

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.

Marine Iron Works, Chicago. Catalogue free. "U. S." Metal Polish, Indianapolis. Samples free. Gasoline Brazing Forge, Turner Brass Works, Chicago. Yankee Notions, Waterbury Button Co., Waterbury, Ct. Handle & Spoke Mfg. Co., Chagrin Falls, O. Hook and Eye Patent for Sale, F. J. Rappold, Erie, Pa. Machine Work of every description. Jobbing and repairing. The Garvin Machine Co., 141 Varick St., N. Y. Ferrante Machine Co., Bridgeton, N. J., U. S. A. Full line of Presses, Dies, and other Sheet Metal Machinery.

Machinery for R. R. contractors, mines, and quarries, for hoisting, pumping, crushing, excavating, etc., new or 2d-hand. Write for list. Willis Shaw, Chicago.

The celebrated "Hornsby-Akroyd" Patent Safety Oil Engine is built by the De La Verne 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.

FREE FACTORY SITES

To be Donated for Manufacturing Purposes at Erie, Pa.

One hundred acres, very desirable location, all rail roads, free to factory employing one thousand men. Also ten other smaller locations, all central with good railroad facilities. Correspondence and inspection solicited. Address Douglas Benson, Secretary Board of Trade, Erie, Pa.

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 This is for our information and not for publication.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. 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.

(7738) A. M. D. asks: 1. In the electrolysis of water about what per cent of the energy of the current is lost in producing heat in the solution? A. The heat developed in any circuit by the passage of an electric current through that circuit is expressed by Joule's law Heat=0.24 C^2Rt.

in which C is the number of amperes, R is the number of ohms, and t is the time in seconds. The heat is found in calories. This equation is derived from the fact proved by experiment that one ampere flowing through a conductor having a resistance of one ohm will develop in that conductor 0.24 calories for each second it flows. It makes no difference whether the current is decomposing water or doing any other work. The heat produced is the same. This is the lost energy of an electric current. 2. How does the heat developed by burning the oxygen and hydrogen combined, compare with the original energy of the current? A. The doctrine of the conservation of energy requires that the heat produced by recombining the oxygen and hydrogen into water shall exactly equal the energy in any other form which may be required to decompose the same quantity of water into its constituent oxygen and hydrogen again. This heat has no connection with the heat of the first query.

(7739) W. P. asks: I have a 4-ohm telegraph instrument. What number of wire (by A. W. G.) and how much must be used to wind it for 30 ohms? To change your 4 ohm sounder to make it have 20 ohms, you can unwind the wire on it at present and get 4 times as much of the same size to be put on together with that which was on the sounder before. If you know the number of the wire now on the sounder you can find from a wire table the length needed to make 16 ohms. This is the quantity you need to add to the sounder.

(7740) A. B. T. asks how the slit is cut in the ribs of a steel pen. A. The slit in steel pens is cut in a shear press with very sharp cutters.

(7741) A. B. S. asks: 1. Will small hand-power dynamo, as described in "Experimental Science," furnish power enough for spark, to ignite gas in gas engine? A. The hand-power dynamo will give a spark which will ignite gas. It will probably serve your purpose if driven at a high speed. We have recently advertised a dynamo especially designed for this work. 2. What is a jump spark? A. A jump spark is a spark produced by the breaking of an electric circuit, and which jumps between two metallic points. 3. Is it necessary to have iron jar for caustic potash cell as described in "Experimental Science"? A. The iron jar is one of the electrodes in the potash cell. If you use a glass cell you will require an iron plate in the liquid as an electrode. Since an old iron pot will answer every purpose it is the cheapest method of putting up the battery.

(7742) S. C. asks: 1. How is electricity transmitted through the air as is thus done by the wireless telegraphy? A. The waves produced by an impulse of electricity through a wire, fly off from the wire in all di-

rections. If the wires are properly arranged the waves may be perceived by a properly constructed apparatus at a long distance from their source. 2. How is the record of the gramophone made? A. The record of the gramophone is at first traced upon zinc, and afterwards etched into the zinc. This is transferred to hard rubber disks such as are used for the instrument. From the zinc disks a large number of impressions may be taken. 3. Of what are the diaphragms of talking machines made? A. The diaphragms of talking machines are made of thin glass, celluloid or iron.

