

greater than 1:15708, the arc is greater than a semi-circle, and indeterminate by this means. As the ratio of the arc to the sine increases slower in the first half of the quadrant than in the last half, the number of degrees may be approximately estimated by the given lengths of the 1/2 arc and 1/2 chord; and by a few trials, the ratio can be found without going through the long process of making out a full table of the quadrant. A. This is not a new method, but is worth investigation.

(70) J. N. McC. says, in reply to several correspondents, who ask as to burning slack: "My experience is that slack requires the grate bars to be very open. I have always used the widest I could get, not less than an inch between the bars; I have used bars with openings of 1 1/2 inches. The only secret in using it with any kind of a furnace is to have the grate bars open enough, so that the fire can be kept open from the underside of the grates, with the poker. Some coal, of course, will go through at first; but coarse coal or wood can be used to start with, and you must rake out what falls through the grate, and put it in again. The coal will soon take so that it will not waste. To build a furnace for the purpose, I would make it wider than usual, with doors in the side of the front, similar to furnaces for burning sawdust. For some varieties of coal, it will be found beneficial to wet the coal before throwing it into the furnace; it helps it to run together. Then put in the coal at the side doors, and let it alone till it cakes; then take your poker and roll it into the center of the fire. It will then be in large lumps and will not waste; and you will always have a good fire in the center. Never smother it with fresh coal."

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

R. B.—A very highly siliceous slate, perfectly compact and homogeneous.—J. E. E.—Your specimen does not contain silver.

J. E. D. asks: How can I make cream candy for feeding weak colonies of bees during the winter? How is the granular condition of the sugar overcome?—E. W. H. asks: How are honey locust seeds prepared for sowing?—N. N. asks: Can you tell me how to color coral after it has been burned?—P. W. says: I have a tame frog which in summer lives on flies. What shall I give it in winter?

COMMUNICATIONS RECEIVED.

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

- On Steam Boiler Explosions. By C. R. C. and by S. G. H.
On Brass Bearings. By T. J. B.
On Utilizing Water Power. By H. C. K.
On a Cheap Locomotive. By F. G. W.
On Springs and Wells of Water. By —
On Tunneling. By J. H. S.
On a Flying Machine. By M. B. E. and by L. S.
On Phosphorus. By —
On Multiplication and Division. By G. B. G.

Also enquiries and answers from the following: E. S. V.—K.—M.—J. B.—L. R. C.—W. H. L.—T. A. J.—P. B. S.—L. W.—I. E. N.—C. O'B.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Enquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of enquiries analogous to the following are sent: "Who makes balloons? Who sells machines for hulling barley, and also for grinding oatmeal? Where can machines for marking boxwood rules be obtained? Are there any makers of railway ticket printing machines in the United States?" All such personal enquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH Letters Patent of the United States were Granted in the Week ending December 29, 1874, AND EACH BEARING THAT DATE. [Those marked (r) are reissued patents.]

Table listing inventions and their patent numbers, including items like Air and gas, carbureting; Ammonia, manufacture of; Atomizer, hydrocarbon; Auger, earth, Hinchings and Eynon; Augers, twist; Bags, filling; Bale tie; Barrel heading wood-machine; Beefsteak crusher; Beer barrels, vent plug for; Beer cooling house; Belt shifter; Biscuit board; Blind stop; Boiler, agricultural; Bolt, door; Boat and shoe chain; Bread, compound for.

