

Business and Personal.

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"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 109, Buffalo, N. Y. Universal and Centrifugal Grinding Machines. Pedrick & Ayer, Philadelphia, Pa.

Best Handle Machinery. Trevor Mfg. Co., Lockport, N. Y.

Fine manufacturing plant to let, sell, or invest in promising business. Box 732, Ashtabula, O.

Wanted—Catalogue and price list of Shell Button Machinery. C. C. Reynolds, Prescott, Arizona.

The Improved Hydraulic Jacks, Punches, 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 Wte, Syracuse, N. Y.

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.

Machinist and engineer desiring a change will consider proposals for taking charge of steamplant. Salary, \$3.00 per day. "L. I. B." Franklin, Delaware Co., N. Y.

General Metals of all kinds and for all purposes, perforated 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.

Hydrocarbon Burner (Meyer's patent) for burning crude petroleum under low pressure. See adv. page 381. Standard Oil Fuel Burner Co., Fort Plain, N. Y.

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., manufacturers of brass, iron gate valves, patent indicator valves, fire hydrants, globe, angle, check, radiator, and safety valves, 52 Cliff St., 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.

Wanted—Traveling man for forge. One who understands the business and is capable of making estimates on marine, railroad, and machine forgings. Apply by letter, with references, box 1040, Pittsburg, Pa.

Pointer on Advertising.—Manufacturers who would advertise for profit in 1893 should write to the Manufacturers' Advertising Bureau and Press Agency, 111 Liberty Street, New York, for points.

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.

(4645) F. D. B. asks: How many elements are known to chemists at the present day? What metals are lighter than water? Give the distance in light years of a few of the stars that have had their parallax measured. A. There are about 70 elements recognized by chemists at the present time. Lithium, potassium and sodium are lighter than water. Distance in light years:

- a Aurigæ (Capella)..... 10 to 70
a Canis Major (Sirius)..... 11 to 16
a Canis Minor (Procyon)..... 26
a Bootes (Arcturus)..... 23 to 25
a Lyrae (Veza)..... 12 to 32

A light year is 63,000 times the distance of the earth from the sun. The double numbers refer to the work of different astronomers.

(4646) G. C. M. asks: What size wire shall I use to convey a current of electricity, E. M. F. 9 to 12 volts, 1 to 150 amperes, a distance of 25 to 30 feet? A. No. 20 Am. W. G. will carry the current named.

(4647) H. & T. ask: Is there a pneumatic tube between Paris and Berlin, and if so, for what purpose is it used, and with what speed does the car travel? A. There are pneumatic tubes in Paris for carrying letters, also in Berlin; but none between the

two cities. The speed is about 20 miles per hour. Size of tube 2 1/4 inches.

(4648) J. O. and others ask how to ink typewriter ribbons. A. Take vaseline (petrolatum) of high boiling point, melt it on a water bath or slow fire, and incorporate by constant stirring as much lamp black or powdered drop black as it will take up without becoming granular. If the fat remains in excess, the print is liable to have a greasy outline; if the color is in excess, the print will not be clear. Remove the mixture from the fire, and while it is cooling mix equal parts of petroleum, benzine and rectified oil of turpentine, in which dissolve the fatty ink, introduced in small portions by constant agitation. The volatile solvents should be in such quantity that the fluid ink is of the consistence of fresh oil paint. One secret of success lies in the proper application of the ink to the ribbon. Wind the ribbon on a piece of cardboard, spread on a table several layers of newspaper, then unwind the ribbon in such lengths as may be most convenient, and lay it flat on the paper. Apply the ink, after agitation, by means of a soft brush, and rub it well into the interstices of the ribbon with a tooth brush. Hardly any ink should remain visible on the surface. For colored inks use Prussian blue, red lead, etc., and especially the aniline colors.

Aniline black..... 1/2 oz.
Pure alcohol..... 15 "
Concentrated glycerine..... 15 "

Dissolve the aniline black in the alcohol and add the glycerine. Ink as before. From the "Scientific American Cyclopaedia of Receipts, Notes and Queries."

(4649) J. P. B. asks: How narrow a belt will a four horse power engine run and develop all the power there is in the engine (steam or gasoline), also what number horse power steam or gasoline engine would be equal to three good (true pulling) horses in a sweep or lever power? A. The power transmitted by a belt depends upon its speed as well as width. A 2 inch belt running 1,700 feet per minute will transmit 4 horse power. A 3 inch belt for the same power should run 1,100 feet per minute. As the actual horse power of steam and other engines, or prime movers, is based on the actual mean pulling power of fairly strong horses, 3 horse power actual of a steam or gas engine should be equal to the pull of 3 good horses. The nominal horse power of a steam engine is only a partial indication of its actual or indicated horse power, which depends upon the steam pressure and point of cut-off. In a gas engine the nominal horse power is not far from the indicated horse power, as the explosive pressures in a gas engine do not vary as much as the steam pressures in the steam engine.