(7743) H. W. C. writes: I have a small range boiler, galvanized iron, which I use for oxygen tank for lantern use. Now the tank is badly corroded inside and I wish to know what kind of paint or varnish would be suitable to use that the gas or any dampness carried over from wash bottle, would not affect. A. If your oxygen tank is badly corroded, you should not use it, since it is in danger of bursting under pressure. Asphalt varnish is the best substance to use to coat the inside of such a tank as a preventative of rust but we do not think it would be safe to use paint or varnish of any kind on the inner surface of the tank. The better way is to dry the oxygen before it enters the tank, since oxygen, in presence of water will rust iron or steel very rapidly. If the gas were passed through calcium chloride after it leaves the wash bottle it would enter the tank dry.

TO INVENTORS

An experience of fifty years, and the preparation of more 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. A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low, in accordance with the times and our extensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broadway, New York.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending OCTOBER 17, 1899.

AND EACH BEARING THAT DATE.

(See note at end of list about copies of these patents.)

Table listing inventions with names and dates. Includes: Alarm, Amalgamating apparatus, Ammunition carrier, Antiseptic device, Ax or similar tool, Axle and axle box, Backstay turning device, Bag tying device, Ball making machine, Barrel, Bearing ball, Belts, Benzoin and homologues, Bicycle, Bicycle driving gear, Bicycle gearing, Bicycle grip, Bicycle pump, Bicycle saddle, Bicycle spring frame, Billiard and dining table convertible, Blast furnace, Bleaching, Boiler, Boiler alarm, Book, Book manufacturing, Book pass, Boot or shoe top supporter, Boulder depressor, Box, Brake, Breathing tube, Broom holder, Brush head, Buckle, Buckle wire, Bundle discharging mechanism, Burial casket lowering device, Burner, Button, Caliper gage, Calipers, Camera, Camera shutter, Can opener, Car body bolster, Car coupling, Car door, Car dumping, Carbureting apparatus, Carpet fastener, Carrying apparatus, Cartridge shells, Case, Cash carrier, Casting aluminum alloys, Casting chilled rolls, Chair, Chopper, Chopping knife, Chuck, Chain, Cigarette machine, Cleaner, Clevis, Clutch, Coals, Cock, Coffin, Cold holder, Column, Crammer, Connection, Converter, Copy holder, Corn husker, Cotton chopper, Couplings, Crushing and grinding mill, Cultivator, Current meter, Cuspidor, Cutter, Date holder, Dental tool guard, Derrick and excavator, Derrick foot block, Digger, Dish washing machine, Display apparatus, Display device, Digestion of wood, Dock construction, Door check.

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. This notice shows the width of the line, and is set in agate type. Engravings may be advertised 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.

WOOD or METAL WORKERS without steam power can save time and money by using our Foot and Hand Power Machinery. SEND FOR CATALOGUES—A—Wood-working Machinery. B—Lathes, etc. SENeca FALLS MFG. COMPANY, 695 Water St., Seneca Falls, N. Y.

AMERICAN PATENTS.—AN INTERESTING and valuable table showing the number of patents granted for the various subjects upon which petitions have been filed from the beginning down to December 31, 1894. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 1002. Price 10 cents. To be had at this office and from all newsdealers.

POWER & FOOT LATHES SHAPERS, PLANERS, DRILLS MACHINE SHOP OUTFITS, TOOLS AND SUPPLIES. CATALOGUE FREE. SEBASTIAN LATHÉ CO. 120 CULVERT ST. CINCINNATI, O.

NEVERSLIP Bar Belt Dressing TRADE MARK. It gives a smooth, pliable and adhesive surface, and saves Belts, Power and Wear of Machinery Bearings. Also adapted to Canvas and Rubber Belts. Box of 12 Bars, \$3.00, sent on Trial. The White & Bagley Co., Worcester, Mass., U. S. A.

Presses for Sub-Press Work. Five sizes, Sub-Presses and Tools to order. Send for Circulars. BLAKE & JOHNSON, P. O. Box 7, WATERBURY, CONN.

Water Emery Tool Grinder Has no pumps, no valves. No piping required to supply it with water. Always ready for use. Simplest in construction, most efficient in operation. Send for catalogue and prices. W. F. & JNO. BARNES CO. 1999 Ruby St., Rockford, Ill.

YOU OWE IT TO YOUR FAMILY AND FRIENDS TO HAVE A Gram-o-phone IN YOUR HOME ONLY MACHINE USING FLAT, SIGNED, INDESTRUCTIBLE RECORDS.

Our Great Admiral writes: "Certainly the most entertaining and interesting of instruments. Nothing in the sound reproducers of to-day so marvelous as this wonderful discovery." —ADMIRAL SCHLEY. Designer of the "Columbia," America's Cup Defender, writes: "The Gram-o-phone is the best reproducing machine extant. . . . A never failing source of pleasure." —HERRESHOFF MANUFACTURING CO.

