame that has no groove? A. Use in a lathe a thin copper disk supplied with emery and water.

(14) X. Y. Z. asks: What will make a good stain (walnut) for pine, poplar, or maple wood? A. Water, 1 quart; washing soda, $\frac{1}{2}$ oz.; Vandyke brown, $\frac{1}{2}$ oz.; bichromate of potash, $\frac{1}{4}$ oz. Boil for 10 minutes, and apply with a brush, in either hot or cold state, diluted with hot water, if necessary.

(15) R. M. asks how a dark color may be imparted to rifle barrels. A. They are generally blued by heat.

(16) R. & Co.—The beetle which you send is the common "larver beetle" (*Dermeestes lardarius*). It was the larva of this insect that committed the depredations of which you complain. Professor C. V. Riley recommends the sprinkling of fabrics with benzine occasionally as a remedy against the incursions of this pest.

(17) F. G. D.—For bells use copper 77, tin 23. Use borax as a flux. Pour quite hot. For the mould use the sand as dry as possible. Bells injured by cooling too quickly may be tempered by reheating them and allowing them to cool slowly.

(18) G. W. D. writes: I have a water wheel 10 feet in diameter giving me ten horse power. How much power will I get from a wheel 30 feet in di-

ameter? The stream of water is sufficiently large for either. A friend claims that the power will be exactly doubled, which I doubt. A. It is possible to double the power with the new wheel, if you have abundance of water. You can effect the same result with the present wheel, however, by running it faster.

(19) "Reader" asks about what length of time a sheet of boiler iron three thirty-seconds inch in thickness will last in the ground before it will rust through. Also what length will it last with threecoats of pitch? A. From 1 to 5 years, according to the nature of the ground. If well coated with pitch, it will last an indefinite period.

(20) T. C. C. asks: 1. What can I use to fill the pores of walnut to prepare it for varnish, and how is it applied? A. Apply several coats of alcoholic shellac varnish, and when dry rub them down with moistened pumice powder. 2. What kind of varnish is best? A. Clear copal varnish gives a fine finish. 3. How is veneering done? A. Moisten one side of the veneer with warm water, coat the other with hot glue, apply the glued side to the surface to be veneered, and clamp securely in position until the glue has set. If not sufficiently moistened on the reverse side the veneer will curl so that it cannot be smoothly applied.

(21) L. A. B. writes: 1. I am making some curved rulers of hard maple from patterns in the SUPPLEMENT. What can I soak them in to make them tough and hard? A. Soak them for about 24 hours in a strong aqueous solution of lead or aluminum acetate, and then for several hours in warm solution of soap in 48 per cent alcohol. Wash with water and dry slowly. 2. Do artists in drawing use a rest for the hand or arm, or are they entirely free from the paper? A. A rest is used for some kinds of work.

(22) F. A. W. asks how to make red impression paper, suitable for marking fretwork patterns on black water. A. Rub into a suitable tissue a mixture of 6 parts of lard, 1 part of beeswax, and a sufficient quantity. Venetian red, red lead, or vermilion, in very fine powder. The mixture should be warm, and should not be applied in excess.

(23) H. G. O. asks for the most efficient method of putting a white coating on brass, with black tin, commonly known as "white washing." A. Boil together 6 lbs. cream of tartar, 4 gallons of water and 8 lbs. of grain tin or tin shavings for half an hour in a porcelain lined vessel; put the clean brass ware in the boiling liquid for a few minutes or until properly coated. A boiling solution of potassium or sodium stannate mixed with tin turnings may be employed instead of the above.

(24) C. W. F. asks: How can I clean 10 or 12 lbs. of mercury of mechanical impurities, otherwise than by distilling? A. Pierce the apex of a dry filter (cornet) with a pin point, adjust the paper accurately to a funnel, and gently pour in the mercury. If the mercury is dry and the impurities are purely mechanical it will rarely be necessary to repeat the filtration. The metal may be freed from gross impurities by passing it through a piece of chamois skin free from holes.

(25) S. D. M. writes: 1. The expression of a horse power is 33,000 lbs. raised 1 foot high in 1 minute. What is the expression of a two horse power? A. 66,000 foot pounds per minute. 2. Theoretically will the principle of the hydrostatic press remain the same if air be substituted for water? A. Yes. 3. By increasing the blast through a blow pipe, the heating effect where the flame impinges is augmented. Does an increase in the combustion of the spirits take place, or is it entirely accounted for by the increase of oxygen in the blast? A. The temperature is augmented through the more rapid oxidization of the combustible. The blast also mechanically concentrates and impels the highly ignited gas against the object to be heated. An excess of blast, however, cools or extinguishes the flame. 4. Is there a good pocket book on mechanical engineering published, similar in character to those used by civil engineers in their profession? A. There are several, Nystrom's, Spon's, and others.

(26) H. F. D. asks: Do plants make air pure or impure in a room? A. It depends somewhat upon the character of the plants, and their number. If the plants are few in number and the apartment is properly ventilated, ordinarily no danger need be apprehended. 2. Does zinc get harder to melt the more you melt it? If so, why? A. No. 3. What is the best mould made of to cast lead in? A. A well dried plaster of Paris mould goes very well for small castings. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 17. 4. Would a steam engine of $\frac{1}{4}$ horse power be sufficient to run a sewing machine or turning lathe? A. Yes.

(27) "Old Subscriber" asks: What coating or varnish can I use to make papier mache fireproof? A. Apply a hot saturated aqueous solution of commercial tungstate of soda or of waterglass. Repeat the application several times.

(28) F. G. P. asks if there are any chemicals that would act like a loadstone. A. No; several of the compounds of iron besides magnetite are magnetic, but the property is not sufficiently marked in any of these to satisfy your requirements. Have you tried small steel magnets or magnetized needles? See "Phil. Trans.," 1855 and 1856, also "Watts's Dictionary of Chemistry," vol. iii. p. 776.

(29) "Reader" asks: What will remove the crust from the inside of a boiler? It collects on the flues almost half an inch thick. A. The use of fresh water is the most ready means of removal, though there are some patented compounds in the market that are well spoken of.

(30) H. L. S., referring to the electric pen described in our issue of February 22, states that there is no need that the writing slab of metal should be insulated; and if well connected with the ground, and one of the poles of the coil, it may be handled with impunity while the coil is working. The sparks will now pass quite as well from the stylus connected with the other pole, as though the metal plate on which the paper rested was insulated.