

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.

The best results are obtained by the Imp. Eureka Turbine Wheel, and Barber's Pat. Pulverizing Mills. Send for descriptive pamphlets to Barber & Son, Allentown, Pa.

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

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

Kimball's Catarrh Cigarettes, an instantaneous relief and a pleasant smoke. They contain no tobacco.

"We get 10 lb. more steam since using 'Downer's Boiler Liquid,'" writes a party who appreciates the merits of the above article. Clean boilers, with more steam and less fuel, is the verdict. A. H. Downer, 17 Peck Slip, New York.

The Globe (Miner) Street Lamp; most durable, none better. Address J. G. Miner, Morrisania, N. Y. City.

For Sale.—Two Horizontal Engines, 50 and 25 H. P.; Price \$675 and \$450; are first-class, new, and complete. Address H. Nadig & Bro., Allentown, Pa.

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

Drop Hammers, Die Sinking Machines, Punching and Shearing Presses. Pratt & Whitney Co., Hartford, Ct.

Air Guns.—H. M. Quackenbush, Manufacturer, Herkimer, N. Y.

Boilers ready for shipment. For a good Boiler send to Hilles & Jones, Wilmington, Del.

Wanted—Estimates for Manufacturing Coleman's Mill Pick, advertised in another column.

The only Portable Engines attached to a boiler having cold bearings. The Peerless and Domestic. Francis Hershey, successor to F. F. & A. B. Landis, Lancaster, Pa.

For one dollar, with your chest measure, we will send, post paid, a pair each of our O. K. Shoulder Braces and Bonanza Armlets. J. W. Smith & Co., 178 Devonshire St., Boston, Mass.

H. W. Johns' Asbestos Roof Paint forms the most durable and economical protective coating in the world for tin roofs, exposed brick walls, iron work, barns, fences, etc., for which it is in every respect equal to the best white lead, while it costs only half as much. It is made in a variety of beautiful colors, samples of which will be sent on application to 87 Maiden Lane, New York.

Lightning Chisel Pruner. Centennial award. For sale or royalty. Address Flournoy, Knowles, Md.

Magnets, Insulated Wire, etc., for experiments. Catalogue free. Goodnow & Wightman, 176 Washington St., Boston, Mass.

Shaw's Mercury Gauges, 5 to 50,000 lbs.; accurate, reliable, and durable. T. Shaw, 915 Ridge Ave., Phila., Pa.

New Pamphlet of "Burnham's Standard Turbine Wheel" sent free by N. F. Burnham, York, Pa.

17 and 20 in. Gibed Rest Screw Lathes. Geo. S. Lincoln & Co., Hartford, Conn.

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

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

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

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

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

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

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

The Ornamental Penman's, Engraver's, Sign Writer's, and Stonecutter's Pocketbook of Alphabets; 32 plates; 20 cts.; mail free. E. & F. N. Spon, 446 Broome St., N. Y.

Linen Hose.—Sizes: 1 1/4 in., 20c.; 2 in., 25c.; 2 1/2 in., 29c. per foot, subject to large discount. For price lists of all sizes, also rubber lined linen hose, address Eureka Fire Hose Company, No. 13 Barclay St., New York.

Dead Stroke Power Hammers; cheapest and best for general forging and die work; 500 in use. P. S. Justice, of Philadelphia.

Forsyth & Co., Manchester, N. H., and 213 Centre St., New York. Specialties.—Bolt Forging Machines, Power Hammers, Combined Hand Fire Engines and Hose Carriages, new and 2d hand machinery. Send stamp for illustrated catalogues, stating just what you want.

Partner Wanted.—A party with limited capital.—Address Des Moines Linseed Oil Works, Des Moines, Iowa.

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.

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

The Lathes, Planers, Drills, and other Tools, new and second-hand, of the Wood & Light Machine Company, Worcester, are being 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.

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.

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

Pulverizing Mills for all hard substances and grinding purposes. Walker Bros. & Co., 23d & Wood St., Phila., Pa.

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, 407 Library St., Philadelphia, Pa.

Walrus Leather for Polishing Agricultural Implements and all kinds of metal. Greene, Tweed & Co., 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.

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

Diamond Self-clamp Paper Cutter and Bookbinders' Machinery. Howard Iron Works, Buffalo, N. Y.

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

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

Improved Steel Castings; stiff and durable; as soft and easily worked as wrought iron; tensile strength not less than 65,000 lbs. to sq. in. Circulars free. Pittsburg Steel Casting Company, Pittsburg, Pa.

