

also of the same without the cut off. A. To find the horse power, the mean pressure during the stroke must be known, and this can only be determined by experiment.

What does squaring the circle mean in a mathematical sense? A. Finding a square whose area shall equal that of the circle.

(32) J. R. D. asks: 1. Should a launch be built, 26 feet by 5 feet, with lines moulded after the Flirt (SCIENTIFIC AMERICAN SUPPLEMENT No. 31), what should be the increased dimensions of the boiler, engine, screw, etc., to speed 10 or 12 miles easily per hour? A. Make everything to scale throughout. 2. About what difference in cost of boiler between steel or iron, the latter to sustain a safe working pressure of 200 lbs. per square inch, the former 1/2 inch thick? A. Probably not more than 20 per cent. 3. What is the most suitable wood material in all respects for such boat building? Is not cedar, and will it conform well when steamed? A. The most suitable wood for small boats is common cedar, with oak or hackmatack frame.

(33) W. L.—To harden magnets heat them to a dark cherry red, plunge them in cool water, then draw to a straw color. You will find methods of magnetizing given in No. 142 of SCIENTIFIC AMERICAN SUPPLEMENT in "How to make a Working Telephone."

(34) C. T. A. asks: 1. What is the expansive bulk of mercury per degree of heat in an open vessel? A. The rate of expansion varies with the temperature. Between 32° and 212° Fah. 1,000,000 parts of mercury become 1,018,153. 2. What is the expansive bulk of mercury per degree of heat under a vacuum? A. The same as in an open vessel. 3. If a bottle is half filled with mercury and half air, a glass tube, open at both ends, inserted through the cork and descending into the mercury, will the mercury rise higher than if the bottle was filled to the cork? A. Yes. 4. Would the difference in those proportions vary the rise of mercury in the tube? A. Yes. 5. If air is used in combination with mercury, will the elasticity of the air render the rise of the mercury in the column unreliable for thermometers? A. Yes.

(35) W. H.—Consult an advanced treatise on algebra.

(36) A "music teacher" writes: Do you know of any device that will do away with pen and ink to copy notes (in music) from the original, do it cheap, and at the same time enable anybody to use it? A. We think a series of rubber stamps would facilitate the operation.

(37) J. M. W. writes: I am building a small steam engine (horizontal), 3 inches bore and 5 inches stroke, to run 300 revolutions per minute, with from 50 to 60 lbs. of steam, cutting off at 3/4 stroke. Will steam ways 1 inch by 1/2 inch be large enough? Exhaust 1 inch x 1 inch, bridges 1/2 inch, steam pipe 1/2 inch, exhaust pipe 3/4 inch. How will these proportions answer? A. These proportions seem to be ample.

(38) H. C. S. asks: 1. What is the difference between ferrocyanide of potassium and the yellow prussiate of potash? A. They are the same. 2. What is the difference between bichromate of potash and red prussiate of potash? A. Potassium bichromate (K2Cr2O7) is a potassium salt of chromic acid (H2CrO4). The red prussiate (potassium ferricyanide—K3(FeCy)2—is the potassium salt of hydroferricyanic acid. Can you give me a recipe for artificial honey? A. You may try the following: Glucose (grape or starch sugar), 1 lb.; cane sugar, 2 ozs.; water, q. s. To this add a sufficient quantity of potato or corn starch boiled with water to a jelly, and about an ounce of gum arabic. Small amounts of molasses and flour are sometimes added. What is used for strengthening essence of orange? A. As we understand you, tartaric acid.

(39) A. S., Jr. asks: What per cent of glycerin will prevent the congelation of water at 0° Fah., at -24° and at -32°, respectively, under ordinary conditions? A. An aqueous solution containing 10 per cent of glycerin, specific gravity 1.024, freezes at 30.2° Fah.; with 50 per cent of glycerin, specific gravity 1.127, freezes at -24.2° Fah.; with 60 per cent, freezes below -31° Fah.

(40) I. F. B. asks for the best way of freeing gas from aqua ammonia while passing through lime drier after leaving the retort. A. If you refer to coal gas, the ammoniacal vapors are not removed in the lime purifier, but in the hydraulic main, the condenser, and washer. See SCIENTIFIC AMERICAN SUPPLEMENT No. 140.

(41) W. T. P. asks why a cannon ball when shot up perpendicular from the earth does not have the same velocity or force in coming down as in going up? A. Because the force of gravitation which causes the ball to descend is less than the force of the gunpowder which sent it up.