Table listing inventions and their patent numbers, including items like Bridge, truss; Buckle, harness; Burner, lamp; Butter bucketfastening; Cap, knitted; Car axle box; Car coupling; Car spring; Carriage, child's; Carriage handle; Churnpover; Cigar mold; Clocks, striking mechanism; Clod crusher; Column, iron; Cooler, lard and liquor; Cooler, water; Cotton worm poison distributor; Cullinary steamer; Cutlery, manufacture of; Dash board; Dental engine; Deural engine hand piece; Derrick for fluid cans; Desk, school; Digger and cultivator; Doorplate; Drill tube clamp; Drying animal charcoal; Egg carrier; Elevator safety attachment; Elevator safety lock; Embankments, construction of; Engine and pump, rotary; Engine, stationary; Engine, balanced valve; Engine governor; Eyecup; Eyeletting machine; Faucet, beer; Fenceplecker machine; Fence, portable; Fifth wheel; Firearm, breech-loading; Firemen's shield; Flour bolt; Fork, egg; Fruit drier; Furnace and stove; Furnace, boiler; Furnace boiler oven; Furnace grate; Furnace, hydrocarbon; Gas, coal; Gas regulator; Gas retorts; Glass, duplex dressing; Grain cleaner and scourer; Grate, M. Mahony; Grate, fire place; Grater, almond; Griper, lifting; Hammer, bush; Harvester; Harvester rake; Hay tedder; Hinges, cover for butt; Hoe and chopper; Hog-holding implement; Hook, snap; Horsepower; Horsepower, R. Stiles; Horsetoe, Kintzing and Hopper; Hydrocarbon atomizer; Indicator; Insect destroyer; Knife, cheese; Knife-grinding machine; Knitting machine; Leather, etc.; Lens-selecting device; Lock, door; Lock, seal; Loom for pile fabrics; Loom picker rod; Lubricator; Malt crusher; Mill spindle; Mirror attachment; Mower, lawn; Needle blanks; Nut lock; Organ reed board; Paper and twine holder; Paper articles, forming; Paper, ruled; Paper-winding machine; Photographic plate; Pipe coupling; Pipes, joint for lead; Plane, bench; Planter, seed; Pliers, cutting; Plow, H. D. Smith; Plow, gang; Plow, wheel; Pocket, safety; Power by fluids, transmitting; Press, hay; Printed sheets; Pruning shears; Pump; Pump, force; Pumps, bucketforchalu; Pyrometer; Range; Range, E. O. Brinckerhoff; Screw taps, cutting; Screw threading device; Separator, grain; Sewing machine; Sewing machine needle bar; Sewing machine welt gage; Shoe, C. F. Hill; Shoe fastening; Sleigh tender; Sleigh thill; Soap, making; Soda fountain; Soda water cock; Spinning mules, clearer; Spinning ring; Spring torsion; Springs, manufacturing door; Stone, dressing.

Table listing inventions and their patent numbers, including items like Stool, foot; Stop doubling machine; Stove, J. H. Blake; Stove, heating; Table, folding; Table slide, extension; Thill coupling; Timberframe joint coupling; Trap, fly; Trunk hinge and stay; Trunk, traveling; Twine, haling; Valve, globe; Valve, hydraulic safety; Valve, slide and steam; Vehicle wheel; Vehicle wheel, W. Montgomery; Vehicle wheel, A. Wietlisch; Vent plug for beer barrels; Vests, device for laying out; Washboard; Washing compound; Washing machine; Watch dust cap; Waterproof compound; Waterwheel; Weather strip; Weather strip, Lynch and Stowell; Well boring horse power; Wheel, traction; Whip hanger; Yoke and pole, neck.

DESIGNS PATENTED.

- 7,957 & 7,958.—SODA WATER APPARATUS.—G. F. Meacham, Newton, Mass.
7,959.—BUCKLES.—V. Price, Woodside, N. Y.
7,960.—STATUARY.—J. Rogers, New York city.
7,961.—MARTINGALE RINGS.—H. F. Corning, Hartford, Ct.
7,962.—PAPER, ETC.—B. Lawrence, New York city.
7,963.—STOCKING FABRIC.—W. Martin, Philadelphia, Pa.
7,964.—COAL SCUTTLE.—C. H. Morse, Rochester, N. Y.
7,965.—HEATING STOVES.—N. S. Vedder, Troy, N. Y.
7,966.—HANDLE TIPS.—H. W. Wright, Glastonbury, Ct.
7,967.—SAD IRON HANDLES.—W. J. Reagan, Royer's Ford, Pa.
7,968.—PEN.—R. E. Cannon, Lexington, Ky.