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

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

Rubber Hose, Suction Hose, Steam Hose, and Linen Hose; all sizes. Greene, Tweed & Co., 18 Park Pl., N. Y.

The SCIENTIFIC AMERICAN Export Edition is published monthly, about the 15th of each month. Every number comprises most of the plates of the four preceding weekly numbers of the SCIENTIFIC AMERICAN, with other appropriate contents, business announcements, etc. It forms a large and splendid periodical of nearly one hundred quarto pages, each number illustrated with about one hundred engravings. It is a complete record of American progress in the arts.

NEW BOOKS AND PUBLICATIONS.

THE COMBUSTION OF COAL. By W. M. Barr. Indianapolis: Yohn Brothers. 8vo. pp. 306. \$2.50.

Mr. Barr has done good service by presenting in plain English such information with regard to the chemistry of coal, and the more recent mechanical devices for the economic use of solid, liquid, and gaseous fuels, as may be of practical utility to the great mass of fuel users. He has not aimed to present new theories or new observations, but rather to bring the knowledge, already established, within the reach of those unprepared by mathematical and chemical training to profit by the excellent but abstruse treatises of Professor Rankine and others. The book is well written, illustrated with a few appropriate cuts, well made, and fully indexed.

VICK'S ILLUSTRATED MONTHLY.—The current number of this floral magazine is full of handsome illustrations and pleasant reading matter. The frontispiece is a collection of small flowered petunias, and it includes every known variety. The grouping is artistic and the coloring exceeding rich. The Monthly is devoted exclusively to flowers and vegetables, and every page is filled with information regarding growing plants and roots. The magazine is devoted mostly to the culture of flowers. The magazine teaches the development of the beautiful, and were half its suggestions followed the world would be a garden of roses and the people in it bright and happy. Mr. Vick is an enthusiast and his spirit is seen in all he writes. The Floral Guide for 1879 has just been issued; it contains a full page colored illustration of lilies and numberless illustrations of smaller proportions, and representing a great variety of plants, flowers, and vegetables. Both magazine and Guide are published at Rochester, N. Y., by James Vick.



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.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

(1) R. G. S. asks for the process of hardening and tempering small steel instruments (dental). A. Heat them to a cherry red and immediately plunge them

into a cake of tallow, resin, or beeswax, according to the size of the tool or temper required.

(2) R. R. S. asks: 1. For best and cheapest method of case hardening axles. A. Pack the axles in an iron box with animal carbon, lute the box with clay, and heat it to a red heat. This temperature must be maintained for several hours, according to the depth of the hardness required. 2. Also the best mode of giving axles a fine polish while revolving in centers. A. Make a grinding clamp and line it with lead. Apply fine emery and oil to the axle and hold on the clamp, moving it along the axle as it revolves.

(3) C. P. W. asks for an explanation of the use of the "scale of chords." A. It is chiefly used for measuring angles. Refer to some geometrical work for explanation of the rule.

(4) R. S. H. writes: I have seen wheels made, or rather used, for gumming saws, by fastening emery on to wooden wheels in some way. Can you tell me how to do it? A. Coat the wheels with good glue, and roll them in emery heated to about 200° Fah. Solid emery wheels are far better than the kind you mention.

(5) A. L. writes: I have a flute, the first joint of which is ivory, and where it comes in contact with my lips it is very much discolored. Can you tell me how to color the ivory an indelible black or some dark color, something that will not injure the flute or poison my lips? A. Suspend in a strong aqueous solution of neutral silver nitrate exposed to direct sunlight until black; then wash thoroughly with water.

(6) G. J. V. asks: 1. How to overcome that nuisance, bedbugs. A. Try benzine—a very small quantity will suffice. 2. Am troubled also with rats and mice, which have become too shrewd to be taken in by any device of mine for destroying them. A. Dr. Ure recommends the following: Melt in a bottle by standing it in water heated to about 150° Fah., 1/2 lb. of lard, to which add 1/4 oz. of phosphorus, and 1/2 pint of proof spirit. Then remove the bottle from the water bath, cork, and violently agitate it for a minute or two. On standing the dilute alcohol separates and may be poured off, while the rest, made fluid by gently warming, is made into a dough with wheat flour and sugar, and flavored with oil of rhodium or anise-seed. Pellets of this dough are placed in the rat holes, and as they shine in the dark and are pleasant to taste and smell, they are readily eaten by rats and mice and prove certainly fatal. There is no danger of fire from the use of this mixture if properly prepared.

