

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.

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.

Yacht Engines. F.C. & A.E. Rowland, New Haven, Ct.

For Punches, Patent Bending Rolls, Radial Drills, and Angle Iron Shears, Hilles & Jones, Wilmington, Del.

Belcher & Bagnall, 95 Murray St., N. Y., have the most economical Steam Engines, Boilers, Pumps, in market; also improved wood and iron working machinery.

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

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

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

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

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

Machine Diamonds, J. Dickinson, 64 Nassau St., N. Y.

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.

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 1/2 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 linen hose, address Eureka Fire Hose Company, No. 13 Barclay St., New York.

If in want of Emery Wheels or Emery Wheel Machinery, write to us for catalogue and prices. Lehigh Valley Emery Wheel Co., Weissport, Pa.

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

Wanted.—A New or Good Second-hand Screw Machine. Address Jerome Redding & Co., Boston, Mass.

Downer's Improved Boiler Liquid is gaining many friends from the ranks of skeptics. To try it is to be convinced. A. H. Downer, 17 Peck Slip, New York.

Manufacturers can save 25 per cent of customary outlays by use of H. W. Johns' Asbestos Liquid Paints, which are of a higher grade than any other paints for structural purposes. Samples and price lists sent free by mail. 87 Maiden Lane, 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.

Partner Wanted.—See "Enterprise," an Adv. on page 286. Address W. W. Pearce, Cuero, Texas.

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

American Watch Tool Co., Waltham, Mass. Lathes for Optical Instrument Makers.

Electro-Magnetic Engine and Battery complete, in running order, for \$2. Send for circular. Crook, Herring & Co., Cor. Centre and White Sts., New York.

Fac-simile Signatures elegantly Engraved on Wood for \$2. Address J. S. Hambaugh, Jacksonville, Ill.

A First-class Pattern Maker desires a Steady Job. Address J. A. Smith, South Newmarket, N. H.

For Sale.—State Rights or Entire Patent of Self-Feeding Oil Stove. J. D. Lane, 1012 Lafayette Ave., B'klyn, N. Y.

I want to buy a few patents (old or new), whole or in part. W. F. Harvey, Fort Jackson, Mont. Co., N. Y.

New American Edition of the Catechism, and Hand Book of the Steam Engine; 900 pages; 150 Illustrations. Price, by mail, \$1.75. Send for circular. F. Keppy Scientific Book Publisher, Bridgeport, Conn.

For Sale.—6 1/2 ft. Boring and Turning Mill; 2 Radial Drills; and 1 Combined Punch and Shear. Hilles & Jones, Wilmington, Del.

Lehigh Valley Emery Wheel Co., Weissport, Pa., will be pleased to send their catalogue on application, and special prices when sizes are given.

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.

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

Needle Pointed Iron, Brass, and Steel Wire for 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.

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

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

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 Liberty St., Philadelphia, Pa.

For Sale Cheap.—Second-hand 8 foot Boring and Turning Mill, Lathes, Planers, Drills, Bolt Cutters, etc. Circulars. D. Frisbie & Co., New Haven, Conn.

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.

Best Turkey Emery in kegs, half kegs, and cans; liberal rates by the ton. Greene, Tweed & Co., 18 Park Place, New York.

Blake's Belt Studs. The most durable fastening for rubber and leather belts. Greene, Tweed & Co., N. Y.

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

Howard's Bench Vise and Schleiter's Bolt Cutters. Howard Iron Works.

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

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

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

Milling, Profiling, Cam Cutting, Revolving Head Screw Machines. 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.

Hand Fire Engines, Lift and Force Pumps, for fire and all other purposes. Address Rumsey & Co., Seneca Falls, N. Y., and 93 Liberty St., N. Y. city, U. S. A.

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.

NEW BOOKS AND PUBLICATIONS.

TABELLEN ZUR BESTIMMUNG DER MINERALIEN NACH AUSSEHEN KENNZEICHEN. Herausgegeben von Dr. Albin Weisbach. Leipzig: Arthur Felix.

