

Business and Personal.

The charge for insertion under this head is One Dollar a line for each insertion; about eight words to a line.

Marine Iron Works. Chicago. Catalogue free. "U. S." Metal Polish. Indianapolis. Samples free.

For Sale—Gasoline Engines. 1 to 25 H. P.; also castings. Dirigo Engine Co., Portland, Me.

Gear Cutting of every description accurately done. The Garvin Machine Co., Spring and Varick Sts., N. Y.

FERRACUTE Machine Co., Bridgeton, N. J. Full line of Presses, Dies and other Sheet Metal Machinery.

Hub, spoke, wheel, bending, and handle machinery. Single machines or full equipments, by the Defiance Machine Works, Defiance, Ohio, U. S. A.

The celebrated "Hornsby-Akroyd" Patent Safety Oil Engine is built by the De La Vergne Refrigerating Machine Company. Foot of East 138th Street, New York.

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.

Michigan Military Academy, Orchard Lake Michigan.

Twenty-first year. Prepares for leading Universities. Graduates are now in Harvard, Yale, Princeton, Cornell, and University of Michigan. New gymnasium, 50 x 100 feet. Address Colonel Rogers, Supt.

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 This is for our information and not for publication.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.

Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.

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.

(7502) C. V. F. asks: 1. Will you please tell me if the moon gives any heat? A. Certainly; the moon gives off heat. You will find a statement on this point in "The New Astronomy," by Prof. Todd, price by mail, \$1.50.

(7503) E. D. B. writes: In a recent Notes and Queries column you gave the ingredients of a polarity tester that discolors at the positive pole. Will you please let me know what is used in the testers that give a purple discoloration at the negative poles?

- 1. Alcohol..... 10 parts. Phenolphthalein..... 1 " Dissolve and add Water distilled..... 110 " 2. Water distilled..... 10 parts. Sodium sulphate..... 1 "

Soak blotting paper in No. 1. Drain and soak in No. 2. After this let it dry. To test pole of open circuit, moisten a strip of the paper and place the ends of the wires about an inch apart upon it.

(7504) J. L. C. writes: I should like to know if there is anything about new hay to attract the lightning, as a number of barns have been burned by lightning this year after the hay was in. A. We have no explanation to offer for the belief prevalent among farmers that barns are more frequently struck by lightning when full of hay.

NEW BOOKS, ETC.

THE TELEPHONE. Outlines of the Development of Transmitters and Receivers. By William J. Hopkins. New York, London, and Bombay: Longmans, Green & Company, 1898. Pp. 83. Price \$1.

This book gives a clear and connected explanation of the principle underlying the design of the telephone transmitters and receivers. It is not a descriptive catalogue of instruments, but deals with the facts and principles in such a way that they will be easily and thoroughly understood.

Advertisements.

ORDINARY RATES.

Inside Page, each insertion. - 75 cents a line Back Page, each insertion, - - \$1.00 a line

For some classes of Advertisements, Special and Higher rates are required. The above are charges per agate line—about eight words per line.

AN ADVANTAGE OF BEING A SUBSCRIBER TO THE Scientific American

By special arrangement, subscribers to the SCIENTIFIC AMERICAN can obtain the

Gramophone ZON-O-PHONE

at once and pay for it on the installment basis.

In thus making it easy to come into immediate possession of this wonderful invention, we believe we are conferring a favor on every one who takes advantage of the offer—and for these reasons:

The improved Gram-o-phone Zon-o-phone is not only a great scientific curiosity but an inexhaustible source of home entertainment—as practical as a piano and a thousand times more varied and entertaining.

The piano, banjo, or any other musical instrument has its limitations, but so far as addressing the ear is concerned the improved Gram-o-phone Zon-o-phone has none. It sets in motion sound waves exactly similar to those vibrated by the originals, reproduces the same results—and to a degree of perfection simply marvelous.

To confound the improved Gram-o-phone Zon-o-phone with earlier and less successful methods is to judge the "long distance" lines of 1898 by the telephone of 1877.

Its records are on disks of hard rubber—flat, circular, indestructible.

They are made by a process which permits of unlimited duplication without impairing their distinctness or brilliancy.

