

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 the following week's issue

"U. S." metal polish. Indianapolis. Samples free. Cheap 2d-hand lathes & planers. S. M. York, Clev'd, O. For Sale-Valuable patent. A. M., box 169, Buffalo, N. Y. Portable and Stationary Cylinder Boring machines. Pedrick & Ayer, Philadelphia, Pa. For Sale-Patent 477,942. S. J. Kelso, 396 Parliamentary Rd., Glasgow, Scotland. The Improved Hydraulic Jacks, Pumps, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York. Stow flexible shaft. Invented and manufactured by Stow Mfg. Co., Binghamton, N. Y. See adv., page 46. Screw machines, milling machines, and drill presses. The Garvin Mach. Co., Laight and Canal Sts., New York. Centrifugal Pumps for paper and pulp mills. Irrigating and sand pumping plants. Irvin Van Wie, Syracuse, N. Y. Wanted-2 second hand vertical engines, about 4' x 4' or 4' x 5', cheap, for temporary use. R. A. Morgan, Noank, Conn. Portable engines and boilers. Yacht engines and boilers. B. W. Payne & Sons, Elmira, N. Y., and 41 Dey Street, New York. Guild & Garrison, Brooklyn, N. Y., manufacture steam pumps, vacuum pumps, vacuum apparatus, air pumps, acid blowers, filter press pumps, etc. Split Pulleys at Low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa. Perforated Metals of all kinds and for all purposes, general or special. Address, stating requirements, The Harrington & King Perforating Co., Chicago. To Let-A suite of desirable offices, adjacent to the Scientific American offices, to let at moderate terms. Apply to Munn & Co., 361 Broadway, New York. Fine Castings in Brass, Bronze, Composition (Gun Metal), German Silver. Unequaled facilities. Jas. J. McKenna & Bro., 424 and 426 East 23d St., New York. Patent for Sale-Automatic self-opening and self-closing inkstand. Can be made for 25 cents each. Address H. A. Burgess, 904 Washington St., Boston, Mass. The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail, \$4; Munn & Co., publishers, 361 Broadway, N. Y. Kennedy Valve Mfg. Co., manuf'rs of brass, iron gate valves, patent indicator valves, fire hydrants, globe, angle, check, radiator, and safety valves, 52 Cliff St., N. Y. Canning machinery outfits complete, oil burners for soldering, air pumps, can wipers, can testers, labeling machines. Presses and dies. Burt Mfg. Co., Rochester, N. Y. Competent persons who desire agencies for a new popular book of ready sale, with handsome profit, may apply to Munn & Co., Scientific American office, 361 Broadway, New York. Send for new and complete catalogue of Scientific and other books for sale by Munn & Co., 361 Broadway, New York. Free on application.

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information and not for publication. References to former articles or answers should give date of paper and page or number of question. Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn. Special Written Information on matters of personal rather than general interest cannot be expected without remuneration. Scientific American Supplements referred to may be had at the office. Price 10 cents each. Books referred to promptly supplied on receipt of price. Minerals sent for examination should be distinctly marked or labeled.

(4666) W. N. asks what they put in the tumbling mills to smooth up broom handles. I want to make a mill for tumbling handles, and don't know what to put in to roll with them. A. Hard wood chips from a turning lathe or wood planer are best. Coarse hard wood sawdust may be used.

(4667) C. E. M., Arizona, writes: We have a number of barrels of cement that got wet in high water last spring. Do you know of any way that it can be fixed so it can be used again? Would like very much to know, as cement is a very expensive article in this country. A. You can only utilize the cement by reburning in a kiln and regrinding.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

January 31, 1893,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Table listing inventions with names and dates, such as Air and gas mixing apparatus, T. Smith, 491,060 and Alarm device, automatic Schilling & Haslam, 490,634.

Main table listing inventions with names and dates, such as Binding, M. M. Beeman, 490,819 and Glassware, machine for printing, C. Z. F. Rott, 491,025.

DESIGNS.

TRADE MARKS.

Table listing trade marks and designs with names and dates, such as Beverages, nutrient or tonic, Coca Cola Company, 22,165.

