

TO INVENTORS.

An experience of more than thirty years, and the preparation of not less than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequalled facilities for procuring patents everywhere. In addition to our facilities for preparing drawings and specifications quickly, the applicant can rest assured that his case will be filed in the Patent Office without delay. Every application, in which the fees have been paid, is sent complete—including the model—to the Patent Office the same day the papers are signed at our office, or received by mail, so there is no delay in filing the case, a complaint we often hear from other sources. Another advantage to the inventor in securing his patent through the Scientific American Patent Agency, it insures a special notice of the invention in the SCIENTIFIC AMERICAN, which publication often opens negotiations for the sale of the patent or manufacture of the article. A synopsis of the patent laws in foreign countries may be found on another page, and persons contemplating the securing of patents abroad are invited to write to this office for prices, which have been reduced in accordance with the times, and our perfected facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN.

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

The new fragrant Vanity Fair Cigarettes. New combinations of rare Old Perique and Virginia.

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.

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

Wanted.—We wish to do Drop Forgings in exchange for new or good second-hand Milling Machines. W. H. Baker & Co., Syracuse, Makers of Breech-loading Guns.

Wanted.—The address of Manufacturers of Keroseene Street Lamps. R. H. Frizze, Toledo, Iowa.

Patent Paper Boxes as applied to all wrapping purposes. Send for sample, stating size, to Wm. Meschenmoser, 120 William St., New York.

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.

We have opened a sample depot for American goods, and wish to negotiate with manufacturers seeking Spanish markets. We shall be glad to receive catalogues, price lists, and samples of American products. Address Herrero Hermanos, Cadiz, Spain.

Having enlarged our capacity to 96 crucibles 100 lb. each, we are prepared to make castings of 4 tons weight. Pittsburgh Steel Casting Co., Pittsburgh, Pa.

H. Prentiss & Co., 14 Dey St., New York, Mannfs. Taps, Dies, Screw Plates, Reamers, etc. Send for list.

Vertical Engines. F. C. & A. E. Rowland, N. Haven, Ct. Howard Patent Safety Elevators. Howard Iron Works, Buffalo, N. Y.

Wanted.—Consignments of Machinery, on commission, new store near Liberty St. Superior advantages. No charge for storage. Address P. O. Box 102, New York.

Just Published.—A complete history of the Steam Engine, 450 pages, 183 illustrations, and 15 portraits. Price by mail, \$2.50. Send for circular. Frederick Keppy, Scientific Book Publisher, Bridgeport, Conn.

Self-feeding Upright Hand Drilling Machines of superior construction. Pratt & Whitney Co., Hartford, Ct.

H. W. Johns' Asbestos Liquid Paints are in use by the United States Navy and Treasury Departments (lighthouse and life saving stations), and on the United States Capitol at Washington.

"Workshop Receipts" for Manufacturers, Mechanics, and Scientific Amateurs. Illustrated. \$2, mail free. E. & F. N. Spon, 446 Broome St., New York.

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

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

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.

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. Phoenix Iron Works, Hartford, Conn.

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. Landis, 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. Use H. W. Johns' Asbestos Roofing.

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

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

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

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.

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

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.

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.

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

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

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

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

Solid Emery Vulcanite Wheels.—The Solid Original Emery Wheel—other kinds imitations and inferior. Caution.—Our name is stamped in full on all our best Standard Belting, Packing, and Hose. Buy that only. The best is the cheapest. New York Belting and Packing Company 37 and 38 Park Row, N. Y.

Portland Cement.—Roman & Keene's, for walks, cisterns, foundations, stables, cellars, bridges, reservoirs, breweries, etc. Remit 25 cents postage stamps for Practical Treatise on Cements. S. L. Merchant & Co., 53 Broadway, New York.

Steel Castings true to pattern, of superior strength and durability. Gearing of all kinds. Hydraulic cylinders, crank shafts, cross heads, connecting rods, and machinery castings of every description. For price list and circular, address Chester Steel Castings Company, 407 Library St., Philadelphia, Pa.

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

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

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

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.

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

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

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

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

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.

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.

NEW BOOKS AND PUBLICATIONS.

