

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. For pile driving engines. J. S. Mundy, Newark, N. J. Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J. Enamelled signs, letters. A. V. Taylor & Co., Cin., O. Handle turning machinery. Trevor Mfg. Co., Lockport, N. Y.

Screw machines, milling machines, and drill presses. The Garvin Mach. Co., Laight and Canal Sts., New York.

Centrifugal Pumps. Capacity, 100 to 40,000 gals. per minute. All sizes in stock. Irvin Van Wie, Syracuse, N. Y.

Emerson, Smith & Co., Ltd., Beaver Falls, Pa., will send Sawyer's Hand Book on Circulars and Band Saws free to any address.

Guild & Garrison, Brooklyn, N. Y., manufacture steam pumps, vacuum pumps, vacuum apparatus, air pumps, acid blowers, filter press pumps, etc.

For the original Bogardus Universal Eccentric Mill, Foot and Power Presses, Drills, Shears, etc., address J. S. & G. F. Simpson, 26 to 36 Rodney St., Brooklyn, N. Y.

The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail, \$1; Munn & Co., publishers, 361 Broadway, N. Y.

Woven wire brushes.—The Belknap Motor Co., of Portland, Me. are the patentees and manufacturers of the best woven wire commutator brush on the market.

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.

The Imperial Power Building, of Pittsburg, Pa., will be completed March 1. It is a new, eight story factory building, fitted up as a model plant, with the finest machinery, electric dynamos and motors obtainable, making it desirable for manufacturers. The proprietor proposes to rent space as may be required by a manufacturer. Each floor contains 7,500 square feet, capable of subdivision, with exterior windows all around and power and appliances to meet any wants and give conveniences not obtainable elsewhere. Located in the heart of the city, within thirty feet of the Pennsylvania R. R. freight depot. Manufacturers desiring to lessen expenses and be surrounded by every convenience should address J. J. Vandergrift, Pittsburg, 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.

(6335) W. A. P. writes: We had erected in our office a natural gas stove, giving it a 3/4 inch vent pipe; ever since there has been a continual dripping of fluid while the stove is lit. We trust you will be able to advise us with a remedy and explain the same. A. The gas in burning produces water. We would suggest the use of a tee at the lowest point of the vent pipe, with a small drip pipe leading thence outdoors. This should be bent into a trap near the stove and the vent pipe from the stove should pitch downward toward it. The presence of water indicates a cold chimney, which shows that the room is getting the heat, which is as it should be.

(6333) J. A. McC. asks: 1. Is there a single cylinder gas engine made to-day that receives an impulse at each stroke of the piston, or two to the revolution? A. Double acting gas engines have been made, principally in England and in France, and some are still in use. There are some difficulties in the operation of this class of engines that have placed the single acting engines in the lead. 2. What is the best proportion per volume of gasoline gas and air for the best results in gas engines? A. The best and most economical mixture is 1 part gasoline vapor to 10 parts of air. 3. If a jet of air and one of gas be admitted into a cylinder at the same instant from opposite sides, in such a manner as to strike each other with considerable force, will they mix sufficiently well to explode in contact with an electric spark, and will such an explosion take place with a considerable degree of certainty if the mixture come in contact with iron at a good red heat? Also at what heat may iron be under such circumstances and the gas be free from danger of explosion while under compression? A. The practice is to admit gas and air at any convenient point. They will ignite by electric spark or by a heated tube into which the mixed gases are compressed. The tube to be at a full red heat. Will not explode at a black heat. 4. To what extent is a charge of gas and air compressed at the moment of explosion in the most economical engines? A. There are engines with and without compression of the mixed gas and air. Compression may be from 5 to 10 pounds. 5. What can you say in regard to the relative efficiency of the tube and electric spark as an exploder? Also with reference to safety and economy? A. The electrical ignition system claims high efficiency in the uniformity of explosive effect. 6. Is there a work on the gas engine that would be of real, practical value

to a tyro, and if so, what is it? A. There are two excellent works on gas engines. Robinson's "Gas and Petroleum Engines," \$5.50, and Donkin's "Gas, Oil and Air Engines," \$6.50 by mail. 7. Do you think it possible to drive a catamaran whose hulls are 15 inches wide, having sharp lines, round knuckles and flat bottom, 28 feet long, drawing 7 inches of water, at a speed of 12 miles an hour on dead water with a paddle wheel placed between the hulls? If so, at what position in the length of the hulls should it be placed, and what should be the length and width of bucket and what diameter and speed should the wheel have? A. The speed of 12 miles per hour may be obtained; but with the difficulty of overloading the boat with the weight of engines and wheel, 9 to 10 miles may be attained. Wheel should be two-thirds the length of hull from bow. Wheel 6 feet diameter, 4 feet wide.