A printed copy of the specification and drawing of any patent in the foregoing list, or any patent in print issued since 1883, will be furnished from this office, for 25 cents, in ordering please state the name and number of the patent desired, and remit to Munn & Co., 361 Broadway, New York.

Advertisements.

Inside Page, each insertion - - 75 cents a line
Back Page, each insertion - - - \$1.00 a line
The above are charges per agate line—about eight words per line. This notice shows the width of the line, and is set in agate type. Engravings may head advertisements at the same rate per agate line, by measurement, as the letter press. Advertisements must be received at Publication Office as early as Thursday morning to appear in the following week's issue.

Patent Foot Power Machinery, Complete Outfits. Wood or Metal workers without steam power can successfully compete with the large shops, by using our New LABOR SAVING Machinery, latest and most improved for practical Shop Use, also for Industrial Schools, Home Training, etc. Catalogue free. Seneca Falls Mfg. Co. 65 Water Street, Seneca Falls, N. Y.

ICE-HOUSE AND COLD ROOM—BY R. G. Hatfield. With directions for construction. Four engravings. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, 59. Price 10 cents. To be had at this office and from all newsdealers.

The Sebastian-May Co Improved Screw Cutting Foot & LATHES Power \$60 Drill Presses, Chucks, Drills, Dogs, and Machinists' and Amateurs' Outfits. Lathes on trial. Catalogues mailed on application. 165 to 167 Highland Ave., SIDNEY, OHIO.

New Full Mounted Lightning Screw Plate. Send for Catalogue. Wiley & Russell Mfg. Co., Greenfield, Mass., U.S.A.

KEUFFEL & ESSER CO. NEW YORK AND CHICAGO. All Drawing Instruments for Schools. Quality warranted. Prices low, correspondence invited. Send for Catalogue.

Model & Experimental Work Small articles manufactured in quantities. Inventions perfected and developed. Working in Aluminum a specialty. Sylvester S. Deming, Designer & Builder of Fine Machinery, 143 Centre Street, New York City. "OTTO" GAS AND GASOLINE ENGINES, 1-3 to 100 horse power can be used in cities or in country independent of gas works or gas machines. No Boiler. No Danger. No Engineer. 33,000 SOLD. OTTO GAS ENGINE WORKS, PHILADELPHIA.

EXPERIMENTAL OR LIGHT MACHINE WORK of all descriptions. Vending machines a specialty. Amer. Vending Mach. Co., 29 Murray St., New York.

VANDUZEN STEAM PUMP THE BEST IN THE WORLD. Pumps Any Kind of Liquid. Always in Order, never Clogs nor freezes. Every Pump Guaranteed. 10 SIZES. 200 to 12000 Gallons per Hour. Cost \$7 to \$75 each. Address THE VANDUZEN & TIFT CO., 102 to 108 E. Second St., Cincinnati, O.

IMPROVED ENGINE LATHES MODERN DESIGNS Also Foot Lathes, Tools and Supplies. Catalogue Free Sebastian Lathe Co. 129-122 Calvert Street CINCINNATI, OHIO.

ALUMINUM: ITS USES AND APPLICATIONS. A valuable and interesting article by G. L. Adenbroke. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 559. Price 10 cents. To be had at this office and from all newsdealers.

EXHIBITS (COLUMBIAN EXPOSITION) PATENTS Caveats, Trade Marks, Copyrights, Designs, etc. Handbook and information concerning Patents sent free of charge. Oldest bureau for securing Patents in America. Over 100,000 applications have been filed by MUNN & Co., 361 Broadway, N. Y.

BEATTY Pianos, Organs, \$33 up. Want agents. Cat'g free. Dan T. Beatty, Wash'ton, N. Y.

James Smith Woolen Machinery Co. MANUFACTURERS OF THE HUB FRICTION CLUTCH. POWER TRANSMISSION MACHINERY. 411 to 421 Race Street, PHILADELPHIA, PA. Applied to Pulleys, Gears, Sprocket Wheels, Reversible Counter-shafts and Cut-off Couplings. The most simple, effective, durable, and economical Clutch on the market. Made in sizes to transmit from 2 up to 1000 h. p., at slow or fast speed. Over 10,000 in use. Write for cuts, description, price list and discounts.

