

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.

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

Assays of Ores, Analyses of Minerals, Waters, Commercial Articles, etc. Technical formulae and processes. Fuller & Stillman, 40 & 42 Broadway, N. Y.

Save your Fuel.—From one fifth to one-third of the usual amount of coal bills can be saved by the use of fire-proof non-conducting Asbestos Coverings on hot air and steam pipes, boilers, heater pipes in dwellings, etc. The genuine can be procured only of The H. W. Johns Manufacturing Company, 87 Maiden Lane, New York, patentees and manufacturers of Asbestos Paints, Roofing, etc. 2d hand 2 H. P. Engine and Boiler, \$140. Geo. F. Shedd, Waltham, Mass.

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

Moore's Regulating Valve, working between high and low pressure. L. Moore, No. 17 11th St., Louisville, Ky.

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.

Sci. Am.; a full set for sale. A. F. Park, Troy, N. Y. Steel Stamping Figures, 1-16 to 1/2 in., \$1; Alphabets, \$3; Dies to order. S. M. York, Cleveland, O.

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

Partner Wanted.—See advertisement on inside page. The only Engine in the market attached to boiler having cold bearings. F. F. & A. B. Landis, Lancaster, Pa.

Bl'ks, Mech's, Ma'fs., address Box 73, Williamantic, Ct. Johnson's Universal Lathe Chucks; the best are the cheapest. Lambertville Iron Works, Lambertville, N. J.

No more danger from kerosene. Sample of patent Safety Valve that fits any lamp, and effectually prevents an explosion, sent by mail for 25 cents. Agents wanted. W. B. Post, 15 Dey St., New York.

Best results obtained from Success Turbine Water Wheel. References given. S. M. Smith, York, Pa.

Right to manufacture a salable Patented Article desired. W. F. Adams, 602 North 4th St., Camden, N. J.

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

Texas Machinery Depot for any kind of machinery or special hardware. P. H. Gerhard, Austin, Texas.

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

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

1,000 2d hand machines for sale. Send stamp for descriptive price list. Forsaith & Co., Manchester, N. H.

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

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

For Fire or Power Pumps, address the Gould's Manf. Co., Seneca Falls, N. Y., or 15 Park Pl., N. Y. city.

Brush Electric Light.—20 lights from one machine. Latest & best light. Telegraph Supply Co., Cleveland, O.

The Hancock Inspirator received a gold medal at Paris, as being the best boiler feeder ever made, and the Old Colony Railroad (who have twenty-three machines in constant use) have just given it their unqualified indorsement, as the cheapest and most effective feeder ever used on their locomotives. Those interested are referred to their letter of recommendation, which may be found in our advertising columns.

J. C. Hoadley, Consulting Engineer and Mechanical and Scientific Expert, Lawrence, Mass.

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

For the best advertising at lowest prices in Scientific, Mechanical, and other Newspapers, write to E. N. Freshman & Bros., Advertising Agents, 186 W. 4th St., Cin. O.

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

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

Bolt Forging Machine & Power Hammers a specialty. Send for circulars. Forsaith & Co., Manchester, N. H.

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.

Eagle Anvils, 9 cents per pound. Fully warranted.

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

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

Two fine Astronomical Telescopes, 3 in. and 7 in., by first-class English maker, cheap. I. Ramsden, Phila.

Gold Chronometer Watch, by first-class English maker; cost \$200, price \$135; latest patented improvements. I. Ramsden, 21 Christian St., Philadelphia, Pa.

For Town and Village use, comb'd Hand Fire Engine & Hose Carriage, \$350. Forsaith & Co., Manchester, N. H.

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

Inventors' Models. John Ruthven, Cincinnati, O.

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

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

Mill Stone Dressing Diamonds. Simple, effective, and durable. J. Dickinson, 64 Nassau St., N. Y.

The best Friction Clutch Pulley and Friction Hoisting Machinery in the world. D. Frisbie & Co., N. Haven, Ct.

Latest and best Books on Steam Engineering. Send stamp for catalogue. F. Keppy, Bridgeport, Conn.

Improved Meat Cutter. Capacity 600 lbs. an hour. Circular and price list, J. W. McFarland & Co., Alliance, O.

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

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

The new "Otto" Silent Gas Engine is simple in construction, easy of management, and the cheapest motor known for intermittent work. Schleicher, Schumm & Co., Philadelphia, Pa.

