



HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto.

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.

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Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

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Minerals sent for examination should be distinctly marked or labeled.

(9441) G. C. asks: 1. Is there any purely geometrical method for constructing a line equal to one-quarter a given circumference? A. A line equal to the quarter of a circumference cannot be exactly determined by geometrical methods. Approximately, the quarter circumference is equal to 0.7854 times the diameter. 2. What is the function of the globe on an open arc lamp? A. The globe on an open arc lamp is useful in catching the pieces of hot carbon which are frequently projected from the lamp, and which have been the cause of fires. It also prevents the wind from blowing the arc. 3. Why does a bicycle stand up more easily when moving than when still? A. A moving body tends to maintain the plane of its motion. For this reason a flat plate can be thrown and made to glide through the air a long distance, and a stone may be made to scale along the surface of water. A bicycle stands up while in motion for the same reason. The larger the wheel, the firmer it stands. Those who rode the old high wheels say that they were much more rigid against tipping over sideways than the lower wheels in use at the present time. 4. What would occur in the water column of a siphon if all atmospheric pressure were suddenly removed? A. If the pressure of the atmosphere were removed, water could not be raised in a siphon or a lifting suction pump. If a siphon were running and the air pressure were suddenly removed, the water would suddenly drop out of both legs, the stream breaking at the top and falling down both sides. 5. Does not a voltaic current consist of two opposite charges flowing in opposite directions in the same wire at the same time, just like the charges of a lightning stroke? A. No one knows in which direction the voltaic current flows through a wire. It may flow from what we call plus to minus, or in the opposite direction. It is a conventional matter to say that the current flows from plus to minus. It cannot flow both ways at once, since that would make the current similar to an alternating current. 6. Could a person deflect an appreciable portion of a street-car current by placing the ends of a thick copper wire at different points on a rail? If not, why? A. No appreciable portion of a street-car current would be deflected through a wire placed on different portions of a street-car rail, because the resistance of the wire would probably be greater than that of the rail between the ends of the wire. 7. If one should take a compound bar made of five metals of different conductivities for sound, and give it one tap upon the end, would he hear at the other end five separate taps? A. This question is indefinite. If a compound bar is made by putting five different metals together end to end, a blow given on one end would be transmitted through the bar, passing with different velocities through the several metals, and but one sound would be heard at the further end. If five several bars be placed side by side, and the ends of all be tapped at the same moment, the sound would travel through each with the proper velocity, and if the bars were long enough, these sounds would separate appreciably from each other, and be heard as separate sounds at the farther ends of the bars. 8. What is the highest ratio of weight to strength which can be obtained in an electro-magnet? A. The highest ratio of weight to strength in an electro-magnet is obtained when the iron is completely saturated with magnetism. The limit practically is reached when there are 140,000 lines of force per square inch of polar surface. If, however, by "strength" you mean lifting power, the practical limit is reached at about 150 pounds per square inch of polar surface. Though the lifting power may be increased beyond this amount, the cost of the strength is much in excess of the cost below saturation. The highest figure given by Thompson in his table is 230.8 pounds per square inch of polar surface. We presume considerable more has been lifted, but we have no data at hand above this point. 9. How does a locomotive gain tractive power by adding more drive-wheels, when according to physics the friction is independent of the amount of surface in contact? A. The "friction of bodies is directly proportioned to the pressure," is Merin's first law. What you have stated is the

second law of friction. In designing locomotives, it is the weight on the wheels which governs the number of wheels by its limit, which is about 20,000 pounds on each driving wheel in the heaviest engines, and varies to as low as 7,000 pounds per driver. The addition of drive wheels to an engine without adding to its weight, or transferring the weight on the truck to the added wheels, does not add to the tractive power of the locomotive.