(42) F. J. F.—For information on canning see article on p. 122, current volume, SCIENTIFIC AMERICAN.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

Judham, Ontario.—No. 1 is chalcopryite. No. 2 is amethystine quartz. No. 3, dark muscovite. No. 4, apatite in quartz. No. 4, ferropopyrite. The rock is probably auriferous. No. 6, pink orthoclase. No. 7, fluorite. No. 8, garnets in dolerite. No. 9, hematite and orthoclase. No. 10, rich magnetite. No. 11, cyanite.—W. G. S.—Quartz with iron sulphide—probably contains a trace of gold.—A. F. J.—It is a quartz pebble—sample returned.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges with much pleasure the receipt of original papers and contributions on the following subjects:

The Telephone. By J. H. R. The Phonograph. By H. L., Jr.

HINTS TO CORRESPONDENTS.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Many of our correspondents make inquiries which cannot properly be answered in these columns. Such inquiries, if signed by initials only, are liable to be cast into the waste basket.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from \$1 to \$5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

[OFFICIAL.]

INDEX OF INVENTIONS FOR WHICH Letters Patent of the United States were Granted in the Week Ending August 27, 1878, AND EACH BEARING THAT DATE. [Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings, will be furnished from this office for one dollar. In ordering please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city.

Table listing inventions with names and patent numbers, including items like Anchorfluke supporter, Animal trap, Axles, Bag holder, Bale tie, Barb winder, Barrel cover, Barrel bead machine, Barrel trussing machine, Barrels, drip basin, Bed bottom, Bed canopy, Belting machine, Bench attachment, Bobbin holder, Boot and shoe heel, Booties, Boots, Bottle, Brake, Brick machine, Bridle and halter, Broom, Broom handle, Buckle, Burring safe, Burring cylinder, Butter package, Butters, Caddy, Calculator, Can for oils, Can, measuring, Car bumper, Car coupling, Car coupling draw bar, Car roof, Carpenter's gauge tool, Carriage curtain fastener, Carriage jack, Carriage jump seat, Cartridge, Chain links, Chair, dental operating, Chair, folding, Chair, rocking, Chair, rocking, S. Willershausen, Chill mould, Churn, Churn dasher, Clevis bolt, Coffee cleaning, Colter, Cooker, Corset exhibitor, Cultivator, Current wheel, Curtain fixture, Detector, Dish, covered, Ditching machine, Drain trap, Dredger for salt, Drill, grain, Drills, colter for grain, Egg opener, Embalming, tubular needle, Engine, electro-magnetic fire, Engine, hydraulic, Chandler & Silver, Engine, road, Engine, wind, Feed cutter, Feed water heater and filter, Fence, K. McKinnon, Fence, J. B. Robertson, Fender, File, bill and paper, Filter, liquid, Fire alarm, electrical, Fire arm, magazine, Fire escape, Flour bolting machine, Fork, manure, Fruit box, Game counter, Gas exhaust regulator, Gas generator, Gas, illuminating, Gas, manufacturing water, Gas tubing, flexible, Gearing, Glazed ware, ornamenting, Gongpull, pneumatic, Grain separator, Grain separator, F. W. Young, Grating, T. F. Baker, Griddle, cake, Hame, P. Hayden, Hammer, steam, Harvester, D. Sager