JOURNAL OF THE SOCIETY OF TELEGRAPH ENGINEERS. London and New York: E. & F. N. Spon.

No. 24, Vol. VII, contains proceedings of meetings held November 13 and November 27, 1878. At the first meeting two valuable papers were read: "Cable Grappling and Cable Lifting," by A. Jamieson, and "Grapnels for raising Submarine Cables in Deep Water," by Francis Lambert. Both papers are abundantly illustrated, as also is the paper read at the later meeting by Major C. E. Weher, describing multiple and other telegraphs at the Paris Exhibition.

THE FLORA OF RICHMOND COUNTY, NEW YORK: By Arthur Hollick and N. L. Britton. 8vo, paper, pp. 36. Price 50 cents.

Students of botany in and about New York will find this a handy catalogue of the flora of Staten Island. The notes indicating frequency, localities, and so on, will be specially helpful to collectors. The list contains some rare plants, and comprises nearly all those enumerated by Torrey as found within fifty miles of New York.

IMPROVED DWELLINGS FOR THE LABORING CLASSES. New York: G. P. Putnam's Sons. 8vo, paper, pp. 45. Price 30 cents.

An uncommonly valuable pamphlet, showing how the greatest and most urgent want of New York city, cheap and wholesome housing for the poor, can be profitably met. The success of Mr. Alfred T. White in providing such tenements in Brooklyn proves beyond question that, as a speculation, properly constructed tenements for the laboring classes in New York will pay their builders handsomely; while the moral, social, and sanitary advantages of such buildings to the city, would be incalculable.

ECONOMIC MONOGRAPHS. New York: G. P. Putnam's Sons. 12mo, paper. Each 25 cents.

No. 11 of this series of pamphlets contains the Hon. Carl Schurz's address on Honest Money and Labor, delivered in Boston, last October. It may be read with profit by any one inclined to harbor "inflation" notions.

No. 12, of kindred spirit, is a discussion of the history and merits of the present system of National Banking, by M. L. Scudder, Jr.

No. 13, Hindrances to Prosperity, is a lecture on causes which retard financial and political reforms in the United States, delivered before the New York Free Trade Club by Simon Sterne.

No. 15 considers International Copyright in some of its relation to ethics and political economy. The author, Mr. George Haven Putnam, puts very forcibly the ethical and political reasons for making the legal recognition of brain work as property independent of national boundaries.

THE ART OF SCIENTIFIC DISCOVERY. By G. Gore, LL.D., F.R.S. London: Longmans, Green & Co. 12mo, pp. 648.

Dr. Gore aims to describe the nature of original scientific research, the chief personal conditions of success in its pursuit, the general methods by which discoveries are made in physics and chemistry, and the causes of failure. Believing that original research is an art and not a science, a method of practical study, not a collection of laws, Dr. Gore endeavors to show how the investigator must proceed if he hopes for success. Whilst great aptitude for scientific discovery must, he says, like any other rare and peculiar ability, be born in the man, it is certain that it may, like those other natural abilities, be assisted by advice and developed by experience; and out of the stores of personal experience as an investigator, and a wealth of fact and illustration gathered from the experiences of others, the attempt is made to show how steady thought, self development, industry, and perseverance, rightly guided, may lead to valuable discoveries. The work will prove a useful addition to any student's library. It is well indexed.

COAL: ITS HISTORY AND USES. Edited by Professor Thorpe. London: Macmillan & Co. 1878. 8vo, pp. 363. Price \$4.

Ten admirable lectures on coal, by Professors Green, Miall, Thorpe, Rucker, and Marshall, of the Yorkshire College, England. The geology of coal is treated by Professor Green; the plants and animals of the coal period, by Professor Miall; the chemistry of coal by Professor Marshall, who also discusses at length the coal question in its broader industrial, commercial, and political aspects. Professor Rucker discusses coal as a source of warmth and power. Unitedly these lectures make by far the most readable treatise on coal yet produced. It is at the same time singularly strong, and full of fresh and important information, as a contribution to popular science. The work is illustrated by fifty-seven wood cuts, and is well indexed.