(9442) E. N. M. asks: Will you tell me how to make a permanent steel magnet? I have been looking over your catalogue, and I find nothing that enlightens me on the subject? A. To obtain a good steel magnet, it is necessary in the first place that the steel shall be adapted to this purpose. High tool steel is usually specified for permanent magnets, but if it contain a certain percentage of manganese it cannot be used. Some grades of cast steel, mild plate steel, and spring steel take magnetism well, but do not retain it well. Some prefer Jessup's and others Stubs' steel. Select a close-grained rolled steel, heat it to a cherry red, and plunge it into water or oil. It will be tempered glass hard. If put in edgewise, it is less liable to be curved by unequal cooling. It is not necessary to temper the whole length of the bar. If the two ends are hard, the center may be left soft. It is easier to temper the whole at once. There are two modes of magnetizing a bar magnet. If you already have a strong magnet, you may draw it along the bar from end to end, pull it off, return in a curve to the place of beginning, and pass it along the bar many times. Do the same with the different sides of the bar. Ten to fifteen times on each side will be sufficient. If you have a dynamo or a good battery at hand, wind a coil of insulated copper wire with an opening large enough to allow the bar to be passed freely through the coil, and pass the bar to and fro from end to end several times while the current is flowing in the coil. For the current of a battery use No. 14 or No. 16 wire and 30 to 50 turns. For a dynamo current the same coil may be used, if the coil is put in series with a lamp. It will be made too hot by the current if put on short circuit.

NEW BOOKS, ETC.

DIE ELEKTRISCHE BÜHNEN UND EFFEKTBELUCHUNG. By Dr. Th. Weil. Vienna and Leipzig: A. Hartleben's Verlag, 1904. 16mo.; pp. 256. Price \$1.25.

The book deals with theatre stage illumination. The author has treated a very special branch of electricity in an admirable manner. The subject is of growing importance, and each new theatre is better than the last as regards the electrical installation. We can recommend this book.

AMERICAN METER PRACTICE. By Lyman C. Reed. New York: McGraw Publishing Company, 1903. 8vo.; pp. 196. Price \$2.

This book will be found useful both to the central station manager and to the consumer of electricity. It describes the principles and methods of construction of typical American meters, and contains, among others, chapters on the "General Management of the Meter Department" and on "Reading Meters," chapters of value to the two classes of men above mentioned, respectively.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending August 2, 1904

AND EACH BEARING THAT DATE (See note at end of list about copies of these patents.)

Table listing inventions with patent numbers, including: Addressing machine, S. E. Farnham; Advertising or picture exhibiting apparatus, M. L. Frink; Arc extinguishing means, R. E. Hellmuth; Arm rest for books, etc., A. E. Van Camp; Article of manufacture and making same, W. S. Bucklin; Astronomical apparatus, F. H. Mackenzie; Autographic register, A. Krauth; Automobile, C. Crisman; Baling press, R. P. White; Band brake, W. N. Dufford; Bar slitting and stretching machine, J. P. Golding; Barrel, etc., closure, C. R. Westling; Bath tub seat and toilet stand, combined, E. T. Brown; Batteries, apparatus for washing storage, J. P. Lough; Battery, see Storage battery; Bearing, self-oiling, F. Hachmann; Bed, camp, G. A. Caproni; Bed, crib, W. S. Foster; Bed, folding, S. J. Herrick; Bedpost, G. Shuman; Beer under pressure, carrying through the fermentation of bottom fermented, V. Lapp; Belt or apron, wire, C. Swinsee; Bicycle gearing, H. F. Maynes; Billiard register, electric, P. S. Hatcher; Binder, loose leaf, I. Wide; Boller alarm, A. Altmann; Boller flue cutting out, expanding, or beading machine, C. E. Luetzer; Boller tube and flue scraper, C. P. Lloyd; Book, card memorandum, T. Noble; Book, pencil, A. H. Stow; Boot or shoe cleaner, W. S. White; Boot or shoe tread piece, A. H. Pratt; Boring machine, F. C. Zeek; Bottle, non-refillable, Fisher & Holston; Bottle, non-refillable, M. P. LaBette; Bottle stopper and dropper, W. T. Goldsmith