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

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

Correct time for Holidays, Whist and Dinner Parties, is the Vanity Fair Cigarettes, with your monogram.

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.

UPLAND GAME BIRDS AND WATERFOWL OF THE UNITED STATES. Part X. By A. Pope, Jr. New York: Charles Scribner's Sons. \$2.50.

The tenth and final number of Mr. Pope's illustrations of the principal Upland Game Birds and Waterfowl of the United States is devoted to the canvas back duck and the brant. The entire series comprises life size drawings in color of twenty species, male and female, or forty specimens in all, by an artist sportsman who has given to them years of patient and painstaking study. The printing reproduces the artist's water color effects admirably.

HAND BOOK OF ALABAMA. By Saffold Berneny. Mobile: Register Print. \$1.50.

A useful volume for those seeking information with regard to the government institutions and resources of Alabama. The State Geologist, Dr. E. A. Smith, contributes a valuable section on the geology of the State and its mineral resources (with a revision of Professor Tuomey's Geological Map of the State), and Mr. Haralson a review of the cotton manufactures of the State and its advantages for such industries. Parts X., XI., XII., and XIII., are devoted to the agricultural products, soils, capabilities, advantages, forest and forage products of Alabama. A report on the climate of Alabama and its adaptation to health and comfort is contributed by Professor William H. Anderson, of the State Medical College, Mobile.

HYGIENE OF THE BRAIN AND NERVES. By M. L. Holbrook, M.D. New York: M. L. Holbrook & Co.

A book of exceptional value; sensible, timely, practical; indeed one of the very few books that everybody should read. It discusses with singular directness and intelligence one of the most dangerous features of American life, high pressure activity, and unwise eating and drinking, combined with a fatal anxiety to accomplish in one year more than there is time for in two; an anxiety, we may add, which makes life at once brief, hurried, fretful, and unenjoyable, with the result in most cases of early nervous breakdown and practical life failure. If read and heeded, as it ought to be, the volume in hand will do much to correct this characteristic mistake in American life. The strong positions taken by Dr. Holbrook with regard to proper habits of eating, sleeping, working, and playing, are fortified by citations from the writings of a score or more of prominent thinkers and scientists, and twenty-eight letters from prominent men and women, describing their physical and mental habits, and giving practical deductions from their personal experience.

ANNUAL REPORT OF THE BOARD OF REGENTS OF THE SMITHSONIAN INSTITUTION FOR 1877. Washington: Government Printing Office.

In addition to the customary review of scientific work carried on under the auspices of or assisted by the Smithsonian Institution, this volume is enriched by an able review of color blindness in its relation to accidents by rail and sea, by Professor Holmgren, of the University of Upsal, Sweden; a large number of valuable communications on American antiquities; a dozen short memoirs on meteorological subjects, and other papers of permanent interest.

THE YOUNG SCIENTIST. Industrial Publication Company. New York: 50 cents a year.

A monthly journal for boys, devoted to simple experiments in chemistry, amateur mechanical work, etc.

CATALOGUE OF THE LIBRARY OF THE UNITED STATES PATENT OFFICE. Washington: Government Printing Office.

This is substantially the first printed catalogue of the Patent Office Library, which now contains some 24,000 volumes, not including duplicate specifications of patents and pamphlets.

THE AMERICAN QUARTERLY MICROSCOPICAL JOURNAL. Vol. I. No. 1. Edited by Romya Hitchcock. New York: Hitchcock & Wall. \$3 a year.

In view of the numerous failures of high grade periodicals in this and other special departments of science, the projectors of this handsome quarterly are to be commended for courage, if for nothing more. The initial number is highly creditable to them and to their department of scientific research. We sincerely hope that it will be well sustained.

MANUAL OF MINERALOGY AND LITHOLOGY. By James D. Dana. New York: John Wiley & Sons.

This, the third edition of Professor Dana's useful manual, is almost a new book throughout. It has been rearranged and rewritten, and the author believes, materially improved. The chapter on rocks has been increased in fullness so as to make it a prominent part of the work.

JOURNAL OF THE BRITISH SOCIETY OF TELEGRAPHIC ENGINEERS. Nos. XXII. and XXIII. London and New York: E. & F. N. Spon. 1878. 15 shillings.