Hence the proprietors can afford to pay almost any price for a desirable record, as it can be copied indefinitely. The authenticity of every record is guaranteed, all later records being signed. They include those of

- Chauncey M. Depew, Rev. T. DeWitt Talmage, Dwight L. Moody, Wm. H. Crane, Joseph Jefferson, Robert G. Ingersoll, Sol. Smith Russell, Maggie Mitchell, etc.,

who will entertain you in your own homes exactly as they entertained you upon the platform.

Sousa's band, including his most celebrated solo artists, will play for you.

Operatic artists, comedians, story tellers, banjo players, male quartets, "coon singers," are instantly available.

And most wonderful of all is its simplicity. Practical and profitable for exhibition purposes. Many are making money with it.

Price, improved Gram-o-phone Zon-o-phone, \$25; records, 50 cents each.

Special limited offer to actual subscribers to SCIENTIFIC AMERICAN, \$5 cash and \$3 per month, for seven months, records cash as ordered. The proprietors agree to refund the money, less express charges, if the instrument is not satisfactory and is returned immediately. For further particulars, address NATIONAL GRAMOPHONE CO., 874 BROADWAY, NEW YORK.



Star Screw Lathe Automatic Cross feed 9 and 11-inch Swing. New and Original Features. Send for Catalogue B. Seneca Falls Mfg. Company, 695 Water St., Seneca Falls, N. Y.

SECTORLESS WIMSHURST MACHINE.—This article gives directions for making. 4 illustrations. SCIENTIFIC AMERICAN SUPPLEMENT 1131. Price 10 cents. For sale by Munn & Co. and all news-dealers. Send for new catalogue.

POWER & FOOT LATHES SHAPERS, PLANERS, DRILLS MACHINE SHOP CUTTING TOOLS AND SUPPLIES. CATALOGUE FREE. SEBASTIAN LATHE CO. 120 CULBERT ST. CINCINNATI, O.

THE HALL BRASS PIPE WRENCH. A PERFECT TOOL WITH FRICTION GRIP. Bushings for all sizes and shapes. Highly polished pipes made up without scar or injury. For Circulars and Prices WALWORTH MFG. CO., 16 Oliver St., BOSTON, MASS.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

SEPTEMBER 20, 1898,

AND EACH BEARING THAT DATE.