Table listing inventions with patent numbers, including: Bottle stopper removing device, F. M. Glaessel; Box tray making machine, J. C. Donnelly; Brake beam, R. P. Lambert; Brake shoe, H. Fresh; Brakes, pressure retaining device for fluid pressure, F. Mertsheimer; Bread, making, L. C. Sharpless; Bride blind, H. G. Semmann; Brush holder, L. Christiansen; Brush, tooth, C. Heilrath; Buggy top support, L. W. Leving; Building construction, T. O. Shea; Bung and connection therefor, valve, D. Beebe; Burner, J. Heinrichs; Button, H. H. Q. Bell; Cabinet, boss, C. E. Emory; Cabinet, kitchen, L. I. Brubaker; Calendar, daily engagement, W. E. Judge; Can, J. E. State; Can, G. C. Witt; Can cleaning machine, W. Munn; Can filling machine, multiple, J. Cunniff; Can opener, A. D. York; Can opener, W. H. Stephenson; Can opener, F. Pendleton; Candy heating device, E. W. Curtiss; Cap, Breck & Froeman; Car coupling, W. Kelsa; Car coupling, Snyder & Lyter; Car door, C. M. Shepherd; Car door operating and fastening device, R. J. Scales; Car door operating and locking device, F. H. Howe; Car draft gear, railway, D. C. Ross; Car fender, F. Canitz; Car, gondola, G. I. King; Car hand strap, J. S. Paxton; Car or wagon undercarriage, tram or railway, P. Herbert; Car Townsend bearing, railway, P. B. Car wheels, abrading shoe for truing up, J. M. Griffin; Card case and counter, O. A. Sterl; Carding engine feed, C. M. Barber; Carton marking machine, C. S. Luitwieler; Cash register, W. H. Muzzy; Casket cabinet draw section, W. Thompson; Cement or cementitious products, machine for making, W. E. Jaques; Cereal product, A. P. Anderson; Chair, see Dental chair; Chair, E. H. C. Armstrong; Check book, F. E. Hodges; Check book, L. M. Meser; Chili reaster, Knapp & Ortega; Chimney cap construction, J. W. Belcher; Chimney top, R. Schlegelmilch; Chuck, drill, C. W. Sargent; Chuck, magnetic, C. W. Sponsel; Cider mill, A. C. Burner; Cigar branding machines, etc., attachment for, W. M. Campbell; Circuit breaker, Wright & White; Circuit controlling apparatus, time, H. C. Little; Clipping or grooming machine, A. L. Hale; Clothes line, M. S. Cross; Clutch device, T. L. & T. J. Sturtevant; Clutch for lathes, etc., W. Runge; Clutch, friction, C. Seymour; Coal feeding apparatus, pulverulent, W. F. Wolfe; Coat, hat, umbrella, etc., rack, safety, C. F. Garland; Coating and lining material for metal objects, M. Tech; Cook, stop, F. E. Hummel; Collapsible tube, J. A. Symonds; Controller, F. B. Corey; Cookey or doughnut cutting device, F. W. Gardner; Cooler, H. Reininger; Copper, sampling, R. Baggaley; Core spindle, collapsible, W. H. Larsson; Corks simultaneously on both ends and forming them same length, machine for grinding, G. H. Vincke; Corn snapping machine, J. C. Parson; Corset, apparel, D. Kops; Corset attachment, D. Kops; Corset stay, D. Kops; Cotton gin, E. R. Barber; Cranes, derricks, etc., gearing for, S. W. Whit; Crips, etc., closure attachments for, M. C. Collier; Currents, rectifying and interrupting alternating, W. Scheidel; Curtain and shade adjuster, window, C. Bryan; Curtain or shade holder, H. H. Forsyth; Curtain stretcher, U. Hebert; Cuspider, E. F. Holland; Cut out, F. Buchkop; Dental articulator, A. H. Fleming; Dental chair, F. E. Case; Dental disk cutter, J. A. Hallett; Dental work, apparatus for shaping metal parts in, D. N. Booth; Derrick frame, short hoist, A. Klenne; Dial, A. J. Farmer; Die cutting machine, E. Meyers; Die lifter, E. B. Hawkins; Dish, J. H. Crockwell; Display case, Pickett & Schumer; Display curtain holder and repository, T. J. McElhenie; Display device, L. A. de Kernay; Display package, J. P. Hummel; Distillation of crude oils from pine wood, J. C. Mallonee; Diving apparatus, J. von Miniszewski; Diving suits or apparatus, means for forcing water from, Petrie & Martin; Door check, O. C. Rixson; Door closing device, O. C. Rixson; Door guard, self-locking, E. H. Deherty; Door hanger, sliding, Axman & Kuechle; Door, warehouse, J. Erwood; Dough, forming, C. F. Dietz; Dough forming machine, C. F. Dietz; Draft rigging mechanism, G. H. Forsyth; Dress hanger, S. Hermann; Dress suit case, hand bag, etc., S. M. Gordon; Drill, see Reck drill; Drill, J. W. Pickett; Drilling and tapping machine, C. C. Newell; Drilling machine, multiple, A. C. Vauchain; Drilling machine template, A. C. Vauchain; Drop attachment, balanced cord, H. D'Oliver, Jr.; Drum, heating, M. E. Leehr; Drying apparatus, L. Gathmann; Drying house for fish, etc., H. N. Haug; Dye and making same, orange, O. Sebst; Electric cells, producing elements for, I. Kitzse; Electric connection rossette, M. Norden; Electric current interrupter or circuit breaker, mechanical, J. O. Helme, Jr.; Electric fixture switch attachment, cluster, W. L. Bradshaw; Electric motors, regulating, F. E. Case; Electric time switch, A. W. Hutchings; Elevator, E. C. Northrop; Elevator or mining cage safety appliance, W. P. Ward; Elevator speed controlled safety stop, H. M. Young; Engine starting device, gasolene, F. Reynolds; Engines, electric sparking plug for gas, Buchner & McClure; Envelop opening machine, J. C. Robertson; Excavating machine, C. C. Battey; Excavating shovel, automatic, T. Cox; Exerciser and developer, physical, A. E. Terry; Exploding mines, blasting, etc., apparatus for, F. L. M. Masury