VELOCITY OF ICE BOATS. A Collection of interesting letters to the editor of the SCIENTIFIC AMERICAN on the question of the speed of ice boats, demonstrating how and why it is that these craft sail faster than the wind which propels them. Illustrated with 10 explanatory diagrams. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 214. Price 10 cents. To be had at this office and from all newsdealers.

EDISON PHONOGRAPHS FOR SALE. ADDRESS, North American Phonograph Co. EDISON BUILDING, New York. Masonic Temple Bldg., Chicago.

STEVENS PATENT SPRING DIVIDERS Leader, No. 75. Price, by mail, postpaid. 2 1/2 inch. \$0.80 4 inch. \$0.90 6 inch. \$1.00 3 1/2 inch. \$0.85 5 inch. \$0.95 8 inch. \$1.25 You are quite welcome to write us at any time about improvements which you can suggest on our tools. Ideal and Leader Spring Calipers and Dividers, Ideal Surface Gauges, Depth Gauges, and Fine Machinists' Tools. Illustrated catalogue free to all. STEVENS ARMS & TOOL CO., P. O. Box 28, Chicopee Falls, Mass.

THE STIRLING BOILER is economical in fuel, repairs, and absolutely safe at high pressure. Practically self-cleaning. THE STIRLING COMPANY, GENERAL OFFICES: FULLMAN BUILDING, CHICAGO Branches in all principal cities.

T. A. G. THE TUSCARORA ADVERTISING COMPANY, Manufacturers, Publishers and Importers of Advertising Goods and Art Novelties, Canton, Ohio. Buy good specialties outright or manufacture on royalty. Salesmen cover every State and Territory in the Union.

HYDRO-CARBON BURNER For Burning Crude Petroleum under low pressure (Meyer's patent). Adapted for all kinds of Iron and Steel Forging, Tempering and Welding, Annealing, etc., for Burning Sewer Pipe, Heating Asphalt, Oxidizing Lead, Generating Steam and an endless variety of special work. Engineers furnished on application to equip plants with our improved system. Standard Oil Fuel Burner Co. FORT PLAIN, NEW YORK.

CHAPMAN VALVE MANUFACTURING COMPANY, MANUFACTURERS OF Valves and Gates For STEAM, WATER, GAS, AMMONIA, OIL, ACID, Etc.; also GATE FIRE HYDRANTS. We make a Specialty of Valves for Superheated and High Pressure Steam 100 Pounds Pressure and Upwards. General Office and Works, INDIAN ORCHARD, MASS. Treasurer's Office, 72 KILB STREET, BOSTON. Chicago Office, 24 WEST LAKE STREET. All work Guaranteed. Send for Circulars and Prices.

VOLNEY W. MASON & Co., FRICTION POLLEYS, CLUTCHES, and ELEVATORS PROVIDENCE, R. I.

BARNES' New Friction Disk Drill. FOR LIGHT WORK. Has these Great Advantages: The speed can be instantly changed from 6 to 1600 without stopping or shifting belts. Power applied can be graduated to drive, with equal safety, the smallest or largest drills within its range—a wonderful economy in time and great saving in drill breakage. Send for catalogue. W. F. & JNO. BARNES CO., 1999 Ruby St., Rockford, Ill.

THE STATE for OREGON Manufactures is OREGON A Great Field for Manufacturers and Factories. Portland is its great industrial center. Her perfect water power unequalled anywhere, has every facility of location for Mills and Factories. Is situated on tide water at the terminal connecting point of Railroad and Sea and River navigation. Full information furnished free by the Oregon State Board of Immigration, Portland, Oregon.

ALUMINUM In all shapes. Manufactured by Cowles Electric Smelting and Aluminum Co., Correspondence solicited. LOCKPORT, N. Y.

