

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.

Sutton's Patent Pulley Cover.—If you are losing power, get it again by using these covers. Calculate how much power you are losing and find the gain you will make in your work by adopting a positive remedy. Send for a circular. Address Joseph Woodward, proprietor and manufacturer, P. O. Box 3419, New York.

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

Blake's Belt Studs. The most durable fastening for rubber and leather belts. Greene, Tweed & Co., N. Y. National Steam Pump; best and cheapest. Send for prices. National Iron Works, New Brunswick, N. J.

Auburn, N. Y., March 1, 1878. H. W. Johns Manufacturing Co., 87 Maiden Lane, N. Y. Dear Sirs: In answer to your inquiry as to how we like your paint, we are more than entirely satisfied with it. As you are aware, we are large users of paint, and of all that we have ever used, are satisfied yours is far superior; it is put on with less labor, covers better, flows more easily, has a better body, and, as far as our experience goes, will stand the weather better than any other paint we know of. Your roof paint is unsurpassed; we used one coat on a tin roof, and to-day it looks as fresh, and the color is as bright, as when first applied, and there is no sign of its cracking. Respectfully yours, Josiah Barber & Sons, Manufacturers of Woolen Goods and Carpetings.

For Sale Cheap.—A few State Rights for a Clothes Line Fastener, just patented. John A. Worley, Cleveland, O.

Blake Crusher, Improved 10 x 4; Evans Screw Press, No. 2. Both good as new; about half price. J. E. Mitchell, 310 York Ave., Philadelphia, Pa.

Steel Stamping Figures, \$1 per set; Name Stamp, 15 cents per letter. C. L. Alderson, Cleveland, O.

For Screw Cutting Engine Lathes of 14, 15, 18, and 22 in. Swing. Address Star Tool Co., Providence, R. I.

Best Turkey Emery in kegs, half kegs, and cans; liberal rates by the ton. Greene, Tweed & Co., N. Y.

Wanted—New Machinery on Commission, in large new store near Liberty St. Superior advantages. No charge for storage or cleaning. Address P. O. Box 1012, New York.

Combined Universal Concentric or Eccentric and Independent Jaw Chucks. Pratt & Whitney Co., H't'd, Ct.

Downer's Anti-Incrustation Liquid, for the removal and prevention of scale in steam boilers, is safe, effective, and economical. Fully guaranteed. Try it. 17 Peck Slip, New York.

Shaw's Noise Quieting Nozzles subdivide the steam into numerous fine streams. All parties are cautioned against purchasing from infringers. T. Shaw, 915 Ridge Ave., Philadelphia, Pa.

The Horton Lathes Chucks; prices reduced 30 per cent. Address The E. Horton & Son Co., Windsor Locks, Conn.

Wanted.—A Second-hand Phonograph. Address, with description and price, C. H. Abbot, Lee's Summit, Jackson Co., Mo.

Agents for Patent Medicine will hear of something to their advantage by addressing F. S. Ide, Box 121, Providence, R. I.

For Sale.—A New No. 5 Stiles & Parker Geared Punching Press; latest and best; cheap; no use for it. B. D. Washburn & Co., Boston, Mass.

Lincoln's Milling Machines; 17 and 20 in. Screw Lathes. Phenix Iron Works, Hartford, Conn.

Louisiana Sugar Growers.—Your attention is called to the advertisement of P. A. de La Nux, C. E., of Honolulu, Sandwich Islands, on page 334.

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

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

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

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.

Sheet Metal Presses, Ferracute Co., Bridgeton, N. J. Vertical Burr Mill. C. K. Bullock, Phila., Pa.

Eagle Anvils, 9 cents per pound. Fully warranted.

Diamond Planers. J. Dickinson, 64 Nassau St., N. Y. Clipper Injector. J. D. Lynde, Philadelphia, Pa.

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.

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

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.

Linon Hose.—Sizes: 1 1/2 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 linon hose, address Eureka Fire Hose Company, No. 13 Barclay St., New York.

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.

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

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.

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.

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

Pulverizing Mills for all hard substances and grinding purposes. Walker Bros. & Co., 234 & Wood St., Phila., Pa.