THIRTY-SEVENTH ANNUAL REPORT OF THE BOARD OF EDUCATION, OF THE CITY AND COUNTY OF NEW YORK.

The New York Board of Education has now 261 schools and departments under its control, on which about \$3,000,000 are annually expended. The total number of pupils enrolled is about 240,000, with an average attendance of nearly half that number. There are besides 15 corporate schools participating in the school fund, with an average attendance of nearly 10,000.

A REVISED LIST OF THE BIRDS OF CENTRAL NEW YORK. By Frank R. Rathburn and others. Auburn, N. Y. 8vo, paper, pp. 45.

This list is highly commended by Dr. Elliott Coues as worthy of being regarded the leading authority upon the Ornithology of Central New York.

PROGRESSIVE JAPAN. By Gen. Chas. W. Le Gendre. San Francisco: A. L. Bancroft & Co.

In this critical study of the political and social needs of our next neighbor to the West, General Le Gendre has not failed in his design to throw light, and very clear light, upon the present situation of affairs in the Mikado's Empire. He has gone further, and by tracing historically the influences involved in the recent and progressive transformation of the social and political condition in Japan, he has made possible an intelligent forecast of the future of that remarkable people.

FUEL: ITS COMBUSTION AND ECONOMY. Philadelphia: Henry Carey Baird & Co. 12mo, pp. 394. \$2.25.

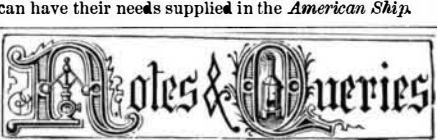
This volume contains an abridgment of C. Wye Williams' treatise on the combustion of coal and the prevention of smoke; T. Symes Prieaux's work on the "The Economy of Fuel;" and a review by the editor, D. Kinnear Clark, of recent practices in the combustion and economy of fuel. In the latter part will be found much fresh information touching the use of other fuels than coal, and description of recent devices for utilizing waste heat and for the use of gas and powdered fuel in metallurgical and other operations.

TRANSACTIONS OF THE ILLINOIS STATE HORTICULTURAL SOCIETY FOR 1877. Edited by the Secretary, O. B. Galusha. Chicago: published by the Society.

Contains the proceedings of the twenty-second annual meeting of the Illinois State Horticultural Society; the proceedings of the eleventh annual meeting of the Horticultural Society of Northern Illinois; and the transactions of the Warsaw Horticultural Society. It embraces several important essays and discussion of subjects relating to scientific and practical horticulture; and some valuable descriptions of the State Entomologist, Professor Cyrus Thompson, and others, of insects affecting horticulture. Professor Thompson's report on insects injurious to the vegetable garden will be found of interest everywhere.

THE AMERICAN SHIP:

The American Ship, published at No. 3 Park Place, New York city, terms \$3.00 per annum. John W. Griffiths editor, is devoted to navigation in all its branches. In the present low state of the shipping interests of the country our legislators and shipowners will do well to obtain the best light on this subject. From our knowledge of the editor (who is the author of several works on naval architecture), we believe they can have their needs supplied in the American Ship.



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) G. A. H. asks for an explanation of the cause of the rise and fall of the barometer, that is, the cause of changes in the air's pressure. A. The course of the barometer is generally in the opposite direction to that of the thermometer; that is, that when the temperature rises the barometer falls, and vice versa, which indicates that the barometric variations at any given place are produced by the expansion and contraction of the air, and therefore by its change in density. If the temperature were the same throughout the whole extent of the atmosphere, no currents would be produced, and at the same height atmospheric pressure would be everywhere the same. But when any portion of the atmosphere becomes warmer than the neighboring parts, its specific gravity is diminished, and it rises and passes away through the upper regions of the atmosphere, whence it follows that the pressure is diminished and the barometer falls. If any portion of the atmosphere retains its temperature while the neighboring parts become cooler, the same effect is produced; for in this case, too, the density of the first mentioned portion is less than that of the others. Hence, also, it usually happens that an extraordinary fall of the barometer at one place is counterbalanced by an extraordinary rise at another place. The daily variations appear to result from the expansions and contractions which are periodically produced in the atmosphere by the heat of the sun during the rotation of the earth.