(4650) M. S. K. writes: A friend says that a man weighs more at the equator than at the north pole, owing to the increase of gravity as the equator is approached. I say that the weight would be less at the equator, owing to the centrifugal force of the earth. Please let us know which is correct and what the variation per pound would be. A. Your friend is on the wrong side and you are correct.

(4651) E. V. wishes to know the life and how many shots can be fired from the 124 ton gun to be exhibited by Krupp at the World's Fair. What is the cause of disablement of so large a gun as the above after a number of rounds? A. The number of shots that a 124 ton gun can bear is very uncertain, depending upon the size of the bore and the powder charge. About 95 shots is all a 110 ton gun can usually stand.

(4652) O. D. R. asks: What is the difference in the power necessary to perform a certain amount of work with the usual piston, link and crank and with the power applied tangentially to a crank of the same radius? In what ratio does the resistance of air increase with compression? A. The crank value of the piston mean pressure is 62 1/2 percent of the tangent force of the crank pin periphery. Volumes x 15 = 15 is the approximate equation for compressing air (isothermally) for pressure. Thus 3 cubic feet compressed to 1 cubic foot is 3 x 15 = 45 pounds pressure. When air is suddenly compressed the heat generated by compression expands the air, and if confined reaches a higher pressure, which on cooling returns to the pressure as above stated. Complete tables of pressures, volumes and temperature, with the theory, may be found in SCIENTIFIC AMERICAN SUPPLEMENT, No. 279, 10 cents mailed.

(4653) C. A. G. writes: In a letter of the 13th century it is related that some Greenland fishermen on the 25th of July, 1286, were in a place where "the sun was shining both nights and days, and was as high at midnight as it used to be when seen north-west of their home," the home being situated at 63° 10' N. lat., and the time for the observation there the summer solstice. Is it possible to calculate the latitude of the unknown place, where they were on the above said day? A. The sun in the northwest at 63° of latitude at the summer solstice was probably 5° or 6° above the horizon. A midnight sun of that elevation on July 25 would require the fishing party to be in latitude 78° or 79°. No exact computation can be made from the statement given.

(4654) G. H. asks: Which is the largest and best shipyard where a man can get a job as carpenter, and what are the average wages for carpenters? A. The largest and most active shipyards are at Newport News, Va., Philadelphia, Chester, Pa., Wilmington, Del., and Bath, Maine. Ship carpenters' wages, \$3 to \$3.50 for first class workmen.

(4655) X. Y. asks: Is there an acid or spirit that by placing on ordinary glassware will soften it so I can bore holes in it with a common awl? Please give some directions for use. A. No substance will soften glass. Heat is the only means of softening. You can drill a hole with a diamond or with emery in a small tube by revolving the tube.

(4656) P. G. asks: How fast can a man of ordinary strength row a sixteen foot boat containing one person besides himself? Also how large ought the propeller of a sixteen foot boat be, and how many revolutions must it make to drive the boat five miles an

hour? A. One man can row a light shell boat from 5 to 5 1/2 miles per hour. It will require a 12 inch diameter wheel, 2 feet pitch, 250 revolutions per minute to make 5 miles per hour.

(4657) Subscriber in Sweden asks: What is it to vulcanize railway sleepers, what way is it done, and what preparation is used for the purpose? A. The ties or other lumber are placed in strong cylinders of steel 6 feet diameter by about 50 feet in length, the cylinders being lined with coils of steam pipe. The cylinders are then closed tight and air pumped in until a pressure of about 150 pounds per square inch is obtained, when steam is turned into the coils at 200 pounds pressure per square inch and the heat due to this pressure kept up for from 4 to 5 hours, when the steam is turned off, air pressure discharged and the ties or lumber withdraw. By the continued high heat under a pressure to prevent the sap boiling out of the wood the sap is thoroughly coagulated and the lumber dried. By this treatment lumber for interior work and furniture, and many kinds of wood heretofore rejected on account of liability to warp have become valuable for furniture and in decorative art work. The life of railway ties is largely lengthened by this process.

(4658) C. S. K. asks if the tension in a clock spring increases by winding the same amount as a spring in spring scales by pulling. A. The action of a spring in a clock increases its tension in winding the same as the spring in a balance by pulling, only the clock spring has so much longer range, with only a part of it in use, that the difference is not felt in winding.

(4659) E. B.—Zinc has the greatest degree of expansion and contraction by changes in temperature of the common metals. Mercury expands and contracts more than any metal and is therefore generally used in thermometers.