(6337) C. A. C. asks: 1. What is the safe carrying capacity of No. 30 silk-covered copper wire, such as is used in telegraph relays (in amperes)? A. 0.15 to 0.20 ampere if wound in a tight coil. 2. What should be the carrying capacity of fusing wire to protect the same (in amperes)? A. About the same as given above, for they are very safe figures. 3. Also, how can telephones be used on a telegraph line about 1,500 feet long, with three stations on same? We use ordinarily the telegraph line, but wish to use both telegraph and telephones together. The batteries are located as follows: Three at one end and five in the middle. How can it be arranged so that either end may call the middle station (using the telegraph instruments for a call), and the middle station be arranged so that he may switch his telephone on to either section of the line, leaving the other end out or grounded? A. Use back contact keys at middle station, with ground connections there. 4. Also will telephones work through the five batteries without any trouble? A. The batteries will not prevent the telephones from working.

(6338) G. A. D. asks: Does the sun move? Is this earth perfectly round, or is it flattened at the poles? If so, how is it proved? A. The sun moves in space toward the constellation Hercules at the rate of about 16 miles per second. In this sense it moves. It also moves by revolution upon its own axis. The apparent daily motion of the sun through the heavens is not a real movement, but is an optical effect upon our perception, due to the revolution of the earth upon its own axis. The earth's form is a spheroid of revolution, as is proved by measures upon the meridian with their terminals compared with observations for their latitude. Also by the force of gravity, as deduced from the varying lengths of a pendulum at different latitudes for a given time beat.

(6339) C. H. H.—No one has the right to make a patented article for his own use without the consent of the patentee.

(6340) H. A. W. & Co. say: In Notes and Queries of SCIENTIFIC AMERICAN of December 1, J. J. H. asks, "How high above level of its source will an ordinary hydraulic ram raise water?" You answer from 100 to 200 feet. About two years ago we put in a Rife's ram (advertised in your paper). With this line we raise water to our farm 243 feet high, pipe line 4,360 feet long; our feed pipe to ram is 500 feet long, 5 inch pipe and 11 feet fall, and gives us 60 gallons per hour and sometimes runs up to 90 gallons.

(6341) R. L. H. asks: 1. In what number or numbers of the SCIENTIFIC AMERICAN SUPPLEMENT can I find directions for making instruments for the measurement of the following: Volts, amperes, ohms, and watts? A. See our SUPPLEMENT, Nos. 353, 398, 423, 440, 552, 554, 563, 603, 604, 618, 734, 811. 2. How many cubic feet of gas can be obtained from 1 gallon of water by the electro analysis process, and how long would it take to decompose it with 20 amperes, if I use 1 square foot for each electrode? A. About 157 feet hydrogen and 78 feet oxygen, requiring about 1,000 hours. The size of electrode is a superfluous statement. 3. Are gold and platinum the only metals from which I can catch the gases separately? If not, please mention other cheaper ones. A. You can use iron or copper in a solution of caustic soda. 4. What is the fractional horse power of the motors described in SUPPLEMENT, Nos. 761 and 641, and how many volts and amperes does each require? A. No. 761 is about one-thirtieth horse power, No. 641 is about one-tenth horse power. 5. How many volts and amperes does the dynamo in SUPPLEMENT, No. 161, give? About 12 volts and 1 1/2 amperes. 6. How can I calculate the candle power of a lamp? A. Allow 31 watts per candle power. 7. With 10 volts and 5 amperes, can I make an induction coil that will give 50 volts and 100 amperes? If so, how? A. No. It would involve creation of energy.

(6342) P. C. T. asks: 1. What make of storage battery do you recommend for charging by gravity cells? A. For storage batteries address some of the dealers who advertise in our columns. 2. What occurs if circuit is closed without cutting out gravity batteries? A. The storage batteries keep on receiving their charge; the circuit is necessarily closed when charging. 3. What causes buckling of plates? A. Too rapid a discharge. 4. What capacity should they be for cauterizing purposes—how many volts and amperes are most practicable? A. This depends entirely on the length and size of the cauterizing wire or instrument. 5. What is the difference between a galvanic and faradic current? Johnson's Cyclopaedia states magneto and secondary currents from induction coils are faradic, and yet we read of galvanic medical batteries. A. Johnson's Cyclopaedia is correct. In medicine it may be desirable to use a galvanic current.