Contains in clear, concise terms the chemical composition, outward appearance, and other properties necessary for the recognition of about 1,000 minerals, together with such remarks as may be of special interest. Only one feature diminishes the value of the book for practical purposes—the minerals are arranged in groups solely according to the similarity of their outward appearance. To determine a specimen the student must, therefore, select one of the numerous tables and hunt up among its members one the properties and behavior of which will exactly correspond with those of the specimen, at the cost of much time. Had the reverse order been chosen, as by Fresenius in his "Qualitative Chemical Analysis," the practical value of the book would have been much greater. Nevertheless the completeness and conciseness of the work render it valuable as a book of reference to the chemist, miner, and mineralogist.

Notes & Queries

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. C. R. asks: What kind of varnish is used to obtain the fine finish on fish rods, and how is it applied? A. Try a mixture of alcoholic shellac varnish 2 parts, boiled linseed oil 1 part, shake thoroughly before using, and apply with a cloth pad, rubbing the article to which the polish is applied, until the varnish is dry and hard.

(2) H. A. M. asks: Will you inform me if there is any difference between a foot square and a

square foot. A. As surfaces, no. In terms, yes. A "foot square" is a square 12 inches on a side (=144 sq. in.) A "square foot" is 144 sq. in. in any shape.

(3) B. asks: What is the lifting power of street gas per cubic foot? A. The average when petroleum is not employed for "enriching," is about 35 lbs. per 1,000 cubic feet.

(4) "Science" writes: My intention is to learn the engineering profession, but I have a liking to either steamship, locomotive, or steamboat engineering. 1. Which, in your opinion, is the best and most skilled position of the three, and receives the best salary? A. Locomotive engineering offers the best field. 2. What is the salary of locomotive engineers on our Western roads? A. We do not think there is any standard; they differ on different roads and with the kind of train.

(5) A. T. T. asks: Will a crank give the same motion as an eccentric to work the valve on an engine? A. Yes.

(6) R. C. L. asks: How can I obtain a high polish on cattle horns? A. a, scrape the horn carefully; b, smooth with powdered pumice stone and oil; c, polish with rotten stone and oil.

(7) H. S. C. writes: A portable 2 horse power steam engine can be purchased for two hundred dollars or less: in view of this why are not our machinists and steam men awake to the fact that there are hundreds of men waiting for a steam road wagon which we know can be got up for less money than to purchase a horse wagon and appliances? A. Your two horse engine would cost nearer \$400 than \$200. Have you considered the expense of a skilled engineer, the current repairs, the chances and costs of accidents, etc.?

(8) J. D. H. writes: If J. A. F. (43) "Notes and Queries," SCIENTIFIC AMERICAN, March 8, will reduce the blast nozzle to seven eighths inch, he will have all the power he wants.

(9) G. M. D. asks: 1. What is waterglass? A. A variety of glass (silicate of soda or potash) containing excess of the alkaline base, soluble in water. 2. How are agates polished? A. Usually horizontal disks of iron, pewter (or copper), wood, and leather covered with moistened emery of different grades of fineness, sand, rotten stone, or tripoli, and putty powder, respectively.

(10) J. F. & J. H. W. write: We saw in SCIENTIFIC, February 22, an alloy of tin and phosphorus. Is phosphorus a metal, and how is it mixed with tin or copper? A. Phosphorus is non-metallic; it may be forced beneath melted metal by means of a rod of baked clay having a small bell-shaped cavity at the lower end.

(11) J. M. asks if hair can be produced on the face by artificial means, and if so, how. A. See answer No. 40, p. 252, current volume, SCIENTIFIC AMERICAN.

(12) W. C. writes: 1. A train is traveling at a speed of 50 miles an hour. A cannon placed on one of the cars is fired off at a given point in the same direction as the train; the projectile from cannon has same velocity as train. How far will projectile be carried in an hour? A. Add the uniform speed of the train to the range of the projectile. 2. Reverse the cannon and shoot in opposite direction. How far will it carry? A. If the ball leaves the gun at same velocity as train is running it will fall nearly vertically to the ground.