DRILL CHUCKS. Write "THE PRATT CHUCK CO." Clayville, N. Y., U. S. A., for free illustrated catalogue of POSITIVE DRIVING DRILL CHUCKS showing the only perfect system ever devised for holding and driving drills. Foreign Agencies: Ph. Roux et Cie, 54 Boulevard du Temple, Paris, France. E. Sonnenthal Jr, Nueu Promenade, No. 5, Berlin, Germany. Selig, Sonnenthal & Co., 85 Queen Victoria Street London, E. C., England.

CELLULOID ZAPON CELLULOID LACQUERS MANUFACTURERS OF 41 BARCLAY ST. NEW YORK GUM VARNISHES - BRILLIANT AND DEAD BLACKS - SHELLS & CO.

WELL DRILLING MACHINERY, MANUFACTURED BY WILLIAMS BROTHERS, ITHACA, N. Y., Mounted on and on Sills, for deep or shallow wells, with steam or horse power. Send for Catalogue. Williams Brothers ITHACA, N. Y.

BORE WELLS DRILL WELLS THE BEST MACHINERY and TOOLS in the world for succeeding in this business—also Horse Powers, Steam Engines, Pumps & Valves, Iron Pipe and Fittings, Well Supplies. Honest and reliable work assured. Catalogue mailed free. LOOMIS & NYMAN, TIFFIN, OHIO.

OIL WELL SUPPLY CO. 91 & 92 WATER STREET, Pittsburg, Pa. Manufacturers of everything needed for ARTESIAN WELLS for either Gas, Oil, Water, or Mineral Tests, Boilers, Engines, Pipe, Cordage, Drilling Tools, etc. Illustrated catalogue, price lists and discount sheets on request.

EXPERT MODEL MAKING. Established 1877. J. C. SKYL, Prop. Chicago Model Works, Chicago, Ill., 179 E. Madison St. Write for Catalogue of Model Supplies.

ONLY 25 CENTS A Practical Little Book. "HOW TO MAKE A 1 H.P. MOTOR OR DYNAMO." Illustrated with plans and all details. Address 18 Park Row, N. Y. Electrical Review Stamps Accepted.

GAS and GASOLINE ENGINES STATIONARY and PORTABLE. All Sizes. Dwarfs in Size, but Giants in Strength. Expense one cent an hour per horse power and requires but little attention to run them. Every Engine Guaranteed. Full particulars free by mail. Mention this paper. VAN DUZEN GAS & GASOLINE ENGINE CO. Cincinnati, O.

FUELS AND THEIR USE—A PRESIDENTIAL address before the Society of Chemical Industry, by J. Emerson Reynolds, M.D., discussing the modern developments of the fuels coal, peat and petroleum. Gasification of coal. Natural gas. Gasified petroleum. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 568. Price 10 cents. To be had at this office and from all newsdealers.

DESIGNING AND BUILDING OF NEW MACHINERY. SUPPLY AND INSTALLATION OF STEAM ENGINES, PUMPS, ELECTRIC PLANTS.

Steel Type for Writing Machines, J. D. MALLONEE, MFR., STOCKTON, N. Y.

Shingle, Heading and Stave Mill Machinery and Veneer Cutting. Handle Machinery for Turning Handles for Brooms, Axes, etc. Wood Pulp Machinery. Improved Gauge Lathe. Trevor Mfr. Co. Lockport, N. Y.

ESTABLISHED 1846. THE SCIENTIFIC AMERICAN

The Most Popular Scientific Paper in the World Only \$3.00 a Year, Including Postage. Weekly—52 Numbers a Year.

This widely circulated and splendidly illustrated paper is published weekly. Every number contains sixteen pages of useful information and a large number of original engravings of new inventions and discoveries, representing Engineering Works, Steam Machinery, New Inventions, Novelties in Mechanics, Manufacture, Chemistry, Electricity, Telegraphy, Photography, Architecture, Agriculture, Horticulture, Natural History, etc. Complete list of patents each week.

Terms of Subscription.—One copy of the SCIENTIFIC AMERICAN will be sent for one year—52 numbers—postage prepaid, to any subscriber in the United States, Canada, or Mexico, on receipt of three dollars by the publishers; six months, \$1.50; three months, \$1.00.