(6343) L. A. F. asks: 1. How can the danger resulting from the falling of a private telephone wire onto a trolley wire be avoided? A. By guard wires placed over the trolley wires, or by good insulation on the telephone wire. 2. In case of its falling onto the trolley wire, is there any danger to building upon which it is strung? A. There is a certain amount of danger, but the high resistance of the telephone apparatus is to some extent a safeguard. 3. Is there any easy way to remove the crystals that form in a bichromate of potash battery? A. Immerse completely in a tub of water and then place the cell on its side with its bottom raised, as

by resting on a brick, or completely invert it. It must be kept full of water.

(6344) W. S. asks: When sailing from New York to Montevideo does the compass point toward the south magnetic pole after crossing the equator? A. The compass is not reversed in crossing the equator. Its south pole points to the southern magnetic pole, with variations due to the lines of magnetic declination. The only change that requires adjustment is the dip of the needle, as in north latitudes the north end of the needle must be counterbalanced for the dip, which must be changed or reversed in southern latitudes.

TO INVENTORS. An experience of nearly 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 Granted

December 25, 1894.

AND EACH BEARING THAT DATE.

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

Table listing inventions and their patent numbers. Includes items like Air brake signal apparatus, Alarm, Amalgamator, Amalgamator and separator, Anchor, Folding, E. Joyner, Animal trap, V. J. Schell, Artillery, carriage or mounting for, H. Jakobson, Axle, car, R. Bettermann, Band cutter and feeder, F. F. Landis, Barrel head turning machine, W. W. Trevor, Bath apparatus, shower, H. M. Christopher, Bearing for wheel boxes, ball, W. S. Robinson, Bed bottom, extensible, A. H. Freese, Bed lounge, A. J. Gauntan, Beer carbonating apparatus, C. Barus, Beer forcing apparatus, air pressure, H. E. Bailey, Beer, etc., in receptacles for market, process of and apparatus for preparing, A. M. Hofmann, Bell, automatic pickle, Bemis & Adams, Bell, signal, I. T. Garside, Bicycle saddle, C. P. Rogers, Bicycle support, C. A. Schloer, Boiler, See Heating boiler, Boiler furnace, O. Friederich, Bolt, J. Dinkelacker, Jr., Bolt or screw cap, G. A. Lambert, Bone and vegetable matter, machine for comminuting, E. J. Roche, Brace, See Shoulder brace, Brake, See Car brake, Windmill brake, Brake handle, P. G. Emery, Brake handle, J. Patterson, Brick kiln, H. S. Teal, Brick kiln, C. E. Prest, Buckle, Ruffhead & Anthony, Buggy top attachment, Axline & Bailie, Building constructions, composition for, W. R. Forbush, Burglar alarm, J. Adams, Burner, See Oil or gas burner, Button, detachable, W. J. Moore, Calking tool, D. Calvey, Cambering machine, H. C. Rydink, Camera, See Photographic camera, Can head forming, W. Trevor, Can testing machine, J. Black, Candlestick and match box, combined, A. Nittinger, Sr., Car brake, S. L. Leonard, Car brake, R. F. McKee, Car head forming, W. Trevor, Car brake, railway, Dickinson & Warner, Car brake, railway, A. F. Letson, Car construction, W. E. Coffin, Car coupling, G. W. Bartlett, Car coupling, T. P. Beadle, Car coupling, D. G. Gent, Car coupling, D. G. Gross, Car coupling, J. L. & J. E. White, Car coupling, A. I. Worthington, Car fender, W. B. George, Car fender, A. D. Smith, Car fender, L. A. Peckham, Car life-guard, J. Schneider, Car sanding device, street, W. C. Fisher, Car seat, folding, W. Sutton, Cars, electric lighting system for railway, M. Moskowitz, Car entrance guard for open, J. A. Brill, Carriage wheel, E. S. Renwick, Cartridge crimping machine, T. R. Barney, Case, See Sales check case, Casting apparatus, H. B. Cox, Chafe iron, roller, C. L. Bellamy, Chain or link belt, conveyor, S. Essex, Chair, See Folding chair, Invalid chair, Chair seats, spring support for, J. A. Staples, Chisel, subaqueous rock breaking, W. L. Ross, Christmas tree light, E. A. Ueblich, Coin counter, A. Lorenz, Cinch plate, A. P. Gent, Clamp, See Ironing table clamp, Clasp, See Garment supporter clasp, Clothes drier, G. Finkbeiner, Coal washer and separator, T. M. Righter, Cook, gauge, C. R. Moore, Coin-operated mechanism, J. W. Patterson, Comb, J. P. Noyes, Commutator, H. L. Bridgman, Cooking corn, etc., in cans, apparatus for, H. R. Stickney, Corn sheller separator, Q. Adams, Coupling, See Car coupling, Thill coupling, Cover, strainer, and steam guard, combined kettle, Benson & Berslin, Cultivator, Danos & Haydel, Cultivator, B. M. Rolph, Dust collector, R. D. Drayer, Dust collector, J. W. Skinner, Dyeing machine, L. Weldon, Electric cable, T. Guilleaume, Electric conductor support, J. M. Andersen, Electric cut-out, H. Hansen, Electric plug, A. H. Palmer, Electromagnetic machines, controlling, W. I. Donshea, Elevator, N. P. Otis, Embankments, machine for building, W. G. Price

