

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.

National Steam Pump is now on exhibition at the American Institute; also 46 Cortlandt St., N. Y.

Magic Lanterns and Stereoscopes of all prices. Views illustrating every subject for public exhibitions. Profitable business for a man with a small capital. Also lanterns for college and home amusement. 74 page catalogue free. McAllister, Mf. Optician, 49 Nassau St., N. Y.

Vertical Engines, 10 to 15 H. P., thoroughly well made. John Hartwick & Co., 47 Gold Street, New York.

Northrop's Sheet Iron Roofing makes most durable fireproof roof. Used on all kinds of buildings. Send for circular and prices. Northrop & Co., Pittsburgh, Pa.

Vertical & Yacht Engines. N.W. Twiss, New Haven, Ct.

"W. H. B."—Guy C. Hotchkiss, Field & Co., 622 East 14th Street, New York, have a Hydraulic Sheet Punch for sale. Capacity 72 holes at one time; worked by direct-acting steam cylinder. Price \$1,000.

Wanted.—Light Motor, 2 or 3 horse power, to propel Aerial Car. Gas or oil engine preferred. Address R. W. Cowan, P. O. Box 409, Montreal, Canada.

Engines, ½ to 5 H. P. Geo. F. Shedd, Waltham, Mass.

Wanted.—Low priced, second hand Lewis, Oliver & Phillips Bolt Head. G. C. Chase, Manchester, N. H.

Scroll Saw Designs. L. H. Russell, Stratford, Conn.

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

Extension of time.—Proposals for Jacksonville Water Works will be received until November 21, 1878. See advertisement page 237, October 12, 1878.

Best Turbine Water Wheel, Alcott's, Mt. Holly, N. J. Right to manufacture a salable patented article desired by an old established house; would pay royalty or purchase. G. Thomas, Box 23, West Troy, N. Y.

Useful Books for Engineers and Mechanics. Catalogues free. E. & F. N. Spon, 446 Broome St., New York.

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.

The Lawrence Engine is the best. See ad. page 270.

For the most substantial Wood-Working Tools, address E. & F. Gleason, 52 Canal St., Philadelphia, Pa.

Warranted best and cheapest Planers, Jointers, Universal Woodworkers, Band and Scroll Saws, etc., manufactured by Bentel, Margedant & Co., Hamilton, Ohio.

Magneto Call Bells for Telephone Lines. The Best. No battery required. Bunnell, 112 Liberty St., N. Y.

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

Eagle Anvils 9 cents per pound. Fully warranted.

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

Notice.—Charles N. Elliott, of N. Y., is no longer connected officially with the Ingersoll Rock Drill Company and is not authorized to collect moneys or transact any business whatever for the same.

Kreider, Campbell & Co., 1030 Germantown Ave., Phila., Pa., contractors for mills for all kinds of grinding. Alcott's Turbine received the Centennial Medal.

The only Engine in the market attached to boiler having cold bearings. F.F. & A.B. Landis, Lancaster, Pa.

Dead Pulleys, that stop the running of Loose Pulleys and Belts, taking the strain from Line Shaft when Machine is not in use. Taper Sleeve Pulley Works, Erie, Pa.

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

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.

Wheelbarrows.—Over 50 styles, with felloe-plated, bolted wheels. Pugsley & Chapman, 8 Liberty St., N. Y.

North's Lathe Dog. 347 N. 4th St., Philadelphia, Pa.

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

Nickel Plating.—A white deposit guaranteed by using our material. Condit, Hanson & Van Winkle, Newark, N. J. English Agency, 18 Caroline St., Birmingham.

Boilers ready for shipment, new and 2d hand. For a good boiler, send to Hilles & Jones, Wilmington, Del.

Punching Presses, Drop Hammers, and Dies for working Metals, etc. The Stiles & Parker Press Co., Middletown, Conn.