The Improved Hydraulic Jacks, Punches, and Tube Expanders. R. DuRoi, 24 Columbia St., New York.

C. M. Flint, Fitchburg, Mass., Mfr. of Saw Mills and Dogs, Shingle and Clapboard Machines. Circulars.

The best Friction Clutch Pulley and Friction Hoisting Machinery in the world, to be seen with power applied, 55 and 97 Liberty St., New York. D. Frisbie & Co., New Haven, Conn.

No gum! No grit! No acid! Anti-Corrosive Cylinder Oil is the best in the world, and the first and only oil that perfectly lubricates a railroad locomotive cylinder. Doing it with half the quantity required of best lard or tallow, giving increased power and less wear to machinery, with entire freedom from gum, stain, or corrosion of any sort, and it is equally superior for all steam cylinders or heavy work where body or cooling qualities are indispensable. A fair trial insures its continued use. Address E. H. Kellogg, sole manufacturer, 17 Cedar St., New York.

The 1879 Pennsylvania Lawn Mower.—Light draught and easily adjusted. Machines warranted. See illustrated editorial, Sci. Am., No. 14. Lloyd, Supplee & Walton, Philadelphia, Pa.

Deoxidized Bronze. Patent for machine and engine journals. Philadelphia Smelting Co., Phila., Pa.

Wood-working Machinery, Waymouth Lathes. Specialty, Wardwell Patent Saw Bench; it has no equal. Improved Patent Planers; Elevators; Dowel Machines. Rollstone Machine Company, Fitchburg, Mass.

Ace Lathes.—Swing, 7 in.; turn, 19 in. long; back geared; screw cutting. Send 3 cent stamp for circular and price, to W. Donaldson, southwest corner Smith and Augusta, Cincinnati, Ohio.

The Twiss Automatic Engine; Also Vertical and Yacht Engines. N. W. Twiss, New Haven, Conn.

Dead Pulleys that stop the running of loose pulleys and their belts, controlled from any point. Send for catalogue. Taper Sleeve Pulley Works, Erie, Pa.

The only economical and practical Gas Engine in the market is the new "Otto" Silent, built by Schleicher, Schuram & Co., Philadelphia, Pa. Send for circular.

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.

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 AMERICAN JOURNAL OF OTOTOLOGY. A Quarterly Journal of Physiological Acoustics and Aural Surgery. New York: Wm. Wood & Co. \$3 a year.

Two numbers of this periodical have been published, giving abundant evidence of ability, strength, and practical utility. It is edited by Dr. Clarence J. Blake, of Boston, in conjunction with Professor A. M. Mayer, of Hoboken; Dr. Albert H. Buck, and Dr. Samuel Sexton, of New York; Dr. C. H. Burnett, of Philadelphia; Dr. J. Orne Green, of Boston; and Dr. H. N. Spencer, of St. Louis. Just now the department of acoustics is pushing to the front rank in importance as a field for original investigation and discovery, and is well worthy of distinctive representation in journalism. The American Journal of Otology takes a position with the highest scientific periodicals of the world.

THE COAL TRADE. By Frederick E. Saward. New York: 1879. Price \$1.

This, the sixth annual review of the coal trade at home and abroad, by the editor of the Coal Trade Journal, is correctly described as a valuable compendium of statistics relative to coal production, prices, transportation, and related interests, the world over. The author notes that 235,000,000 tons of coal are annually used by the Anglo-Saxon race, while all the other races use not more than 75,000,000 tons together; and he ventures to affirm that it is because the Anglo-Saxon race so augments its power that it has achieved the greatest advance in material civilization.

AMERICAN CHEMICAL JOURNAL. Edited by Ira Remsen, Professor of Chemistry in the Johns Hopkins University. Baltimore: Innes & Co. \$3 a vol. Single numbers 50 cents.

The avowed object of this journal is to provide for the connected publication of all good original papers written by American chemists. Hitherto such papers have either had a semi-private publication, or have been widely scattered among periodicals not specially devoted to this science. In addition the journal will reprint entire or give abstracts of the more important chemical contributions to other, especially foreign journals. It will also give reviews and reports of chemical publications, processes, and investigations. The first number (April) contains a valuable report by Professor J. W. Mallet, of the University of Virginia, on the recent important changes in the industrial applications of chemistry; a discussion of Lockyer's latest hypothesis, and other valuable papers.