Table listing inventions and their patent numbers. Includes items like Enamel or paint, marine, C. H. Christian, Engine, See Rotary engine, Steam engine, Engine and superheater apparatus, combined, J. C. Walker, Envelope, M. Carey, Envelope, money, C. H. Cameron, Excelsior cutting machine, C. G. Smith, Faucet for supplying hot or cold water, G. H. Cole, Faucet, self-closing, W. A. Turner, Fender, See Car fender, Fire escape, S. H. Roper, Fire extinguishing apparatus, household, D. L. Keeler, Flusher, automatic siphon, R. C. De La Hunt, Folding chair, G. M. Bennett, Folding machine, W. E. Curtis, Funnel, Root & Silvery, Furnace, See Boiler furnace, Smoke consuming furnace, Furnace, H. D. Smith, Furniture, revolving, Krabol & Bostad, Fusible box, F. C. Jobby, Game apparatus, coin controlled, A. L. Pratt, Game apparatus, Mason & Cole, Garment supporter clasp, F. D. Harding, Gas retort, T. Hennessy, Gate, J. E. Knapp, Gate, J. W. Smith, Glass machine, wire, F. M. Ryon, Glassware, metal for the manufacture of, C. E. Blue, Glove, R. Raymond, Grinding device for rotary cutters, J. Miller, Guard, See Car life guard, Pin guard, Gum and making same, J. Hanson, et al., Hame, C. F. Mock, Hanger, See Mail bag hanger, Harness breast strap, C. H. Russell, Harrow, I. T. Evans, Harvester, G. W. Ingersoll, Harvester, corn, H. M. Cox, Hat block, expanding, S. E. Dunham, Hay loader, E. Binfield, Heater, See Car heater, Heating boiler, steam or hot water, L. R. Blackmore, Hinge for electric apparatus, A. B. Davis, Hook, See Garment book, Hose mender, A. Van Dyke, Hydrocarbon lighting system, B. L. Lawton, Iceing to pastry, apparatus for applying, Strohecker & Hutton, Indicator, J. H. Scott, Inhaler, E. Seuchen, Inkstand, L. N. Thomas, Inkstand, pneumatic, C. A. Sigelen, Insect powder dusting machine, Lousaw & Clarke, Insulator, L. McCarty, Inward chime bell, J. Potter, Ironing table clamp, Kaufmann & Nimeroff, Journal bearing, I. Corneliussen, Journal bearing, revolvable sectional, W. J. Trippe, Keyboards by means of perforated cards, mechanism for actuating, C. Gavioi, Kiln, See Brick kiln, Kitchen cabinet, P. E. Smith, Knife, See Pruning knife, Knitting machine, circular, W. R. Johns, Knitting machine, circular, Morin & Jacques, Ladder, extension, C. W. Howard, Lamp, electric arc, E. J. Murphy, Latch, gate, W. Wilson, Latch, gate, W. F. Wilson, Lathing strip, L. T. Hazan, Life preserver, J. P. Brown, Lighting device, B. H. Pendleton, Lock, See Coin actuated lock, Time lock, Locomotive for elevated railways, electric, F. B. Behr, Locomotive, smoke consuming, F. C. McNally, Locomotives, means for controlling electric, Egger & Wessel, Loom Jacquard apparatus, O. W. Schaum, Lubricator, G. Howells, Lumber drying kiln, W. P. Murphy, Magazine or book holder, F. Barwick, Mail bag hanger, J. A. Brandt, Mashing machine, A. Schultz, Mechanical movement, A. Sharp, Metals, apparatus for extracting, A. Guillaume, Miner's spooning tool, N. E. Adams, Moulding apparatus, S. J. Adams, Motion for centrifugal or other machines, production of high speed rotary, A. Frank, Motor, See Spring motor, Motor charging device, J. T. Conti, Music box damper, G. A. Brachhausen, Musical