(7) H. A. J. asks how to remove the stains from the front of a brick house caused by white paint washing off of the window frames and running down the bricks. Also the green mould that has collected on the bricks, back of an old porch roof, now taken down. A. Apply a strong solution of caustic potassa or soda, and after a few hours wash with plenty of clean water.

(8) R. M. C. asks the best method of making an electro-magnet to sustain a heavy weight by the use of one "carbon" or "Daniell" cell, and how long will either of the above cells sustain its strength on a closed circuit without attention? A. You cannot expect to sustain a great weight with a single small cell of either battery. We think, however, that a magnet having 1/2 inch cores, 2 1/2 inches long, each wound with 10 or 12 layers of No. 30 wire, would give good results with a single cell. The carbon battery will run down in a short time. The Daniell will keep up for three or four months.

(9) G. W. L. asks: If a lead pipe attached to a common lifting pump be flattened one half of its diameter through its whole length, will the pump work as freely and throw as much water in a given time? A. If the pipe, before being flattened, is only sufficient to supply the pump, no.

(10) R. B. asks how to grind in a faucet plug. A. Drawfile the plug, and grind with the sand that is rapped from castings, or with grindstone grit and water.

(11) F. A. S. asks: 1. What is the proportion of the peroxide of manganese, carbon, and gum lac used in the new form of Leclanche batteries described in SUPPLEMENT No. 159? A. Use only enough shellac to cement the particles together. You can determine the proportion by an experiment. 2. Will gas carbon ground fine do for the carbon used in the carbon blocks made of the above mixture? A. Yes. 3. If I take a block of wood made the same size and shape that the rubber blocks are (between the zinc and carbon), and soak it in hot beeswax and coat it over on the outside with beeswax, will it not answer the purpose? A. Yes. 4. What is the size of Right transmitter for telephones, diaphragm thimble holding the carbon, and size of spring? A. The size given in the engraving on page 186 of current volume of SCIENTIFIC AMERICAN is correct.

(12) E. C. P. asks: What metal expands most when heated (mercury excepted)? A. Zinc, among common metals.

(13) G. W. G. asks for the number of minor planets now known. A. Professor Swift informs us that there are 194.

(14) N. C. L. writes: I have a boat 28 feet long over all, 6 1/2 beam, will draw about 2 feet, it is sharp fore and aft, like a whale boat, very strongly built. I have a steam fire engine boiler, 10 to 12 horse power. I want to make 10 to 12 miles an hour. If I carry 100 lbs. of steam, how large should the engine be? Would 4 1/2 x 7 inch cylinder be about right? A. 4 1/2 inches by 7 inches would answer, but 5 inches by 8 inches would be better. 2. The boat having a sharp stern, would you advise the use of two propellers, one each side? A. Two screws to be preferred.

(15) S. M. H. writes: 1. I noticed in the SCIENTIFIC AMERICAN, some time since, that antimony could be used in the place of carbon in single fluid batteries. Would you use two antimony plates with zinc between, or two zinc plates with antimony between? A. You will find carbon more satisfactory than the antimony. Use two carbon plates with one zinc plate between. 2. How many such cells would be required for ordinary medical use? A very strong current is not required. A. One cell is sufficient.

(16) C. A. W. asks: 1. In the condenser of induction coil, described in SUPPLEMENT No. 160, are

both surfaces of the tin foil counted; that is to say, if each sheet were 1 foot square, would there be 20 or 46 sheets? A. 40 sheets. 2. I wish to make an electro-magnet about 3 inches long; what is the best diameter for core, and also what size wire and how much should I use? A. Half inch cores. If the magnet is intended for experimental purposes, probably six or eight layers of No. 18 wire will answer. 3. I wish to run a line with a friend about 800 feet off. Which will be the cheapest, a line of copper (about No. 20 or 18) or regular telegraph wire? A. Telegraph wire. 4. Which will have the more resistance? A. For the same size, iron has the most resistance; this is compensated for by using a larger wire. 5. How many gravity cells would it take to run it? A. It depends on the arrangement of your line, your instrument, etc. Probably four would answer.

(17) C., Y. & Co. ask for a copper dip, such as used by certain fixture manufacturers on their iron castings. A. Copper sulphate, 3 1/2 oz.; sulphuric acid, 3 1/2 oz.; water, about 1 gallon. Place the clean casting in a tumbling barrel with sawdust, bran, or sand moistened with this solution, and revolve for a few minutes; a longer exposure will spoil rather than improve the film of copper deposited. In place of tumbling the articles, they may be simply rubbed with this mixture.