APPLICATIONS OF THE PHYSICAL FORCES. By Amedee Guillemin. Part I. 40 cents.

The aim of this edition of Guillemin's admirable work is evidently to bring it within the reach of many who would not think themselves able to buy the complete work outright. It is to appear in eighteen monthly parts. Whoever wishes to become acquainted with the more remarkable applications of physical science in the arts and industries, and in the greater art of original investigation, will not find elsewhere so beautiful and attractive a presentation of the great subject. The work will be illustrated by four colored plates and nearly five hundred engravings.

THE SCIENCE INDEX. Edited by A. Hildebrandt. Manchester, Eng.: Bow Chambers, 55 Cross street. January, 1879. 19s. a year.

The object of this index is to supply a monthly guide to the more important articles of a scientific nature printed in the leading English and American periodicals. The first issue (quarto, pp. 84) covers the month of January, 1879, classifying and, in many instances, briefly describing the more valuable articles appearing in some forty different papers and magazines. The enterprise is a novel one, and promises to be extremely useful to students and journalists.

ORGANON OF SCIENCE. By John Harrison Stinson, Esq. Eureka, Cal.: William Ayres. 12mo. pp. 158.

This is an ambitious little book. The author describes it as a scientific work, and says that the science, the principles of which it sets forth, differs from all other sciences in that it shows the only keys which can be used in unlocking the mysteries of any science. Unfortunately the keys are very rusty; the print is barely legible, there is no index, and the language will have to be translated into English before many will undertake to read the work. It is asking too much of a man to expect him to learn a new science and a new language at one and the same time.

A MANUAL FOR ENGINEERS AND STEAM USERS. By John W. Hall. Providence, R. I.: Wm. A. Harris. 16mo. pp. 109. 10 cents.

Though intended primarily as a guide to the users of the Harris-Corliss engines, and an advertisement of their merits, this little manual will be found to contain considerable information of value to steam users, engineers, and mechanics.



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) H. H. S. asks for the best method of hardening steel. A It depends upon the quality of the steel. As a general rule it should be heated to a cherry red and plunged into cool (not cold) clean water and held still until cold. A little common salt is sometimes added to the water.

(2) J. A. asks what jewelers use to make hard solder glow in repairing gold or silver jewelry. A. Solder having the proper degree of fusibility is the first requisite. Use pure borax as a flux.

(3) G. J. asks why it is that, in opening the waste valve, such, for instance, in our common wash bowls, a whirlpool immediately is created. A. By the form of the bowl there is a greater or higher column above the outlet than at any other point, and the water is run from the point immediately over the opening; but what gives the rotary movement is a doubtful question.

(4) D. H. M. writes: In our mill we have a steam engine 14 inches diameter of cylinder and 28 inches stroke, making 125 revolutions per minute working under a steam pressure of 70 lbs. to the square inch. I have a single slide valve that cuts off the steam when the piston has traveled half the length of the cylinder. Please give me the horse power of the above engine. A. See p. 267 (4), current volume.

(5) P. C. asks: Do you know of any artificial device in use to create a draught under steam boilers, that will induce the smoke and heat to return and pass under the furnace so that the same can be utilized? I consider the escape of smoke and heat from smoke stacks an unnecessary loss. A. No, but by a proper arrangement and use of blast in ashpot, you can prevent the loss of heat passing off through the chimney, but in a well proportioned boiler this is not worthwhile; it has been frequently tried and abandoned.

(6) C. H. T. asks: 1. What book could I get that would give me the most information on steam power and the engine, and where could I get such a book? A. For a beginner, Renwick or Lardner on the steam engine; you may obtain it from industrial publishers who advertise in our columns. 2. What is high and low pressure? A. Ordinarily engines (high) exhausting into the atmosphere, and (low) exhausting into a condenser.

(7) C. W. H. asks: 1. What is meant by the pitch of a propeller? A. The advance the propeller would make in one revolution if working in a solid nut. 2. How to find the horse power of an engine? A. See p. 267 (4), current volume.