SENT ON APPROVAL to SUBSCRIBERS to SCIENTIFIC AMERICAN.

On receipt of \$5.00, simply as evidence of good faith, we will ship to any subscriber to the SCIENTIFIC AMERICAN a new \$18 Gram-o-phone, and six (6) signed, indestructible 50-cent records (total \$21.00), your own or of your selection, with the privilege of 24 hours' examination, when the balance may be paid your express company, or returned and your money refunded.

Special Concession on Installment Basis. To subscribers to SCIENTIFIC AMERICAN the Gram-o-phone will, for a short time, be sold on the installment plan for \$19.00; \$4.00 cash, \$3.00 a month for five months; records, as wanted, 50 cents each. Money refunded, less express charges, if instrument is not satisfactory and is returned immediately. FOR SALE EVERYWHERE.

National Gram-o-phone Corporation, Broadway and 18th Street, New York. BRANCHES: BOSTON, 178 Tremont Street. PROVIDENCE, 457 W. Estimater Street. PHILADELPHIA, 18 North Ninth Street. CHICAGO, 161 State Street. CLEVELAND, Colonial Arcade. CINCINNATI, 21 and 23 West Fifth Street. SHERMAN O'LAY CO., San Francisco, Cal., Pacific Coast Agents.

Table listing various inventions and their patent numbers. Includes: Dredge, Dressing machinery, Drying kiln, Dye, Educational appliance, Egg case, Elastic or resilient wheel, Electric heater, Electric meter, Electric motor, Electric motor frame, Electric motors, Electrically illuminated devices, Electrician's tool, Elevator, Elevator safety appliance, End gate, End gate, wagon, Engine, Engine vaporizer, Engine stopping system, Envelop fastener, Envelop machine, Excavator, Excutor cutting machine, Expansion engine, Fasteners for gloves, Fastening device, Faucet measuring, Faucet register, Feed box, Feed trough, Feed water apparatus, Feed water heater, Feed water regulator, File, invoice, K. Cross, Filter, R. H. Martin, Filter apparatus, Filter, water, C. Salzberger, Firearm, recoil operated, Fire escape, Fire escape and scaffold, Floor foot shield, Fluids or gases under pressure, Fodder cutting machine, Forge, means or heating, Furnace, Furnace for annealing, Furnace reversing valve, Gage, Game, flag, Gas burner, Gas generating apparatus, Gas generator, Gas generator, acetylene, Gas generator, acetylene, S. J. Taylor, Gas generator, acetylene, F. S. Wood, Gas lighter, electric, Gas machine, Gasoline fixture, Gate, Gate, E. E. Hanken, Gear casing, Gears, swinging shaft for, Generator, Gin saw gummer, Glass cutting machine, Glass manufacturing apparatus, Glass, Shortle, Gove, Gold or silver ores, Governing mechanism, Grain cleaner, Grain header, Grapple, Header, Grass cutter, Grate, Guard rail, Gun telescope attachment, Hammer and elevator, Handkerchief holder, Hanger device, Harness loop bushing, Harrow seeding attachment, Harrow tooth fastening, Harvester, bean, Harvester, pea, Hat rack and advertising device, Heater, Tank heater, Heating system, Heel shoe, Hoisting machine, Horseshoe, Hub for vehicle wheels, Hydrocarbon oil burning apparatus, Igniting device, Incandescent bodies, Incandescent bodies, Indicator, Insulator, Insulated handle, Jack, Jar closer or opener, Joint, Journal box, Kiln, Knife, Label affixing machine, Lamp, electric incandescent, Lamp, street, Land roller, Last for boots or shoes, Lasting machine, Lathe for turning balls, Letter, sign, Lifting jack, Lifting jack, Lifting jack, Lightning arrester for electric circuits, Liquid meter, Lithographic press, Lubricator, Magneto-electric machine, Marble, manufacture of artificial, Marking sheep, Match box machine, Measuring and cutting goods, Measuring instrument, Measuring instrument, Meter, Mill, Mill, Mining machine, Mop head, Motor, Mucilage holder, Musical instrument, Musical instruments, Nailing machine, Necktie retainer, Nipple boiler, Nipple boiler, Optical apparatus, Oven door, Paper bag machine, Paper making machine, Paper pulp straining apparatus, Paring and coring machine, Pavement, cement concrete, Pea rake, Photograph, Photogram, Photogram, Photochromoscope camera, Pliers or dams, Pin, Piston lubricator.

(Continued on page 286.)