(4660) S. H. W.—Malleable iron can be nickel plated.

TO INVENTORS.

An experience of forty 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

January 17, 1893,

AND EACH BEARING THAT DATE.

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

Table listing inventions and their inventors with patent numbers. Includes items like Accounting blank form for keeping, Alarm clock, Alloy of metals, Amalgamator, Animal stock, Asparagus bundle, Asphalt mixing machine, Bag, Bait, Baking pan, Barrel hoop, Battery, Bedstead, Beer making, Belt support, Bevel, Bicycle, Bicycle canopy, Bicycle parcel carrier, Bicycle seat spring, Bicycle sleigh attachment, Bins or pockets for containing coal, grain, etc., Blinds, guide strip for inside, Blowing engine, Boiler, Boiler chimneys, apparatus for controlling the draught in, Boiler joint for steam, Bolster spring, Bond, coupon, S. R. Hopkins, Book and package case, portable, Book cover, Book, duplicating check, Bottle, Bottle filling apparatus, Bottling machine, liquid, Box, Box, paper box, shipping and display box, Brake, Brick machine, Brick mould, Bridge, Brush machine, Bucket, well, Buckle and snap hook combined, Bung, T. Marple, Buttonhole finishing machine, Camera, Leighton & Hitchcock, Camera shutter, E. J. Molera, Can, body forming machine, Can filling machine, Can wiping machine, Car and train, railway, Car brake, Car brake, electric, Car coupling, Car coupling, Lee & O'Farrell, Car coupling, A. C. McCord, Car coupling, J. Simpson, Car coupling, J. L. Smith, Car coupling, J. Stern, Car coupling, S. G. Wilber, Car hand strap, street, Car platform, Car, railway, Cars, air supply device for railway, Cars, air supply device for railway passenger, Cars in trains, ventilating apparatus for railway, Carriage, child's, Carriage folding seat, Case, Case, See Book and package case, Cast-iron and steel carrier apparatus, Caster, furniture, Casting sash weights, apparatus for, Ceiling, metallic, Chair fan attachment, Check or token and missive, combined, Chuck, C. M. Conradson, Chuck, screw machine, C. M. Conradson, Churn and butter worker, combined, Chute, coal, Clamp, See Screw clamp, Clamping device, ball and socket joint, Clip, See Tug clip, Clothes hanger, T. M. Garrison, Clutch, friction, J. Walrath, Cock, gauge, J. B. Mitchell, Coffee mill, J. B. Quigley, Comminator, C. O. C. Billberg, Comminator brush, nd holder, J. F. McLaughlin, Compressor, D. Neale, Copying book, J. P. Julia, Copying, device for facilitating, J. J. Hill, Corn popping apparatus, W. B. Dotathen, Cotton picker, C. C. & C. C. C. Coupling, See Car coupling, Whimtree coupling, Crank power, P. Bright, Crusher, See Rock crusher, Cultivator, T. Lull, Curtain stretcher, E. R. Osgood, Cutter, electric, H. C. Montgomery, Cutter, See Egg cutter, Twine cutter, Desk receptacle, E. P. Carolan et al., Dial, sun, C. E. Chamberland, Disks, mechanism for controlling the action of oscillating, F. Lambert, Door closing device, H. C. Montgomery, Door lock, sliding, H. Hubbell, Dough machine, J. H. Mitchell, Draught equalizer, P. V. Schandoney, Drier and carbonizer, M. J. Spencer, Dust pan, P. Hill, Dyeing apparatus, A. Hinz, Earth mover, J. B. Bridgewater, Egg cutter, E. Barrini, Electric battery, J. H. Davis, Electric circuit breaker, E. Thomson, Electric heater, J. F. McLaughlin, Electric heater, T. E. Morford, Electric meter, F. J. Dibble, Elevator safety appliance, W. Winkless, Embroidering machine fabric holding frame, J. Graf, Engine, See Blowing engine, Gas or similar motor engine, Steam engine, Eyeglasses, R. Straubel, Jr., Face, J. J. Gage, Feed box, G. J. Schlosser, Fence, J. F. Ogletree, Fence post, W. H. Ringle, Fence tension device, wire, P. Black, Fencing, barbed wire, A. Deffis, Fender, See Gin saw fender, Flow fender, File cabinet, letter, B. Brown, File, paper, G. W. Mills, Fire escape, L. Amidjah, Fire escape, D. J. Arnold, Firearm, breech loading, Hye & Parry, Firearm recoil check, Tredway & Wirth, Flood