Clubs.—Special rates for several names, and to Post Masters. Write for particulars. The safest way to remit is by Postal Order, Draft, or Express Money Order. Money carefully placed inside of envelopes, securely sealed, and correctly addressed, seldom goes astray, but is at the sender's risk. Address all letters and make all orders, drafts, etc., payable to MUNN & CO., 361 Broadway, New York.

THE Scientific American Supplement

This is a separate and distinct publication from THE SCIENTIFIC AMERICAN, but is uniform therewith in size, every number containing sixteen large pages full of engravings, many of which are taken from foreign papers and accompanied with translated descriptions. THE SCIENTIFIC AMERICAN SUPPLEMENT is published weekly, and includes a very wide range of contents. It presents the most recent papers by eminent writers in all the principal departments of Science and the Useful Arts, embracing Biology, Geology, Mineralogy, Natural History, Geography, Archaeology, Astronomy, Chemistry, Electricity, Light, Heat, Mechanical Engineering, Steam and Railway Engineering, Mining, Ship Building, Marine Engineering, Photography, Technology, Manufacturing Industries, Sanitary Engineering, Agriculture, Horticulture, Domestic Economy, Biography, Medicine, etc. A vast amount of fresh and valuable information obtainable in no other publication.

The most important Engineering Works, Mechanisms, and Manufactures at home and abroad are illustrated and described in the SUPPLEMENT. Price for the SUPPLEMENT for the United States, Canada, and Mexico, \$5.00 a year; or one copy of the SCIENTIFIC AMERICAN and one copy of the SUPPLEMENT, both mailed for one year to one address for \$7.00. Single copies, 10 cents. Address and remit by postal order, express money order, or check. MUNN & CO., 361 Broadway, New York.

Building Edition.

THE SCIENTIFIC AMERICAN ARCHITECTS' AND BUILDERS' EDITION is issued monthly. \$2.50 a year. Single copies, 25 cents. Forty large quarto pages, equal to about two hundred ordinary book pages; forming a large and splendid Magazine of Architecture, richly adorned with elegant plates in colors, and with other fine engravings; illustrating the most interesting examples of modern architectural construction and allied subjects.

A special feature is the presentation in each number of a variety of the latest and best plans for private residences, city and country, including those of very moderate cost as well as the more expensive. Drawings in perspective and in color are given, together with full Plans, Specifications, Sheets of Details, Estimates, etc. The elegance and cheapness of this magnificent work have won for it the Largest Circulation of any Architectural publication in the world. Sold by all newsdealers. \$2.50 a year. Remit to MUNN & CO., Publishers, 361 Broadway, New York.

Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO. Industrial Publishers, Booksellers, and Importers, 810 Walnut St., Philadelphia, Pa., U. S. A.

WHERE TO LOCATE NEW FACTORIES.

The Illinois Central Railroad Company is desirous of calling the attention of capitalists and manufacturers to the advantages possessed by the different cities and towns on their Southern Lines and on the lines of the Yazoo & Mississippi Valley Railroad Company, in the shape of

UNLIMITED RAW MATERIAL, PROXIMITY TO MARKETS, CHEAP LABOR,

Fuel, etc., and believes that it needs but a presentation of their merits to attract the careful attention of all interested in converting the raw materials to be found on their lines into the finished product.

INDUCEMENTS OFFERED

by the different localities for desired industries. Individuals or companies wishing to embark capital in cotton, clay, wood-working, canning or other industries, can find a profitable field and hearty co-operation.



ARTESIAN

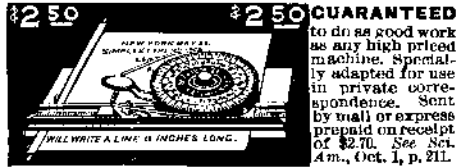
Wells, Oil and Gas Wells, drilled by contract to any depth, from 50 to 300 feet. We also manufacture and furnish every thing required to drill and complete same.

PRIMUM ARTESIAN & OIL WELL SUPPLY CO., 80 BEAVER STREET, NEW YORK.

The Best Mechanical Help For inventors, experimenters, etc., comes from a real machine shop with first-rate men and tools accustomed to regular work.