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

Table listing inventions with patent numbers and names of inventors. Includes items like Acid, making salicylo-acetic, L. Limpach; Air brake, H. S. Park; Alarm clock, E. N. Case; Alloy, aluminum, W. A. McAdams; Auger twisting machine, W. M. Hamilton; Axes, hammers, etc., for their handles, means for securing bases of; Back pedaling brake, A. P. Morrow; Back pedaling brake, S. A. Randall; Back pedaling brake, H. Symes; Bail attachment for stone jars, J. T. Gill; Barrel, J. C. Estabrook; Bars, etc., rolling shoe for coal, J. F. Schmad; Basin and sewer trap, catch, G. H. Mowe; Bath tub, D. D. Buick; Bath valve, shower, Demarest & Cunningham; Beam, girder and post, combination structural metal, M. Horton; Bearing, anti-friction, P. R. Gardner; Bearing, ball, P. Davies; Bearing, ball, J. McAlpine; Bearing, bicycle crank shaft, J. Morrison; Bed, extension, Furnivall & Martin; Bed, folding, B. Krellenstein; Bed, iron, H. Long; Bed springs to cross wire bases, machine for attaching, J. P. Leggett; Bevel tool, F. Lafferty; Bicycle driving gear, J. Howard; Bicycle frame, Nies & Dunn; Bicycle gear case, Nies & Dunn; Bicycle saddle, J. B. McManus; Bicycle umbrella support, H. J. Abernathy; Bicycles, etc., propelling mechanism for, Z. T. Ubil; Boat, life, A. F. Pendleton; Boiler, steam, boiler, Washboiler; Boiler, Meier & Tidemann; Boiler setting, steam, Kennedy & Williamson; Bootjack, C. F. Spaid; Bottle orifice compressor, hot water, J. F. Morrill; Bottle washer, H. W. E. Mentze; Bottles, etc., machine for manufacturing, J. B. Vernay; Box, See Display box; Hat box, Paper box; Box cover brace and support, N. S. Nissen; Brush, D. B. Forward; Bung, M. W. Shannon; Camera, and view, A. Mathews; Camera, panoramic, F. L. Gregory; Can cover, milk, T. R. Hetland; Cane from cars, etc., apparatus for unloading sugar, J. W. Bodley; Car brake handle, E. C. Collins; Car construction, R. P. Lamont; Car coupling, Dougherty; Car coupling, Hopkins & Evans; Car coupling, H. H. Warner; Car door, W. R. Ellis; Car doors and sides, means for protecting, Jones & Hodge; Car fender or guard, P. J. Poelman; Car heating apparatus, J. F. McElroy; Car replacer, H. Miller; Cars, seat recording device for passenger, N. M. Powell; Carpet fastener, E. R. Webb; Carrier, See Cart; Carriage carrier; Cartridge carrier, T. E. Jackson; Cash register, J. H. McCormick; Chair, See Folding chair; Reclining chair; Chemical engine, T. Down; Churn, powers, means for regulating, Moore & Curran; Cigar machine, J. Reuse (reissue); Circuit breaker for three wire systems, E. M. Hewlett; Circuit breaking switch, automatic, Bossert & Pomeroy; Circuit breaker, D. M. Moore; Circuit interlock, C. A. Johnson; Closure cap, cover, stopper, etc., T. Sloper; Clothes line, pinless, J. W. Jackson; Clothes wringer, W. Aab; Coating upon surfaces, forming integral metallic; E. T. Thomas; Coin controlled machine, J. G. MacPherson; Coin holder, D. J. Cable; Column, metallic, A. Nurick; Comb, See Currycomb; Contact finger for controllers or electric switches; Controller, T. Von Zweigberck; Cooker, heat retaining starch, J. E. Dann; Corkscrew, E. Walker; Corset, T. S. Gilbert; Corset attachment, E. Young; Corset, bustle, Kops; Cow tail holder, E. J. & L. M. Trapp; Cradle, self rocking, R. D. King; Cultivator, Head & Register; Cultivator, cotton, J. E. Barron; Cultivator scraper, A. C. Butler; Currycomb, J. D. Barnard; Curtain fixture, window, W. W. Phillips; Cuspidor bowls, supporting attachment for, G. E. Johnson; Cutter, See Hog nose cutter; Cycle parts, housing for screw threaded, C. P. Birtch; Cycles with adjustable gearing, driving mechanism for, F. H. Vagt; Damper operating mechanism, chimney, F. M. Clotworthy; Dental tool, Erickson's Head; Display box, counter, C. E. Davis; Distiller, domestic water, J. E. Hicks; Door spring, O. Voigtlander; Door stop, Bortman & Munkwitz; Drawings supporter, T. S. James; Drilling machine, J. L. Jones; Dye and making it, blue, E. Elsaesser; Dye and making it, blue black, E. Elsaesser; Electric battery, V. Jeanty; Electric brake, J. B. Linn; Electric controller, S. Harris; Electric coupling, J. F. McElroy; Electric motor, Pignati et al; Electric heater, J. F. McElroy; Electric machine safety device, dynamo, E. M. Hewlett; Electric meter, C. D. Haskins; Electric motor controller, F. E. Case; Electric motors, method of and means for controlling and cutting out, T. Von Zweigberck; Electrical distribution system, C. F. Scott; Electroplating apparatus, H. R. Boissier; Electroplating articles in bulk, apparatus for, G. Landen; Elevator, See Grain elevator; Elevator, H. J. Herren; Elevator, E. A. Trapp; Embroidering machine, G. Baur; Embroidering machine jacquard mechanism, H. Hill; Excelsior machine, W. H. Brown; Fabric, See Plush fabric; Farm gate, swinging and sliding, J. Pratt; Faucet for cans, etc., vented, G. W. Banker; Feed regulator, boiler, C. B. Mitchell; Fence, M. Steffe; Fence, T. B. & T. Custer; Fender, See Car fender; Fertilizer distributor, E. B. Rainey; Fibrous material from peat, producing, K. A. Zschorner; Films, method of and apparatus for producing, J. Wheeler; Filter, centrifugal, H. Chapman; Fire kindler, automatic, G. I. Green; Fireplace, J. E. May; Fireproof, compound for rendering substances, H. Gallinowsky; Fireproof concrete, mould for, H. Foveaux; Flushing device, W. Scott; Folding chair, E. E. Allen; Folding machine, M. J. Locke; Frame, See Bicycle frame; Fruit jar or can, S. J. Dunkley; Furnace, See Electric furnace; Furniture, combination, J. E. Plummer; Galvanic element, Krays & Koenig; Game, J. H. & G. L. Tickner; Gas from oil, apparatus for making, F. L. Martenette; Gas generator, acetylene, F. E. Bundy