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

Presses, Dies, and Tools for working Sheet Metals, etc. Fruit and other Can Tools. Bliss & Williams, Brooklyn, N. Y., and Paris Exposition, 1878.

For Power & Economy, Alcott's Turbine, Mt. Holly, N. J.

The Cameron Steam Pump mounted in Phosphor Bronze is an indestructible machine. See advertisement. 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.

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

NEW BOOKS AND PUBLICATIONS.

VICTORIAN RAILWAYS. Report of the Board of Land and Works, for the year ending December 31, 1877. Melbourne, Australia, 1878.

At the close of 1877 there were in the colony 931 miles of railway open for traffic, and 32 in course of completion. The construction of 161 miles more had been authorized by parliament. The average number of miles open for traffic the whole year was 787. The total train mileage was 3,420,960 miles; the number of passenger journeys, averaging 21½ miles, was 3,395,709. The average earnings per mile of road were \$7,215; the average expenses, \$3,765. The proportions of passenger and goods traffic to the total revenue were 40 and 60 per cent respectively. A colored map of the four railway systems of the colony, and illustrations of the different types of locomotives and carriages used, accompany the report.

ANNUAL REPORT OF THE DEPARTMENT OF MINES, New South Wales, for the year 1877. Sydney, Australia, 1878.

The mineral resources of New South Wales include gold, coal, tin, copper, iron, silver, lead, and antimony. The aggregate value of all the mining products of the colony, up to January, 1878, was nearly \$46,440,000. The yield for 1877 was \$2,233,161. The report contains valuable geological maps of the mineral districts. The minister of mines calls attention to the use of telephones in underground operations in this country; and expresses the hope that by the introduction of better mechanical appliances a fresh stimulus would be given to mining research, and mining operations would be carried on with greater expedition and economy.

INDUSTRIAL SCIENCE DRAWING: Elements of Free-Hand Geometrical Drawing. By S. Edward Warren, C.E. New York: John Wiley & Sons, 1878. Price \$1.

Though nominally a second edition, this is substantially a new work. Part I. treats of plane drawing; Part II., on drawing from "the round," is largely new; and Part III., on the elements of geometric beauty, is almost wholly new.

FERNS IN THEIR HOMES AND OURS. With 8 ch. rom-lithographs of rare ferns. By John Robinson. Salem, Mass.: S. E. Cassino. 12mo. Price \$1.50.

In this attractive little book Professor Robinson has described the growth, structure, and distribution of ferns, and their cultivation under glass, in ferneries, and out of doors. Dr. A. S. Packard furnishes 10 illustrations for a chapter on fern pests and means for their destruction.

A MANUAL OF THE MECHANICS OF ENGINEERING AND OF THE CONSTRUCTION OF MACHINES. By Dr. Phil. Julius Wiesbach. Second volume. Part II. Translated by A. Jay Du Bois, Ph.D., with additions by R. H. Buel, C.E. New York: John Wiley & Sons, 1878.

This, the second half of the second volume of Wiesbach's mechanics, is devoted to heat, steam, and steam engines. The character of Dr. Wiesbach's work is too well known to require comment here. Mr. Buel has undertaken to supply any deficiencies with regard to American steam engineering.

ELECTRIC LIGHTING. A Practical Treatise by Hippolyte Fontaine. Translated from the French by Dr. Paget Higgs, Assoc. Inst. C.E. With 48 illustrations. 8vo. pp. 194. \$3. E. & F. N. Spon, N. Y.

This work is designed to show what are, in the present state of science, the judicious applications of electric lighting, to record the services that this new light is capable of rendering to a multitude of industries, and to combat false ideas founded on the possibility of its universal use.



(1) T. F. V. asks: What is best for drinking water to run through, black, galvanized or lead pipe? A. Lead and galvanized iron pipes should not be used as conduits for drinking water. The black enameled pipe answers very well, but in many cases wood tubes are preferable where they can be employed.