(2) A. D. gives the following method of cutting threads on 3 inch wrought iron steam pipe. After cutting the pipes to the proper length square the ends; then cut off a piece of threaded pipe 1/4 inch long, square the end of it, and drive a wooden mandrel through it and into the pipe to be cut until the two ends meet, then center it in the lathe, and chase it with an ordinary chaser. The chaser I made myself without a hub, the V being cut with a saw file. Not seeing this plan mentioned in your article on chasing and knurling, I give it for the benefit of some of your readers.

(3) "Reader" asks: Will you please inform me through your columns: 1. How I, having a good theoretical but no practical knowledge of steam engines, can get the necessary license to run a little steam launch for my own amusement this summer? Will a license be necessary? A. You had better apply to steamboat inspectors in your vicinity. 2. With a launch having steel boiler, no tank, no condenser, how far objectionable would it be to run in salt water (feed direct from outside)? Would it merely be better to go to the trouble of putting in a tank (taking out air tanks from under seats) or would it be very important? Would the fact that boiler is steel make any difference? A. You should have fresh water tanks; steel makes no difference.

(4) M. K. L. asks: 1. What was the right ascension and declination and longitude of the planets on April 1, 1879? Professor L. Swift gives us the following: The longitudes are as follows:

Table with 2 columns: Planet and coordinates. Mars, April 1, 1879, at noon: 272° 47' 53". Jupiter: 324° 03' 00". Saturn: 5° 51' 19". Uranus: 152° 35' 20". Neptune: 39° 13' 23". Mars... R. A. 20h. 52m. 11s. Dec. South 18° 48' 00". Jupiter: 22h. 15m. 14s. " " 11° 42' 32". Saturn: 1h. 02m. 08s. " North 3° 51' 31". Uranus: 10h. 12m. 00s. " " 11° 59' 32". Neptune: 2h. 26m. 34s. " " 12° 41' 35".

2. Is the increase of Mercury's velocity from 0° to 180° uniform, and what is the rate of increase? A. The increase and decrease of velocity of Mercury is not 0° to 180°; from perihelion to aphelion it decreases, and increases from aphelion to perihelion.

(5) W. T. H. asks: 1. How many cells of the larger size of "easily made bichromate batteries" mentioned in SCIENTIFIC AMERICAN SUPPLEMENT No. 159 will be required to obtain a good light from the "simple electric light" described in SCIENTIFIC AMERICAN SUPPLEMENT No. 162? A. 10 or 12. 2. Would a gallon jar give four times as much electricity as a quart jar in the above mentioned battery, supposing the other parts to be proportional? A. No. 3. What size wire should be used in connecting the cells of a battery? A. No. 14. 4. Do cells of different elements work well when coupled together, as, for instance, cells of gravity, Watson, and carbon batteries? A. No.

(6) C. E. R. asks (1) for a receipt for cementing leather to an iron face pulley to make a belt hold better. A. Try equal parts of pitch and gutta percha. Warm the wheel, apply the cement hot, and lap the ends of the leather. 2. What is best to use on belts to keep them from slipping? A. Powdered rosin, or a mixture of powdered rosin and Spanish white, is sometimes used, but it is eventually injurious to the belt.

(7) J. K. writes: I have charge of a circulating library of over 7,000, and have great trouble in keeping the paper numbers on the backs of the cloth backed books. (The leather bindings I have numbered in gold.) Book binder's paste does only for a short time, but the labels afterwards get brittle and drop off. Can you give me information regarding a real good substitute for that purpose? It will require to be adhesive and at the same time retain its elasticity. A. Four parts by weight of glue are allowed to soften in 15 parts of cold water for some hours, and then moderately heated till the solution becomes quite clear. Sixty-five parts of boiling water are now added with stirring. In another vessel 30 parts of starch paste are stirred up with 30 parts of cold water, so that a thin milky fluid is obtained without lumps. Into this the boiling glue solution is poured, with constant stirring, and the whole is kept at the boiling temperature. After cooling, a few drops of carbolic acid are added to the paste, which must be kept in closed bottles to prevent evaporation of the water, and will, in this way,