THE JONES BROTHERS ELECTRIC CO. CINTI, O.

THE SIMPLEX TYPEWRITER



Address Simplex Typewriter Co., 39 Grant Jones Street, New York.

To Inventors. E. Kongslow, manufacturer of Fine Machinery and Models, offers Special Facilities to Inventors.



WOODEN TANKS. LARGE WATER TANKS. SPECIFICATIONS FURNISHED FOR FOUNDATIONS & TOWERS.

MANUFACTURERS and INVENTORS ATTENTION!

We are prepared to design, give estimates on, and manufacture Light Machinery, Electrical Appliances, and Metal Specialties of every description.

SINTZ GAS ENGINE CO.



Rubber Rolls and Wheels.

Power Wringing Machines, Drying and Ventilating Fans. All styles of Trucks made to order.

Wanted - Competent Foreman to take charge of Cabinet Paper Machine and Compositing Department of large Cabinet Factory in the West.

STEEL TYPE FOR TYPEWRITERS. Stencils, Steel Stamps, Rubber and Metal Type, Dies, etc.

Perfect Newspaper File

The Koch Patent File, for preserving Newspapers, Magazines, and Pamphlets, has been recently improved and price reduced.

The 1892 Model Remington Typewriter



For Ease and Convenience of Operation, Simplicity of Design and Durability of Construction, is UNEQUALED.

WYCKOFF, SEAMANS & BENEDICT, 327 Broadway, N. Y.

No one ever wrote 1000 Letters an Hour, that is, unless they first wrote one and then copied the rest on an EDISON MIMEOGRAPH

GATES ROCK & ORE BREAKER. Capacity up to 200 tons per hour. Has produced more ballast, road metal, and broken more ore than all other Breakers combined.

Agents wanted for the Life and Publications of JAMES C. BLAINE

WE SEND FREE with this beautiful Organ an Instruction Book and a handsome, upholstered Stool!

\$10.00 to \$50.00 per night. A light and profitable business. Magic Lanterns and Views of popular subjects.

After being on the Market Seven Years THE AGME AUTOMATIC ENGINE AND BOILER STILL LEADS!

HARRISON CONVEYOR! For Handling Grain, Coal, Sand, Clay, Tan Bark, Cinders, Ores, Seeds, &c.

LIFE SAVING DEVICES. - A collection of suggestions of devices for communicating between the shore and stranded vessels.

OUR OFFER. 2 Months on Trial for BUBIER'S Popular Electrician 10c.

MALLEABLE AND FINE TRAY IRON & STEEL CASTINGS FROM SPECIAL PATTERNS

MECHANICAL DRAWING, Mechanics, Mining, Prospecting, Arithmetic, etc., may be studied at home, without loss of time from work.

SEND for our list of 19 Catalogs of Musical Instruments.

SCIENTIFIC EXPERIMENTS. - Description of some simple and easily performed scientific experiments.

FOR SALE. One Jute softening machine and five double dry Jute spinning frames.

THE "MUNSON" TYPEWRITER. This machine is an "evolution," the outgrowth of years of experience and the best results of scientific work.

INVENTIONS

Practically Developed. ELECTRIC CUTTER CO., 166 Elm Street, New York (E. D'AMOUR, Supt.), Machinists, Pattern and Model Makers.

CUT PRICES On Revolvers For 60 Days. AUTOMATIC SHELL EXTRACTOR. ONE FREE If You Order Five.

BOOKS.

Analysis, Commercial Organic Analysis. By Alfred H. Allen. Second edition, revised and enlarged. Vol. 3.

Drawing, Simple Lessons in Drawing for the Shop. By O. Reynolds. One vol., 16mo, cloth, 82 pages, illustrated, 1892. \$1.00

Electric Toy Making, Dynamo Building, and Electric Motor Construction. This work treats of the making at home of Electrical Toys, Electrical Apparatus, Motors, Dynamos and Instruments in general.

FREE. Our entirely new Catalogue of Scientific and Technical Books, containing over 3,000 titles, and embracing more than 300 different subjects, with authors' Index, will be mailed free on application to any address in the world.