(2) Reader asks: Can you give a method of making champagne cider? A. Good pale vinous cider, 1 hoghead; proof spirit, 3 gallons; honey or sugar, 14 lbs.; mix, and let them remain together in a temperate situation for a month; then add one quart of orange flower water, and fine it down with ½ gallon of skimmed milk.

(3) "Scientific" asks: How can I melt rubber gum (as it comes from the rubber boot factory) so as to run into a mould such as is used in casting printers' rollers? A. Vulcanized rubber cannot be melted in the way you propose, as it suffers partial decomposition in the operation, and does not again assume its original qualities on cooling.

(4) E. S. F. asks: What is the intrinsic value of gold? A. Coin value: 24 carats fine = pure gold. 1 grain = 4½ cents. 23½ grains = \$1. 1 dwt. = \$1.08½. 1 ounce (troy) = \$20.67.

(5) M. S. asks: What is the proper composition for 18 carat gold? A. 18 dwts. fine gold, 2½ dwts. fine silver, 3¼ dwts. copper. Or fine gold 100 dwts., fine

silver 19½ dwts., copper 13½ dwts. For red 18 carat ring gold the following proportions are used: fine gold 40 dwts., silver 4¼ dwts., copper 8½ dwts.

(6) A. B. asks (1) for the ingredients and manner of mixing and making crucibles. A. There are in common use two methods of making crucibles, one by forcibly shaping the moist ingredients in a double mould; the other by pouring the "slip," of the consistency of cream, into porous moulds of a species of stucco. In the latter case a series of the moulds are placed upon a table and filled with the semi-fluid composition. By the time this operation is finished on 50 or 60 moulds the workman returns to the filled, and alternately pours the slip out of them, leaving only a small quantity sufficient to give the requisite thickness to the bottom. In each of the moulds so filled a perfect crucible is formed by the abstraction of the water of that portion of the "slip" in immediate contact with the stucco, and the crucible will be either thicker or thinner in proportion to the time this absorbent action has been allowed to go on. 70 or 80 crucibles may thus be formed in 15 minutes. The moulds and their contents are placed in a slow oven. In a short time from the contraction of the clay in drying the crucibles may be removed and the moulds dried thoroughly and used again. As soon as the crucibles, formed by either of the above methods, have become perfectly dry they are baked by subjecting them to the heat of a potter's kiln. The composition of which crucibles are made differs according to the uses for which they are intended. The following may be taken as good specimens—(German), Stourbridge clay, 8 parts; cement (old crucibles ground to fine powder), 3 parts; coke, 5 parts; graphite, 4 parts. Or Stourbridge clay, 4 parts; cement, 2 parts; coke powder and pipe clay, of each 1 part. Suitable for brass founders. (Hessian)—Clay (containing about 10 per cent of silica), about 75 percent; sand (containing a little alumina and lime), 25 per cent. (Black lead)—Fine refractory clay, 1 part; graphite, 2 to 3 parts; a little sand is often added. French clay crucibles are made of Paris clay with a small quantity of very fine sand. 2. Also tell me, is black lead and plumbago the same thing? A. Yes.

(7) T. A. Y.—You can get a patent on your article if it is new. You might also patent the machine for producing it.

(8) C. W. G. writes: I want to get two or three practical books on yacht building. I cannot find any that suits me. I have those you published in the SUPPLEMENT by Paddlestaff, but I want something more complete with numerous plans. A. We believe the instructions in the SUPPLEMENT are the only practical work of the kind published.

Is iron when galvanized dipped in melted zinc? A. Yes.

(9) F. L. A. asks: 1. What preparation is used in drawing on zinc plates, so that when acid is applied it will eat everything from the surface except drawing? What acid is employed, and how? A. Coat the zinc, while warm, with an even film of wax or a varnish of wax and asphaltum, and after scratching the design through the coating with a suitable tool, place a rim of wax, or a putty of wax and pitch, around the edges, and cover the plate, while in a horizontal position, with dilute nitric acid. See p. 219 (37), vol. 34, SCIENTIFIC AMERICAN. 2. Will any other plate answer as well as zinc to electrotype from? A. No. 3. How is the acid removed after it has eaten to a sufficient depth? A. By washing with water.