(13) H. C. R. asks: How long has the engine in the United States Mint at Philadelphia been in use? A. The horizontal engine, built under the direction of Franklin Peale, Esq., was erected in 1837, and removed in the end of 1877, after 40 years' service. The "Steeple" engine was erected in 1850, and is still in use.

(14) S. M. D. asks: Is there any process by which iron can be prevented from rusting, when not painted; if so what is it? A. See articles on Professor Barff's process, No. 126, SCIENTIFIC AMERICAN SUPPLEMENT, and pp. 327 and 367, vol. 39, SCIENTIFIC AMERICAN.

(15) V. writes: I propose to lay an inch or one and a half inch iron pipe from this office to another office, 260 feet distant, and the pipe is to lie mostly underground and to be used for a speaking tube. It will have three turns or elbows in it. Could conversation at one end be heard distinctly at the other? A. Yes, if the corners turned are not too sharp. Make the curves of your elbows of large radius, say 12 or 18 inches.

(16) T. D. H. asks: What will set the colors in new calico or gingham that are likely to fade, without injury to the goods? A. The mordant will depend altogether upon the character of the dye or color used on the goods. Many dyes (such as the coal tar or aniline series) become bleached by prolonged exposure to sunlight; as a rule this cannot be remedied.

(17) O. S. W. asks: Is ozone produced during the process of ironing cotton clothing? I have frequently noticed the odor of ozone on going into the kitchen where the girl was ironing. A. Probably not; the odor of hypochlorous acid and of nitrous vapors is often mistaken for ozone.

(18) L. L. W. asks: 1. Why is the present apparatus of log chip and line preferred by navigators to any other mode of ascertaining the speed of a vessel? A. Because of cheapness and simplicity; further, "old salts" understand it. 2. Is there any reason why the telephone should not in time carry the voice across the ocean through the cable? A. The electrical current works so slowly through a long submerged cable as to render the use of a telephone in connection with it impossible.

(19) A. P. S. asks how to polish pearl shell (mother of pearl for umbrella handles). A. a. Smooth it on a common grindstone wet with soap and water. b. Apply powdered pumice stone and water with a buff wheel. c. Finish with rotten stone moistened with sulphuric acid a little diluted with water.

(20) O. W. F. writes: If three men have a shaft to carry which is 12 feet long, and two men was to carry with a lever (the other man at one end) where will they place the lever so as to carry two third of the shaft? A. Three feet from end of shaft.

(21) E. S. C. writes: My engine is horizontal, 6 inches stroke, 3 inches diameter; what size boat of side wheel pattern will it run with ease; what size of paddle wheels and how many strokes to the minute, when the engine runs at 800 strokes? A. Your engine would probably drive a light skiff about 5 to 6 miles per hour in still water; it would, however, depend much on your boiler, and whether the engine is geared or works direct on paddle wheel shaft. Paddle wheels about 4 1/2 feet diameter by 15 inches face would suit.

(22) J. R. F. writes: We have a 75 horse high pressure engine which exhausts by way of a Berryman heater up through pipe 80 feet high. We have a hole at the bottom, and the steam condensed is now running to waste. Can I utilize this water by pumping it back into the boilers, or would the grease from the cylinder prevent my using it? A. As the Berryman heater heats all the feed water you require, the gain by returning the condensed water will not be worth the cost.

(23) H. L. V. asks: 1. What is "manifold" paper? A. The white paper is only very fine thin writing paper. The black is soft paper, prepared by being smeared with a composition of grease and plumbago or lampblack; this mixture is allowed to remain on for 12 hours, and the paper then wiped with a piece of wool or cotton waste. Place white paper over black, and write with a blunt point. 2. What was the size and capacity of the Mary Bell, said to have been the largest steamboat on the Mississippi? A. We do not know; will some correspondent at the West inform us? 3. Our canary chews the quill end of such of his feathers as fall out. What does it need? A. Cuttle fish. 4. What are some good works on spectrum analysis? A. Spectrum Analysis, by H. E. Roscoe; Spectrum Analysis, by H. Schellen, and Spectrum Analysis, by Professor Redwood, No. 79 SCIENTIFIC AMERICAN SUPPLEMENT.