(18) J. K. asks: 1. If an electric light can be maintained in a vacuum. A. Yes; the Geissler tube, the electric egg, and the Sawyer-Man lamp are examples. 2. It is stated that the wonderful Kansas and Colorado Centennial clock runs a hundred years with one winding up, and that the weight or weights of this clock has a fall of 6 feet and falls 1/4 of an inch in a year, and takes less power to run it than a watch. Now, perhaps a clock might be geared to run a hundred years, but the complicated machinery would cause so much friction that it would require a great deal of power. I doubt very much if it would ever stir, the friction would be so great. Now I would like to have the SCIENTIFIC AMERICAN'S opinion about this wonderful clock; is it a humbug or is it not? A. There is very little friction in the clock referred to, the escapement and pendulum operate very slowly.

(19) J. C. A. asks: How does the microphone magnify small sounds? A. By varying the electrical current so as to produce in the receiving instrument greater sonorous vibrations than those at the microphone or transmitter.

(20) W. A. R. asks: What is the cheapest and easiest method of etching on glass? And how are the etching fluids prepared, and will the fluids used to etch glass produce the same results on metals? A. Glass is etched by hydrofluoric acid gas or liquid hydrofluoric acid (solution of the gas in water). The former in contact with glass produces a rough surface (as in ground glass), while the latter ordinarily leaves the surface clear. The gas is prepared by mixing together finely powdered fluorspar (calcium fluoride), 3 parts, and 2 parts of strong sulphuric acid, in a shallow leaden dish, and applying a gentle heat. The plates to be etched may be placed over the dish. The operation should be conducted under a hood or in the open air to avoid inhaling the pernicious fumes. The plates are prepared by coating them while warm with wax or paraffine, through which to the surface of the glass the design is cut with suitable graters. In preparing the liquid acid the mixture of spar and oil of vitriol is placed in a leaden or platinum retort, which is heated, and the gas given off is conducted into a leaden bottle filled with water, which absorbs it. In contact with the flesh the acid produces stubborn sores. The metals are usually etched with dilute nitric acid and niter, or sulphuric acid, sulphate of copper and salt, hydrochloric acid and chlorate of potash. Hydrofluoric acid is not used on metals.

(21) E. D. V. asks: 1. Of how many grains does the drachm consist? A. Apothecaries' weight—1 dr.—60 grs., or 1/8 troy pound. 2. In patent office formula, when not specified, how are we to understand drachm or dram, as avoirdupois or apothecaries'? The same question concerning the use of the word drachm or dram in these columns. I understand it, when not otherwise specified, to mean always 27 and eleven thirty-seconds grains. Am I correct? My drug-gist disputes me. A. Usually, the old apothecaries' drachm of 60 grains is understood, although in modern pharmacy (U. S.) the pound, drachm, and scruple have fallen into disuse, while in chemical formulae the metric system is now almost exclusively employed. The avoirdupois drachm is now seldom used.

(22) N. D. writes: In finishing some stores I want a large quantity of counters, 400 or 500 feet. Black walnut is dear; white wood in wide boards is much cheaper and sufficiently hard and smooth. How can I stain this wood so as to resemble cherry, mahogany, or black walnut? A. Water, 1 quart; washing soda, 1 1/2 ounce; Vandyke brown, 2 1/2 ounces; bichromate of potash, 1/2 ounce. Boil for ten minutes, dilute with water if necessary, and apply hot with a brush.

(23) A. J. B. asks: 1. How are carbons for batteries made? A. See SCIENTIFIC AMERICAN SUPPLEMENTS, Nos. 157, 158, and 159. 2. How are porous cups for batteries made? A. They are made of potter's clay, baked without glazing. 3. How is the best and cheapest battery made which will do for nickel or silver plating? A. For plating on a small scale use a Daniell or a gravity battery. A full description of these batteries is given in the SUPPLEMENTS referred to above.

(24) H. J. G. asks (1) how to make a good diamond wheel for grinding, polishing, and sharpening diamonds? I would like to make a wheel to fit into my foot power lathe. A. Use a flat soft iron disk. Burnish the diamond dust well into it. 2. What color must I have when drawing the temper of a square center for centering in lathe? A. A brownish yellow.

(25) J. A. D. asks: Can a six horse power engine employed in a cheese factory, at the foot of a hill, be used with advantage for cutting and grinding feed in a barn 35 rods distant, on the summit of the hill? If so, what means of connection should be used? A. You can readily do it by employing a small endless wire rope, allowing it to run over a sheave at the factory, and over another sheave at the barn. Any dealer in wire rope will give you plans.