(10) H. M. H. asks whether strychnine is used to make the thick foam (or thin) on beer or other malted liquors. A. The poisonous alkaloid is never used, to our knowledge, in beer or other liquor. The only effect it would have on beer would be to increase its bitter taste.

(11) W. J. S. asks: How can paper be prepared so that the action of the atmosphere will change it to several different colors in such a manner that it can be used, like a barometer, for foretelling the weather? A. Saturate the paper with a moderately concentrated aqueous solution of cobalt chloride; press and dry. When properly prepared dry air develops a blue color and moist air a pink tint. The arrangement does not foretell the weather, but simply indicates the hygroscopic condition of the surrounding air.

How can ink powders be made so that by the addition of cold water they will produce first class black, red, green, blue, and violet ink? A. See p. 315 (15), vol. 38, SCIENTIFIC AMERICAN. Soluble nigrosine (in 200 parts of water) also makes a good bluish-black ink. For red use "rubine extra" (dissolves in 150 parts of water); for violet, methyl-violet 5B, or BR, Hofmann's violet 3B, gentiana-violet B (dissolve in 300 parts of water for use); for blue, water blue BR, 5B, or 2B (dissolve in 200 parts water); for green, methyl-green (dissolves in 100 parts water). These latter are aniline colors, and the inks require no gum.

Can you give a description of the geometrical lathe, or refer to some work that does describe it? A. "The Lathe and its Uses."

(12) C. D. H.—In SUPPLEMENTS 30 and 32 complete directions for building a small rowboat were given, which were not repeated in succeeding numbers. Those who wish to follow the instructions for building the family boat, the Whitehall boat, the canoe or the yacht, should first read the initial directions in SUPPLEMENTS 30 and 32.

(13) W. F. asks: Have the actions of the gyroscope ever been explained, and if so, what is the explanation? Why does the north pole always point to the same place in the heavens? A. It is due to the persistency of a rotating body in maintaining its plane of rotation against the force of gravitation.

(14) H. G. writes: I have been casting small wheels out of zinc in a brass mould. I have poured the metal at different temperatures, but there are always cracks in the outer ring of the wheel. What is the trouble? A. The zinc contracts in cooling, and as the mould is rigid it must of necessity crack. Use a sand mould or employ a tougher metal.

(15) B. B. S. writes: I have a small sail-boat, 15 feet by 3 feet. Please let me know the largest

amount of sail that I can carry. A. The size of small boat sails is determined only by custom and experience. If your boat is stiff for its width it will carry a sprit sail 6½ feet on the mast and 8½ feet on the boom.

(16) R. W. M. writes: A shaft 60 feet long, 40 feet of which is 3 inches in diameter, and the remaining 20 feet of which is 2½ inches in diameter, has been thrown out of line by unequal settlement of building. Can it be lined up true without being taken out of boxes to have the boxes lined up? A. This is quite possible if the amount of spring is not excessive.

(17) R. C. K.—A thermometer will indicate a lower temperature in the wind than out of it.

(18) O. E. D. asks: How much power is lost in using the common treadle and crank motion? A. None, as we understand your meaning, if the mechanism is properly constructed. In practice, however, there is usually a considerable loss on account of friction or from other causes.

(19) A. J. asks for the best and cheapest process of manufacturing vinegar from wine and cider, and which is best and cheapest made, wine or cider vinegar. A. See pp 284 (50), and 86, vol. 37, and 122 (6), 218 (4), and 171 (47), vol. 34, SCIENTIFIC AMERICAN. Consult Dussauce's "Treatise on the Manufacture of Vinegar." Wine vinegar is generally considered the best.