Table listing inventions with patent numbers, including: Extractor, see Lime and sediment extractor; Eyeglasses, G. A. Stiles; Eyeglasses, L. F. A. T. 766,569 to 766,575; Eyeglasses or spectacles, A. D. Bloch; Fabric, machine for extruding liquid from, I. E. Palmer; Fare box, F. H. Stuart; Fatty substances, separating fluid from solid portions of, W. B. Kerr; Faucet, W. R. Campbell; Faucet, soda fountain, E. J. Calley; Fence, portable, Stone & Bear; Fence post, J. W. Gibson; Fence post, composite, B. F. Stultz; Fence wire clamping device, J. A. Clements; Fence wires, fastening, C. H. Hanson; Fertilizer discharger controlling mechanism, W. Petzer; Fertilizer distributor, J. G. Love; Filing case, B. Pithers; Filter, feed water, G. H. Ward; Finger ring, J. E. Fitzgerald; Fire alarm system, B. P. Ketchum; Fire door, F. L. Saine; Fire extinguisher, Erb & Morell; Firearm, P. O. Elterich; Firearm, breech loading, A. Chuchu; Firearm, magazine, H. Hundrieser; Fishing gear, A. W. Wilson; Fishing tackle, S. D. Martin; Fleshing machine, F. J. Perkins; Flexible joint, H. Austin; Floor and ceiling support, E. W. Fenn; Floor covering protector, D. W. Young, et al; Flue stopper, G. McAdams; Flute, G. Steinert; Fly screen, F. P. Knowles; Friction brake, G. A. Esign; Fruit picker, H. C. Balch; Fuel block or briquet, G. W. Hepp; Funnel, H. F. Ganon; Funnel, H. Hagenbach; Furnace, see Roasting furnace; Furnace, W. Hentchel; Furnace, J. T. Greene; Furnace gate, anti-radiating, G. F. Watkins; Gage and gage clamp, F. H. Richards; Game apparatus, H. U. Downing; Garment fastener, F. K. Hatfield; Garment, shelter tent, and blanket roll covering, combined, C. H. Mason; Gas and air mixing burner, F. G. Crane; Gas and coke apparatus for the manufacture of, J. C. H. Stut; Gas and coke making apparatus, J. C. H. Stut; Gas and coke manufacturing, J. C. H. Stut; Gas burner, G. Machlet, Jr.; Gas burner, inverted incandescent, H. Ahrendt; Gas generation apparatus, W. A. Salisbury; Gas heater, Karle & Hatch; Gas holder stiffening leg, H. A. Carpenter; Gas machine, C. S. Rogers; Gas machine, acetylene, R. H. Walters; Gas, manufacturing, J. C. H. Stut; Gas treating apparatus, fermentation, J. F. Wittenmann; Gasolene tank safety appliance, J. Stubbers; Gear cutting and milling machine, F. Harding; Gear locking device, A. S. Cowan; Gear wheel, N. C. Bassett; Gearing, differential speed, H. W. Gardner; Glass, apparatus for fire polishing, C. J. Nolan; Glass, drawing, J. H. Lubbers; Glass drawing apparatus, J. H. Lubbers; Glass, fire polishing, C. J. Nolan; Glass grinding machine, H. C. Watson; Glass making wire, Cunliffe & Taylor; Glass making