(24) F. G. writes: In reply to B. S. S., April 12, you say it is known in practice that higher results are obtained by throttling. Do you mean by that that it is advisable in an automatic cut-off engine following far enough to show a terminal pressure of say 17 lbs. absolute, to throttle the steam and allow it to follow enough further to make the average pressure the same in both cases? A. The gain by throttling is greatest when working without expansion or with a fixed expansion. We think there is gain in all cases in carrying a greater pressure in the boiler than is required for the engine.

(25) J. S. P. asks how a soft solder for tin vessels can be made, which is used by heating from the flame of a candle. There is such a solder sold on our streets, which so far has given satisfaction. A. Melt together 2 parts of block tin and 1 part of lead. Take a ladle having a small hole in the bottom, and hold it over a barrel of water, and pour the melted solder into it. As the stream of melted solder is cooled by the water it forms a sort of wire.

(26) C. L. asks: If in a room 50 feet long there is a mirror at one end, will the reflection of an object at the other end of the room appear in size the same as one 50 feet from the observer standing at the mirror, or will it appear the same as one 100 feet from the person? A. To a person standing at the mirror it appears 50 feet away. To a person standing 50 feet from the mirror it would appear to be 100 feet distant.

(27) W. G. H. asks: 1. Can an ice boat run dead ahead of the wind at a speed greater than the velocity of the wind? A. No. 2. Do the Gatling guns when fired at an object send the successive shots to the same point if the aim of the gun is not altered, or do the shots spread or scatter? A. We think they do not scatter.

(28) C. P. T. asks: 1. Is there any back movement in the current of a stream of water in a hose pipe when the stream from any cause is suddenly checked, so as to occasion bursting of the hose? A. Yes. 2. If so, does it extend back to the engine or hydrant throwing the stream? A. Yes. 3. Would the pressure or strain on the hose be less after the stream was closed, or greater than while the stream was in motion? A. Greater.

(29) J. H. asks what kind of oil is the best to use in boilers to keep them free from scales; also the best oil for cylinders; also what effect has tallow and lard oil on piston valve, rods, etc.? What effect has petroleum? A. Mineral oil can be used in boilers. Special cylinder oils are prepared for cylinders, though good mineral oil answers very well when properly applied. Put tallow and lard oil can be used without injurious effects.

(30) J. B. M. writes: I have a vertical boiler (30 H. P.) without flues or tubes; it is 10 feet high; the firebox is a shell within a shell, 4 inches between the walls, with 4 apertures equidistant for the escape of smoke and flame some 6 inches below the crown sheet; the firebox is 5 feet high; from the crown sheet upward is the steam chamber or dome; the boiler stands on a cast ring, some 6 inches larger than the boiler; and around the boiler there is a sheet iron jacket, the size of the ring, the entire length of the boiler, fitted close by a cap of same at the top. Now, the questions I wish you to answer are these: 1. I want to put a brick wall in place of the iron jacket. Is it essential that I should run the wall the entire length of boiler, or would it do as well if I were to draw in the wall (say 12 inches above the usual water line in boiler) until the brick touched the boiler, and continue to the top; or had I better keep the wall the same distance from boiler all the way up? A. The latter way would be the best. 2. Could I put in a heater made of ordinary wrought iron piping (say 1 inch diameter), placing it between the wall and boiler, where it would be acted on by the heat of the fire so as to save fuel by it, having the same connected directly to feed pump? A. It would be better to use cast iron pipes. 3. I use strong lime water, and it forms scale. Would not an inch pipe soon choke up by formation of lime cake? A. You should arrange the pipes so that they could readily be cleaned.

(31) J. B. asks: Is there any rule for finding the diameters, focal lengths, and distances apart of the field and eye lens of a Huyghens or negative eyepiece of any power; also the diaphragm aperture and distance of same from either lens? A. The focal lengths