gate, self-acting, H. A. Corliss, Floor plate, G. Baldwin, Flower and making same, artificial, M. E. A. Souchet, Foot warmer, etc., portable, A. A. Whipp, Furnace, See Hot air furnace, Furnace, W. & J. C. Swindell, Game board, with, W. A. Logue, Gas and air mixing apparatus, Smethurst & Wade, Gas meter frame, H. Logue, Gas or similar motor engine, H. Williams, Gate, J. H. Dickerson, Gate, J. H. Dickerson, Gin saw fender, H. S. Taylor, Glove or dress fastener, D. R. Reynolds, Gold, silver, and copper from ores, obtaining, A. French, Governor for mechanical motors, J. E. Hart, Gun, breech-loading, breakdown, Gun, auxiliary valve for pneumatic, J. Rapieff, Gun, fixed magazine for breech-loading bolt, P. Mauser, Hammock attachment, F. J. Herrick, Harrow, E. E. Whipple, Harrow, W. H. H. Harrow, or cultivator tooth, F. X. Kraback, Harrow, spring tooth, H. W. Eisenhart, Harrow, wheeled, F. Anderson, Harvester brake, C. Grattan, Hat tray, H. Lilly, Hay loader and carrier, combined, D. McCarthy, Hay press attachment, Graham & Knapp, Head rest, S. C. G. Watkins, Heater, See Electric heater, Wat r heater, Hedge trimmer, J. L. Jackson, Hook, See Whimtree hook, Horseshoe, E. Bouchard, Hooper, J. Black, Jr., Hot air furnace, E. R. Stasch, House or tent, portable, A. C. Lauber, Hub attaching device, C. F. Carlson, Hub, vehicle, A. P. Taylor, Ice cream can, G. A. Thurston, Inhaler, R. E. Woodward, Iron, manuf. machinery, W. D. Wood, Ironing machine, A. R. Gustafson, Jack, See Lifting jack, Wagon jack, Keyboard, transposing, B. French, Kitchen cabinet, I. S. Hartcock, Knitting machine, W. Woolcott, Knitting machine, circular, H. A. Houseman, Label holder, J. Ready, Ladder, step, R. F. Porch, Lantern, Veazie & Bevan, Lantern weather guard attachment, J. P. Warner, Latch, water, B. Bernstein, Latch, clothespin, M. D. Lear, Lifting jack, A. Alken, Lock, See Alarm lock, Door lock, Locking device compound, H. A. Brinton, Locomotive and tender housing, F. U. Adams, Loom, H. Wyman, Loom, for weaving tufted fabrics, Wyman & Clark, Loom shedding mechanism, C. Falvey, Loom shuttle, J. M. Deen, Loom stopping mechanism, A. Taplin, Lounge, A. Jansen, Lubricator, W. A. Downes, Lubricator, cover, and Jean, Mail bag, H. Stovener, Mail bag or pouch, J. W. C. Springstun, Map stand, C. E. Linabury, Meat pounder, J. A. Carlson, Metal, machine for cutting scrap, E. H. Wheeler, Meter, See Electric meter, Milk or butter cooling device, J. L. Wilder, Milk, receptacle for use of condensed, W. A. Boulter, See Coffee mill, Mill, See Coffee mill, Mould, See Brick mould, Motor, T. A. Stark, Mower or reaper cutting mechanism, L. King, Musical reed tube, H. H. Walker, Musical instruments, combined bridge and tail-piece for, Owen & Eggert, Jr., Necktie fastener, J. A. Cuper, Nitro-cellulose or celluloid surfaces, producing, B. B. Goldsmith, Nozzle, variable exhaust, H. R. Walker, Nut and bolt lock, C. Stetson, Ore separator, centrifugal, O. B. Peck, Packing, R. C. Ferguson, Packing, metallic, T. Tripp, Pan, See Baking pan, Dust pan, Paper box, T. F. W. Schmidt, Paper box covering machine, H. G. Raffel, Paper box, folding, C. A. Spittel, Paper feeding machine, R. Burnett, Paper tube, F. Carey, Paraffine wax and apparatus therefor, treating or purifying, N. M. Henderson, Pattern for draughting garments, adjustable, H. Horn, Pea sheller, Clark & Russell, Petroleum refining apparatus, H. Frasch, Photograph holder, G. F. Bambridge, Photographic machine, coin-operated, P. V. W. Welsh, Picker, See Cotton picker, Piles preparatory to rolling, machine for reducing, J. H. Goussier, Pipe, method of and apparatus for forming lined, G. W. Harrington, Pipes for jointing, preparing the ends of lined, G. W. Harrington, Planter, corn or potato, W. Williams, Plow fender, A. M. Ellington, Plow, gang, McMillan & Gormley, Pneumatic dispatch or transit system, H. Clay, Pocketbook frame, L. Messer, Portable case, J. L. Jones, Post, See Face post, Power, See Crank power, Preserving foods, apparatus for, A. Baker,