instrument, R. H. Mayland, Nut fastener, machine for making, W. Dunn, Oil cup, C. C. Tyler, Oil or gas burner, C. W. Claybourne, Ore chime bell, loading, Noble & Lloyd, Ore concentrator, S. Beer, Ore concentrator, J. M. Montgomery, Ore separator, magnetic, C. G. Buchanan, Oxids, apparatus for producing, A. Crossley, Packing displacer, J. Matthews, Pail, dinner, H. M. Holmes, Pail, liquid, H. Higbie, Painting apparatus, S. A. Brooks, Paper for bank notes, checks, bonds, stocks and other instruments, D. N. Carvalho, Paper, machine for feeding sheets of, J. H. Knowles, Paper, machine for holding any clamping, I. W. Haysinger, Parer and scissors sharpener, vegetable and fruit, E. Barnum, Peat briquets, machine for forming, E. Stauber, Photographic camera, folding, Hill & Adams, Picking up pins, etc., apparatus for, A. B. Olson, Pin guard, F. G. Stephenson, Pipe connection for fluids, T. & W. T. James, Pipe cutter, J. J. & J. J. McCarthy, Pipe wrench, W. A. Blaisdel, Plating apparatus, C. L. Seward, Plating machine, J. S. Warner, Planter, C. W. Warner, Plow, W. I. Manning, Power converter, E. Carlson, Printed matter, method of and apparatus for producing colored effect on, C. E. Adamson, Printer's galley apparatus for securing type or matter in, F. Ross, Printer's quoin, C. Reitter, Printing presses, disk cover for job, C. E. Adamson, Pruning knife, L. C. & B. Bosley, Pump, A. P. Hill, Pump attachment, J. W. Clark, Pumping liquids from gas producing wells, means for, J. S. Klein, Punch and process of and means for making same, Die, H. S. Schardt, Rail fastener, G. A. Weber, Railway conduit electric, W. H. Swift, Railway, electric, Macoskie & Brinkerhoff, Railway rail, A. J. Moxham, Railway rails, electrical connection for, A. J. Moxham, Railway switch, E. Lemmon, Railway switch, slip, J. W. Wayland, Railway track, A. J. Moxham, Rake attachment, hand, W. Ashby, Razors, machine for concealing, J. F. Fifield, Refrigerator leak alarm, E. C. Paetow, Regulator, See Tank regulator, Rheostat, automatic, R. W. Hollis, Ring, See Curtain pole ring, Rock drilling machine, M. Beal, Rope hauling machine, W. B. Lantz, Rotary engine, F. D. Sweet, Roundabout, J. Armitage et al, Saccharine solution, process of and apparatus for defeating, E. W. Deming, Safety pin, C. A. Bryant, Sales check case, W. M. Kinnard, Sales slip package, memorandum, W. M. Kinnard, Sand blast apparatus, J. E. Mathewson, Sash fastener, J. B. Lushbourn, Sash fastener, C. Miles, Sash fastener, T. K. Wardwell, Saw filing device, M. J. Wilson, Screws and followers, means for controlling operative connection between feed, E. J. Roche, Seal, F. E. Gutterston, Separator, See Ore separator, Spinning rail separator, Sewing machine book, W. I. Blackman, Sharpening disk knives, implement for, Dodge & Schuch, Shoe shaper, J. W. Skinner, Shoulder brace, W. M. Gamble, Sign, revolving pole, M. H. Wilson, Signal, See Air brake signal, Railway switch signal, Silk or thread holding device, L. O. Smith, Signs, mechanical, G. G. Meyer, Smoke consuming furnace, M. Evans, Soap rest, R. Good, Jr., Soap distributor, Ross & Wilcklow, Soldering and testing plant, can, N. L. Bishop