Contains, in addition to brief communications, correspondence, abstracts, etc., a valuable paper on "Insulators for Aerial Telegraph Lines," by John Garvey; and several papers and discussions on sound in relation to the telephone, microphone, etc.

THE MAGAZINE OF ART. Illustrated. New York: Cassell, Petter & Galpin. \$3 a year.

Among the more attractive periodicals that have come to our table the past year the Magazine of Art must take high rank. The eighth number of the first volume was reached in December, and there is every reason to wish it a long life as a representative of fine art.

ART INDUSTRY. New York: Howard Lockwood & Co. \$2 a year.

Of Art Industry but three numbers have been issued, and these have given promise of future usefulness. It is specially devoted to the artistic industries and is finely illustrated. The reading matter is readable and instructive.

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM.

We have received from the Department of the Interior the following issues of the Bulletin of the United States National Museum:

No. 7. Contributions to the Natural History of the Hawaiian and Fanning Islands and Lower California. By Thomas H. Street, M. D.

No. 8. Index to the names which have been applied to the subdivisions of the class Brachipoda. By W. H. Dall.

No. 9. Contributions to North American Ichthyology. No. 1. By David S. Jordan.

No. 10. The same. Part II.

No. 12. The same. Part III.

Also recent issues of the Bulletin of the United States Geological Surveys of the Territories:

Vol. III., No. 4; and Vol. IV., Nos. 1, 2, and 3. Also, miscellaneous publications:

No. 9. Descriptive Catalogue of Photographs of North American Indians. By W. H. Jackson; and No. 10. Bibliography of North American Invertebrate Palaeontology. By C. A. White, M.D., and H. A. Nicholson, M.D.

PHOTOGRAPHS OF THE MOON.—It is fortunate at this time of increasing interest in the moon that arrangements have been made for supplying cheaply and in any quantity Mr. Rutherford's splendid photographs of that satellite. Mr. Oscar G. Mason, of the Photographic Department of Bellevue Hospital, of this city, has undertaken the publication of these valuable aids to the study of the moon, at rates which bring them within the reach of all; and as he has not only made all the prints hitherto furnished, but assisted Mr. Rutherford in making the negatives, there can be no doubt of his doing the work well. Three series of prints are offered, the first showing the different phases of the moon, in dimensions ranging from 17 1/2 to 21 inches; the second series, nine views, eight inch image; the third, nine views, four inch image.

Mr. Mason is also prepared to furnish prints from Mr. Rutherford's negatives of the solar spectrum, recently made with his interference gratings. The prints from these plates give the finest picture of the solar spectrum yet produced.

SOME AMERICAN MAGAZINES.

Scribner's Monthly, which began by rivaling the best popular magazines of the time, has steadily gained in force and excellence. The later volumes not only surpass the earlier, but their steady improvement, especially in the matter of illustration, has compelled a corresponding advance in the quality of American art work, both for books and for periodicals. A host of attractions are announced for the new year.

St. Nicholas has no rival. Its bright and seductive pages furnish more than is calculated to cultivate in the young a taste for pure and instructive reading, and with it a taste for all that is true and clean and kindly in life and conduct, than anything else we know. And it is admirably free from the goody-goody stuff so commonly manufactured for children's reading. It is needless to add that it is absolutely free from the other extreme of juvenile literature—the viciously sensational.

The Popular Science Monthly promises to add to its solid attractions, and they are numerous, the merits of the Popular Science Supplement also, a magazine which has been in many respects the more solidly valuable of the two. In other words, the Monthly is to be enlarged,

so as to make it represent the scientific field more completely, by absorbing the Supplement, but without any increase in its price. This will be especially gratifying to those who have wanted both publications, yet have felt unable to afford the cost of the two.

The removal of the North American Review to New York, and the change of plan in making it more alive to timely questions of public moment and their discussion by men of experience and practical information, rather than by closet students, have added much to its force and value; certainly to the mass of active men who care more to know what prominent men are thinking about matters of general interest, than for the lubrications of pure scholarship.