Table listing inventions with names and patent numbers, including items like Hat, folding, Heater, fire place air, Heating buildings, Heel scouring machine, Hinge for sleeping berths, Hoeing machine, Hog catching device, Hog cholera compound, Hog cholera compound, H. G. Locke, Horse checking device, Horse detach, Horse power, Horses, toe weight, Horseshoe nails, Hose clamp, Hose coupling, Jointflanges, Joints, clamp, Knife cleaning apparatus, Lamp, C. H. Scholle, Lamp, J. J. Thomas, Lamp burner, Lamp burner, W. N. Weeden, Lamp, street, Lamp, vapor burning, Lantern, Lead, manufacture of white, Leather stretching machine, Lock, permutation, Lubricator, Lubricator, vehicle axle, Lubricator, vehicle axle, Malt plow, Mechanical movement, Medical compound, Medicine case, Millstone driver, Mirror attachment, Motor, Nut lock, Oil cloth, manufacturer of, Organ, reed, Ozone, producing, Padlock, Paper cutter and winder, Paper pulp from wood, Paper pulp, treating wood, Paper stock, separating fibers of, Peanut roaster, Pen, fountain, Dieckman & Burgau, Pencil sharpener, Photograph printing frame, Picture frame, Picture frame clamp, Planter, seed, Plow beam, Plow, side hill, Plow stock, adjustable, Pump, cattle, Pump, double-acting, Pump, lift, Pump regulating valve, Printing machine, block, Printingpress, Radiator valve, Railway car signal, Rake, horse hay, Refrigerator, Refrigerators, ice grate, Rock channeling machine, Rolling hoes, picks, Rowlock, Saw, circular, Saw gummer, Scissors sharpener, Screw cutting die stock, Scythe fastening, Seal, metallic, Sewing machine, Sewing machine, boot and shoe, Sheave or pulley, Sifter, coal and ash, Sign, E. Powell, Sink, set back, Sled, Spring support, Spring, vehicle, Spring, vehicle, G. Judd, Sprinkler, external window, Steam or gas, nozzle, Steam trap, Stench or basin trap valve, Stench trap, Stovepipe drum, Stringed instruments, peg for, Stump extracting machine, Stump extractor, Suspenders, Switch chair, Table, tailor's, Tackle block, Target thrower, Telegraph, fire, Telephone, mechanical, Thim and harness, combined, Thill coupling, Thill coupling, Thimble skein, Thrasher and separator, Tobacco cutter, Tool, combined, Torpedoes, raising and lowering, Toy, W. S. Clow, Toy, bandelore, Trace carrier, Track clearer, Truck, car, G. Belou, Truck, car, G. Souther, Truck, hand, Turning tool, metal, Type writing machine, Types, dresser for printing, Umbrella, Valve, air, Valve for barrels, etc., self-closing, Valve, oscillating steam, Valve, stop, Ventilator, A. Unger, Vessels, construction of, Vise, T. E. Dutton, Wagon jack, Waistband, L. T. Smith, Water, S. W. Babbitt, Washing machine, M. L. Scivalley, Washing machine, T. Stumm, Washing machine, pounder, Weather strip for door sills, Wells, driller and pumper, Wells, rock drill for, Wire barbing instrument, L. Eberhart

Table listing trade marks with names and numbers, including items like Accordions and other reed, pipe, and flute instruments, Chemicals, Anthony Pirz, Cigars, etc., Levy Brothers, Cigars, California Cigar Box Company, Cigars, etc., Kerbs & Spiess, Cigars, etc., Edward Hilson, Cologne, J. A. Lansing, Cologne water, J. M. Farina, Graphite for stove polish, etc., Marble, Pleasantville Land Company, Marking ink, Blackwood & Co., Medicinal preparation, J. C. Kerr, Medicinal preparation, Mrs. Joe Person, Medicinal preparation, The Franklin Company, Mustard, Burns & Byram, Paper collars and cuffs, H. A. Mann, Jr., Plastic composition, The Bonislate Company, Printed publications, Keppeler & Schwarzmann, Salt, Richard Evans, Shovels and scoops, E. H. Linley, Smoking tobacco, etc., American News Co., Smoking tobacco, B. Leidersdorf & Co., Smoked, etc., beef, pork, etc., Soap, Day & Frick, Stove polish, J. C. Jacoby & Co., Woven cotton and woolen fabrics, H. Fogg & Co.

Table listing designs with names and numbers, including Counterpane or quilt, Funeral ornaments, Toilet cover, counterpane, Umbrella handle, Amasa Lyon

NEW PATENT LAW FOR Spain, Cuba, Porto Rico, etc.

By the terms of the New Patent Law of Spain, which has lately gone into operation, the citizens of the United States may obtain Spanish Patents on very favorable conditions. The Spanish Patent covers SPAIN, and all the Spanish Colonies, including CUBA, Puerto Rico, the Philippine Islands, etc. Total cost of obtaining the patent, \$100. Duration of the Patent, 20 years, 10 years, and 5 years, as follows: The Spanish Patent, if applied for by the original inventor before his American patent is actually issued, will run for 20 years. Total cost of the patent, \$100. It covers Spain, Cuba, etc. The Spanish Patent, if applied for by the original inventor not more than two years after the American patent has been issued, will run for 10 years. Total cost of patent, \$100. Covers Spain, Cuba, etc.

A Spanish Patent of Introduction, good for 5 years, can be taken by any person, whether inventor or merely producer. Cost of such patent, \$100. Covers Spain, Cuba, and all the Spanish dominions. In order to facilitate the transaction of our business in obtaining Spanish Patents, we have established a special agency at No. 4 Soldado, Madrid. Further particulars, with Synopsis of Foreign Patents, Costs, etc., furnished gratis.

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