TRADE MARKS REGISTERED.

- 2,140.—LABELS.—Allen, Lane & Scott, Philadelphia, Pa.
2,141.—CIGARS.—Goldsmith & Newburgh, Cincinnati, O.
2,142.—JET.—Holzinger & Bruckheimer, New York city.
2,143.—BITTERS.—V. Keck, New York city.
2,144.—CLOTHING.—A. Nicoll, Brooklyn, N. Y.
2,145.—CIGARS.—W. H. Romerman, Jacksonville, Ill.
2,146.—SHIRT BOBOMS.—S. Shiley, Boston, Mass.
2,147.—ROOFING.—A. H. Soden, Newton, Mass.
2,148.—CORSETS.—Comfort Corset Co., Boston, Mass.
2,149.—VARNISHES.—Hyatt & Co., Newark, N. J.

SCHEDULE OF PATENT FEES.

Table listing patent fees: On each caveat \$10; On each Trade mark \$25; On filing each application for a Patent (17 years) \$15; On issuing each original Patent \$20; On appeal to Examiners-in-Chief \$10; On appeal to Commissioner of Patents \$20; On application for Reissue \$30; On filing a Disclaimer \$10; On an application for Design (3 1/2 years) \$10; On application for Design (7 years) \$15; On application for Design (14 years) \$30.

CANADIAN PATENTS.

LIST OF PATENTS GRANTED IN CANADA, DECEMBER 23 to DECEMBER 29, 1874.

- 4,205.—H. Smith, Hamburg, Waterloo county, Ont. Improvements in wind wheels, called "Smith's Improved Wind Power Wheel." Dec. 28, 1874.
4,206.—J. Tesseman and P. Smith, Dayton, Montgomery county, Ohio, U. S. Improvements in valve gear for steam engines and pumps, called "Improvements in Steam Pump Valve Gear." Dec. 28, 1874.
4,207.—P. P. Mackelcan, Montreal, P. Q. Improvements on a machine for pulling stumps, called "The Farmer's Stump Machine." Dec. 28, 1874.
4,208.—W. G. P. Casels, Toronto City, Ont. Improvements in stoves, called "The Improved Water Evaporator." Dec. 28, 1874.
4,209.—M. G. Wilson and J. H. L. Wilson, Sherbrooke, P. Q. Improvements in hollers, called "Wilson's Vegetable Boiler." Dec. 28, 1874.
4,210.—H. D. Gibbs, Batavia, Genesee county, N. Y., U. S. Improvements in devices for connecting the neck yoke with the draft poles of vehicles, called "Gibbs' Improved Neck Yoke Clasp." Dec. 29, 1874.
4,211.—F. H. C. Mey, Buffalo, Erie county, N. Y., U. S. Improvement on grain and malt dryers, called "Mey's Grain and Malt Dryer." Dec. 29, 1874.
4,212.—G. White, London Township, Middlesex county, Ont. Improvements on parts of carriages, called "White's Improvements on Carriage Axles, Springs, Shaft Couplings, and Tyres." Dec. 29, 1874.
4,213.—T. Gavin, Montreal, P. Q. "Ameliorations aux boites a tamiser les cendres de charbon de terre, par Thomas Gavin," called "Improvements in Sifters for Sifting Coal Ashes." Dec. 29, 1874.
4,214.—D. W. Sirell, Riviere du Loup, Temiscouata county, P. Q. Improvements on rackreamers, called "Sirell's Improved Reamer." Dec. 29, 1874.
4,215.—F. H. Date, Niagara, Lincoln county, Ont. Improvements on the manufacture of illuminating gas, called "Date's Manufacture of Illuminating Gas." Dec. 29, 1874.
4,216.—C. M. Clinton and L. Wood, both of Itasca, Tompkins county, N. Y., E. C. Gregg and C. P. Gregg, Trumansburg, Tompkins county, N. Y., U. S. Improvements in wheeled horse rakes, called "Clinton and Wood's Improved Horse Rake." Dec. 29, 1874.

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