Notes & Queries

(1) C. R. writes: I am making some simple laboratory experiments and find alcohol very expensive for heating retorts, flasks, etc. Is there any method of constructing a lamp to burn kerosene, by which the soot and smell may be avoided? There is no gas in my house. Is there any other substance I can use, supposing kerosene is not available? A. Kerosene has not been successfully used for the purpose mentioned. The substitutes for alcohol are wood naphtha (crude methylic alcohol) and gas, the latter used with a Bunsen burner to secure perfect combustion.

(2) C. D. F. asks: 1. Why do opticians charge so much more for lenses (4 or 5 inches in diameter) of short focus (6 or 7 inches) than they do for lenses of same diameter and long focus? A. Because the more convex and shorter focus lenses are of necessity ground singly, whereas several of the longer focus lenses may be ground at one operation. 2. If the difference is in the processes of manufacture, why will not one process answer for both thick and thin lenses? A. Common convex lenses are secured to a convex tool or form and ground by moving over them with a gyratory motion a concave tool, the contact surfaces being charged with the grinding or polishing material. It is obvious that the form having the least convexity will contain the greatest number of lenses. 3. Why is crown instead of flint glass used for condensing lenses, when the refractive power of flint is greater? A. Crown glass of a uniform density is more easily made than flint glass of the same quality. 4. Is there a stereoscopic camera, which takes the views erect instead of reversing them, as in an ordinary instrument? We think not. 5. If not how are the prints made on one piece of paper, and mounted without cutting apart and changing the right for the left? A. The prints or the negative must be cut and transposed, or the views must be transposed in the camera. 6. Why is it necessary that there should be an odd number of cutting edges in the fluted countersink described on page 387, vol. 39? A. It insures a smooth cut. 7. What is used with mercury for tempering drills, which will make them tough enough to stand in drilling tempered steel? A. Nothing. After hardening draw the temper as near as possible to the cutting edge.

(3) C. L. S. asks: 1. Should the ratio between the teeth of different gears be the same as that between their diameters? A. Generally, yes. 2. What is the best work on cotton manufacturing; also on mill engineering? A. Address the book publishers who advertise in our columns for catalogues.

(4) C. L. U. writes: 1. I have 12 lbs. of zinc in three gravity batteries; the current is not strong enough. I would like to make a Bunsen battery; could I make one, using the above zinc, and how? A. The zinc should be recast in cylindrical form, with a slit in one side to permit of circulation. 2. What is the meaning of "ohm" as used in telegraphy? A. The ohm is the unit of resistance to the passage of an electrical current; it is equivalent to a wire of pure copper one twentieth of an inch in diameter and 250 feet in length, or 330 feet of No. 9 iron wire.

(5) E. E. H. asks: How can I finish parlor brackets, made of walnut and cigar box lumber, cheaply, durably, quickly, and beautifully? A. Varnish the lumber before sawing, saw with thin boards between and on the sides of the lumber, and use a fine saw.

(6) S. G. B. asks: 1. Can insects and snakes hear? A. Yes. 2. How are knife blades tempered, so as not to warp? A. By plunging them straight down in the water in the process of hardening.

(7) M. L. A. asks how to drill a hole one half inch in diameter through the bottom of a large glass flask. It is intended for a home made electrical machine. A. A copper tube 1/2 inch in diameter pressed against the glass lightly and plentifully supplied with emery and water, and rotated by means of a lathe or drill stock, will accomplish it.

(8) C. E. O.—Directions for making induction coils are contained in the SCIENTIFIC AMERICAN SUPPLEMENT No. 160.

(9) E. K. asks: Who was Eastlake, and what are his principles of design in furniture? A. Eastlake is a living designer of furniture, etc., in London, Eng.; also art critic and author. His work on household art is published by Scribners. Clarence Cook's work, also published by Scribners, will explain Eastlakism.

(10) G. W. B. states that the shrinking and swelling of the wooden cases of telephones is one cause of derangement. We suggest soaking the wood in melted paraffine or giving them a coat or so of shellac varnish in the inside.

(11) F. S. writes: I am a surgical instrument maker, and in my work I have to bend steel rods, which must be polished before bending, as they have to be perfectly round when bent. The bending of the rods is done with a wooden mallet. 1. Is there anything that can be put on the steel or in the fire by which it might be kept from scaling? A. Apply to the steel before heating a thin paste of 75 parts of sifted wood ashes, and 25 parts of fat clay without sand, mixed with water. 2. Can you give me a receipt for soldering steel to malleable iron? A. Use silver solder.