(8) E. N. asks: 1. How can I determine the amount of weight to be placed on a safety valve? A. See p. 267 (2), current volume of the SCIENTIFIC AMERICAN. 2. How much pressure will a boiler stand, 1/4 inch thick, iron, and 4 feet in diameter, providing it was sound? A. If of good iron and in good condition, 60 to 70 lbs.; if the boiler is old and deteriorated, not over 50 lbs.

(9) H. R. M. asks (1) for the necessary lengths of the radii for the curves of an achromatic objective to be 12 inches focal length. A. The radius of curvature for both members of the objective will be 6 inches, approximately. It will vary with different specimens of glass. 2. Do opticians use any grinding powder between the last grade of emery and the final polish with rouge? If so, what is it? A. Pumice stone is used.

(10) J. J. C. asks what is the meaning of the letters O. G., as applied to moulding. A. The ogee, or cyma recta, is compounded of a concave and a convex surface, the latter being the lowest.

(11) J. N. D. writes: Does the moon oscillate from north to south, and vice versa, during regular and uniform periods? A. The face which the moon presents to us is not always exactly the same, there being a slight apparent (not real) oscillation due to the real inequality in the moon's orbital motion. This apparent swaying is called libration.

(12) E. P. D. asks: What is the carrying strength of a steel cylinder? For example, take a cylinder made from one sixteenth inch steel, 4 feet in diameter and of any given height, say 20 feet, and again 80 feet, the weight to be placed on the top end. What will it carry before bending or collapsing? Of course the joints are supposed to be made equal to continuous steel. A. We know of no experiments with steel tubes that would form a basis of calculation in your case. You will find the results of some experiments with iron tubes in "Fairbairn on Iron Ship Building," page 54, and in "Clark on Britannia and Conway Bridges," vol. i, pages 343 to 364.

(13) A. F. asks: 1. How can I make electrolytes when my mould is plaster or wax, or the way to do it in any shape or form, having impressions of every size, principally of cameos and medals? A. The solution may be prepared by agitating one ounce of powdered copper sulphate with each pint of hot water, and letting the solution cool and settle. If the mould is not saturated or coated with paraffine, stearine, or some other waterproof substance (before coating with graphite) it is apt to soften and crack or fall to pieces through absorption of the electrolyte. 2. Is there any place where I can learn modeling in clay, free, except Cooper Union? A. We know of no other free institution.

(14) F. H. B. asks how to make a cement for fish vases, to set the glass perfectly water tight, and will not poison the water. A. The following is well recommended: Resin, 1 lb.; tar, 4 ounces, linseed oil, about 2 ounces, melt together over a gentle fire and pour into the angles of the aquarium while in a liquid state, but not when boiling, as this would crack the glass. The cement becomes firm in a few minutes. If too liquid after cooling under water, add more tar to the cement and heat again; if not sufficiently fluid add more oil. The cement will not injuriously affect the water.

(15) G. B. M. asks: What is the cause of the ridges on the surface of a board which has been put through a planing machine? A cylinder with but one knife seems to register as many marks to the inch as one containing six knives. A. If your knives are properly adjusted it is probable that your cylinder or knife head is out of balance.

(16) M. M. asks: 1. What gives the lifting power in hydraulic jacks, such as are used in raising locomotives? A. The difference in area of pump plunger and ram. 2. How are they constructed? A. Same principle as the hydraulic press.

(17) G. P. asks: What should be the relative proportion of the grate and the chimney or flue in a furnace for melting brass; say the furnace is 36 inches diameter and 25 feet the height of chimney? A. Make the area of the chimney about half that of the grate.

(18) C. F. asks: 1. If an electric current is used to make an induced current in a second closed circuit, will the former be any weakened or different from what it would have been if the second circuit had not been there, and the former current had not induced another current, other things being the same? A. The current will be slightly weakened owing to the contrary induced current. 2. In the Bell transmitting telephone, is the polarity or direction of the current from the battery changed or reversed at each vibration of the diaphragm; or only the intensity changed, the direction or polarity remaining the same? A. In the new transmitter the primary current is changed in intensity; the secondary current changes direction for each vibration of the diaphragm. 3. When no battery is used