EDUCATION BY MAIL



Thousands have been helped to better pay & positions through our system of instruction. Buildings erected expressly for this purpose at a cost of \$225,000. Courses of Steam, Electrical, Mechanical or Civil Engineering; Chemistry; Mining; Drawing, surveying; Plumbing; Architecture; Metal Pattern Drafting; Prospecting; Bookkeeping; Short-hand; English Branches.

\$2 A MONTH pays for a College Education at Home. 45,000 Students and Graduates. Circular FREE. State subject you wish to study. THE INTERNATIONAL CORRESPONDENCE SCHOOLS Box 942, Scranton, Pa.

Learn the Watch Trade

JEWELRY and ENGRAVING. Address PARSONS' INSTITUTE, Horological Dept., Bradley Polytechnic Institute, PEORIA, ILL.

SAVE 1/2 YOUR FUEL

By using our (stove pipe) RADIATOR With its 120 Cross Tubes, ONE stove or furnace does the work of TWO. Drop postal for proofs from prominent men.

TO INTRODUCE OUR RADIATOR, where we have no active agent we will sell at wholesale price. Write at once. ROCHESTER RADIATOR COMPANY, 82 Furnace St., ROCHESTER, N. Y.

Gas Blast Furnaces GAS PRODUCERS AND PRESSURE BLOWERS.

For Illustrated Pamphlets, apply to AMERICAN GAS FURNACE CO. 23 John Street, New York, N. Y.

WORK SHOPS

of Wood and Metal Workers, without steam power, equipped with BARNES' FOOT POWER MACHINERY

allow lower bids on jobs, and give greater profit on the work. Machines sent on trial if desired. Catalogue Free. W. F. & JOHN BARNES CO. 1999 RUBY ST., ROCKFORD, ILL.

NICKEL AND Electro-Plating Apparatus and Material.

Hanson & VanWinkle Co., Newark, N. J. 186 Liberty St., N. Y. 35 & 37 S. Canal St. Chicago.

VOLNEY W. MASON & CO., Friction Pulleys, Clutches & Elevators PROVIDENCE R. I.

PHYSICAL AND SCHOOL APPARATUS INDUCTION COILS for experiments in X rays and other electrical work.

Catalogue Free. E. S. RITCHIE & SONS, BROOKLINE, MASS.

Tools for Fine or Rough Work

Tools that are common and Tools that are rare, costly and cheap Tools, and every other kind of Tool used in any trade you will find described and illustrated in MONTGOMERY'S TOOL CATALOGUE FOR 1898. A handsome book containing 510 pages and copious index. Pocket size 6 1/2 x 4 1/2 inches, with rounded edges and stitched covers. Every workshop and factory in the country should have one. Sent by mail for 25 cents by MONTGOMERY & CO. 105 Fulton Street, New York.

7,000 Guns in Stock

WE SELL GUNS of every reputable American and foreign make, and give wholesale prices to everybody. We carry in stock

Fishing Tackle and Sporting Goods amounting to a quarter of a million dollars. We can please the fancy of millionaires, or meet the demands of the poorest sportsman and angler. Write for prices, or ask us to send you our Sportin' Goods Catalogue. We load and sell over

1,000,000 Hand Loaded Shells a Year Ask us to send you our price card of hand and machine loaded shells. We have

The largest Gun Repair Shop in America We make guns, re-bore, re-stock, repair—in fact, alter a gun to suit the owner, and guarantee satisfaction. Write for prices.

MONTGOMERY WARD & CO. Originators of the Catalogue Business 111 to 120 Michigan Ave. cor. Madison St., Chicago MENTION THIS PUBLICATION WHEN WRITING