(20) X. asks: 1. How to construct a cheap and efficient "call" for the telephone described on p. 75, SCIENTIFIC AMERICAN, No. 5, current volume? A. Connect a small bell that will jingle easily, with the telephone cord, by means of a short piece of thread, which should be slack when the telephone is used. 2. The telephones are separated by a distance of 5 blocks, and it works splendid, except when the wind blows. The wind produces a humming noise in the telephones which can be heard all over the room. What will prevent this? A. We do not know of a way to prevent the noise.

(21) C.—You will find a good article on the subject of testing oils in Normandy's "Commercial Analysis."

(22) P. A. F. writes: I desire to know if during an epidemic of diphtheria, scarlet fever, whooping cough, or any other contagious disease to which children are subject, any injury will be done or benefit be obtained by keeping a teaspoonful of carbolic acid on a plate in sleeping rooms and all other rooms in the house? Will the acid in a crystal or diluted state be best to use? I often see it recommended to be used in time of epidemics, but they never tell how to use it. A. Carbolic acid is often used in this way. The odor of the substance is not pleasant, otherwise no bad effect need be apprehended. The acid need not be diluted. In cases of contagious diseases the disinfectant is usually mixed with about 20 parts of water and sprayed over the carpets, linen, and other fabrics in the infected apartments.

(23) P. R.—We do not understand your queries.

(24) S. H. C.—Energy of water in foot lbs.
$$\left(\frac{\text{pounds discharged}}{\text{per second}} \right) \times \left(\frac{\text{velocity of discharge}}{\text{in feet per second}} \right)^2 = 64'4.$$

(25) X. Y. Z. asks for a recipe for modeling wax, such as is used by modelers of small fine figures. A. Lead plaster, 8 ozs.; beeswax, 8 ozs.; Burgundy pitch, 8 ozs. Melt together and stir in sufficient prepared chalk to form a paste. Mould it in small sticks for use.

(26) C. V. writes: I have a number of good wine casks that have become musty. I have tried to sweeten them by washing and steaming, but have failed to get them in a condition to put wine in. A. Burn a little sulphur in the empty casks, bung, and let them stand for a day.

(27) W. W. R. asks how to make a good white ink to write on black paper or cardboard. A. Try finely ground (or freshly precipitated) barium sulphate or "flake white" mixed with a little gum water. Where can I obtain stone bottles varying in size from one gill to one pint in size? A. These sizes are seldom met with in stores; they are made to order.

(28) J. M. G. writes: I have a problem to propose for solution which has puzzled me. It is this: suppose a quart bottle of powder, sealed and sunk into the sea, say 3 miles deep, or at such a depth that the pressure all round is greater than the explosive force of the powder, fired by a wire and galvanic battery. Will the glass be broken, or the bottle hold the gas of the exploded powder, or the powder burn without any explosion? A. If such conditions could be realized there would be no explosion. The powder would burn, and the products of its combustion would remain in the bottle.

(29) J. G. S. writes: I send two balls taken out of the piston head of my engine; there were quite a number of them. I would like to know how they were formed and of what. I use pure tallow or beeswax as a lubricant for my cylinder. A. The balls consist principally of metallic iron (dust) and partially charred or decomposed wax. They are formed by the friction of the head under imperfect lubrication.

(30) F. S. B.—To correct spherical aberration in your speculum use a small polishing tool charged with a paste of putty powder, and work carefully from the periphery inward, testing the speculum occasionally.

(31) "A Reader" asks: 1. What is meant by steam being cut off at the stroke of a steam engine? For instance: assuming the stroke to a steam engine to be 4 feet, cut off at ½ of the stroke, how many feet will the piston be driven, by expansion only, during the completion of one revolution of the engine? A. Two feet. 2. Please give the horse power, and the rule for working it, of a steam engine of the following dimensions: Diameter of cylinder, 10 inches; length of stroke 4 feet, cut off at ½ of the stroke, revolutions 45 per minute, pressure per steam gauge, 60 lbs. And