apparatus, cylinder, I. Haley; Glass, manufacturing, S. O. Richardson, Jr.; Glass shaping machine, M. J. Owens, Jr.; Glove stretcher, C. L. McBride; Gold saving apparatus, E. S. Kelley; Gongs, etc., operating device for, Kent & Wegman; Governor, fly-ball, M. Haerberlein; Grain elevator, F. Scott; Grain separator, W. W. Huntley; Grain separator, shaking, F. M. Smith; Graphophone attachment, E. Gilbert; Graves, apparatus for signaling from, Crosby & Henry; Grinding mill, ear corn, J. Jorgensen; Hair springs to time, apparatus for vibrating, G. V. Neal; Handcuff, H. G. Judd; Hand wheel, H. O. Clay; Hat fastener, O. Stromberg; Hat form retainer, W. Bowling; Hay rake, side delivery, F. M. Conroy; Head covering or net, E. F. Constock; Header, grain, J. A. Sharp; Heating and lighting apparatus, Smart & Lynch; Heating system, greenhouse, C. C. Peck; Heel, elastic cushion, J. F. B. Litchfield; Hemmer, tucker, and corder, combined, L. A. & M. E. Mitchell; Hide working machine, D. Glencross; Hinge and check, door, C. E. Treadwell; Hinge, spring, J. Barsley; Hopple, J. T. Coleman; Horse blanket, O. H. Muntz, reissue; Horse releasing device, W. E. Bolsta; Horseshoe calk, W. L. Goodrich; Horseshoe holder, C. Haller; Hose rack, M. C. Meehan; Hose reel, E. Cliff; Hose supporter, A. H. Cole; Hose supporter clasp, J. Lindauer; Hydraulic motor, reciprocating, J. Gruninger; Hydrocarbon burner, W. R. Jeavons; Hydrocarbon burner, C. H. Montgomerie & Agramente; Hydrocarbon vaporizing apparatus, A. S. Newby; Ice chisel and ice chipper, combined, A. Wagner; Ice tank, B. F. Daly; Incandescent burner, J. A. Bowen; Index pin precisionizer, F. H. Richards; Initiation apparatus, P. F. Haberstick; Insulated hanger, arc lamp, H. G. Pflester; Ironing board, C. H. Williams; Ironing machine, L. J. Cooper; Ironing table, shirt, L. J. Cooper; Jack, see Wagon jack; Journal bearing, anti-friction, F. C. Mason; Kettle, steam heated tipping, P. Gruener; Key fastener, E. F. Henderson; Knitting machine stop motion, F. Wilcox; Lace tip, shoe, A. Patvin; Ladder, step, O. Richardson; Ladder, step and extension, A. Hartzer; Lamp, J. P. King; Lamp, electric arc, A. S. Deem; Lamp, hydrocarbon incandescent, W. S. Preskey; Lamp, inclosed arc, O. N. Wiswell; Lamp tubulating machine, incandescent, W. R. Burrows; Lamp, vapor, A. Glover; Lamps, manufacture of incandescent electric, Hogge & Bariller; Latch, F. B. Williams; Lathe carriage turret attachment, J. H. Blair; Leather piece marker, upper, C. S. Luitweiler; Leg and support, removable, J. E. Knight; Lens grinding machine, W. G. Wolfe; Lint, article of, Gault; Lime and sediment extractor, H. White; Liquid separator bowls, means for yielding supporting centrifugal, F. Jebsen