

(4674) S. P. asks: 1. What is the usual way to fix railings, grills, etc., in concrete, in brick, or stone? What materials are used, how mixed and applied? A. Lead is generally used for fastening railings to stone. Holes drilled from 3 to 4 inches deep. Spuds or posts roughened at bottom, lead poured and calked when cold. Pure Portland cement makes a good fastener for bricks, stone, or concrete, only requiring a little deeper setting, say 5 or 6 inches for stone and 6 to 8 inches for brick and concrete. The Portland cement should be mixed thick and driven in with a tamping. 2. Is there anything that can be applied to wood to make it impervious to water under pressure say of 150 pounds per square inch, as water pipes for instance? A. Wooden water pipes can be made impervious to water by immersion in hot asphalt for a few minutes and the asphalt drained out. Hot paraffine may also be used, but does not penetrate the wood as well as asphalt. 3. Suppose I wish to convert decimals of small denomination as 0.0001265 into the metric system, as equivalents, what should I call it? I find nothing lower than a millimeter. A. The reduction of a decimal value of any unit into a metric unit is made by multiplying the decimal by the ratio of the metric value to the primary unit value; so if your decimal is of one inch, your multiplier will be 25.4 x 0.0001265 = 0.0032131 of a millimeter. 4. What is lapping and how is it done? It is a finish I am told after grinding fine work in machine, etc. Are there any books on grinding and lapping published? A. Lapping is truing a surface on a flat wheel, which may be of metal charged with fine emery, or on the flat side of an emery wheel. See "Hand Book for the Artisan, Mechanic and Engineer," by O. Byrne, \$5 mailed. It has a full description of polishing and lapidary work.

(4675) C. K. F. writes: 1. In a book by T. O'Connor Sloane he tells how to make a Lalande-Chapron battery. He takes an empty tomato can, places a quantity of oxide of copper on a layer of iron borings, clippings, etc., on the bottom of the can; a porous cup is then placed in the inside of the jar filled with a 10 per cent solution of caustic soda, a zinc placed inside of this. He says the battery will give electromotive force 0.75 of a volt. How long do you think such a battery would last? Do you think it would pay to make some? Would it give the E. M. F. named above? Would it do as well to omit the porous cup and fill the can with the solution and suspend the zinc plate from the cover? Does a battery of this type emit any fumes or smell while at work? Do you think it would work? A. The porous cup or some equivalent is necessary in the battery as described, only to keep the zinc from touching the iron. An iron wire gauze cup might be used if the zinc were kept from contact therewith by blocks of wood. It gives a low E. M. F. 0.50 to 0.75 volt, has rather low resistance, but is not what is known as a strong battery by any means. It will last quite long and is excellent for open circuit work. The battery emits no fumes. 2. We made a motor of the Siemens type armature and wound for a series motor. It would not run when connected as a series machine on one large cell of the ideal storage type; when we connected it as a shunt, it ran very fast. We have 6 coils No. 20 A. W. G. on armature, and No. 18 on field magnet; the armature is made up of iron washers with one-half pound of wire. Can you give explanation? A. Your motor, we presume, was of too high resistance for your battery. It ran on lower E. M. F. when connected in shunt.

(4676) J. J. K. writes: A says that the sharp cracking sound heard in steam pipes when steam is turned on in the morning is caused by the water remaining in the pipes, which is the condensed steam of the night previous. B contends these sounds are produced by the rapid expansion of the pipes in consequence of the steam rushing through them, and that the water produces only a low gurgling sound, which may be heard at any time steam is turned on. A. The cracking or hammering in steam pipes is made by the surging of the water of condensation from the steam. It may be water that has remained over night in the pipes if they have not been thoroughly drained, or the water condensed in cold pipes, which condenses the steam very fast when first turned on. The hammering may also occur at any time by neglect in properly providing for the drainage of all the pipes in the supply and return as well as the coils or radiators. The mere passage of the steam only causes a whistling noise, and the expansion and contraction of the pipes causes no noise whatever, unless a very great length of pipe drags on a solid fastening or support.

(4677) J. R. P. asks how to mend glass jars. A. The Pharmacist recommends the following as a proved recipe: "Take 1 ounce of Russian isinglass, cut it in small pieces, and bruise well, in order to separate the fibers, then add 6 ounces of warm water, and leave it in a warm place that the isinglass may dissolve, which will require from 24 to 48 hours. Evaporate this to about 3 ounces. Next dissolve 1/2 ounce mastic in 4 ounces of alcohol, and when this is ready, transfer the isinglass from the evaporating dish to a tin can (an empty ether can will be found convenient), heat both solutions, and add the mastic solution to the isinglass in small quantities at a time, shaking the can violently after each addition. While still hot strain the liquid through muslin cloth and put up in 1/2 ounce bottles. This cement is very valuable, and articles, such as mortars, graduates, etc., mended by it have been in use for years, and, in fact, seem to be stronger than they were originally." From the "Scientific American Cyclopaedia of Receipts, Notes and Queries."

(4678) E. P. W. asks: What horse power engine would it take to drive a pump forcing water into a cylinder under a pressure of one thousand pounds to the square inch, the cylinder having an opening or discharge pipe of 1/2 inch in diameter, the opening of 1/2 inch to be open all the time and the pressure to be maintained at 1,000 pounds? A. You will require 12 horse power for maintaining the pressure as stated.

(4679) J. J. O'B. asks: Is hot air pumped into a boiler with an air compressor of any economical aid in doing the work with steam? Is it not dangerous to continually pump hot air into a

boiler? Is it feasible to do the work with steam and hot air mixed in proportion of two to one—two of steam and one of hot air? If so, is there any economy in it? The working pressure is to be 100 pounds a square inch. A. There is no economy in pumping air into a boiler to use with steam. It costs more to compress air than the work it returns. There is no danger, and it is feasible, to use aerated steam in any desired proportion. The only economy ever claimed was the saving of the latent heat of the steam that the air displaced, but it costs more than the heat expended in compressing the air by a steam-driven compressor.

(4680) S. E. B. asks: Is there any foundation for the oft-advanced theory that burning zinc (in small pieces occasionally) in soft coal heaters will remove soot from stove pipes and chimneys? If not, is there any way to keep them free except by taking them down? A. There is a possibility that the zinc in oxidizing and passing through vertical pipes and chimneys deposits a coat of white oxide upon the surface, which may detach the soot that is afterward deposited and cause it to fall, when it may be readily cleaned out. We have no evidence that the soot is burned or destroyed by the zinc. We know of none but the old way of cleaning that is reliable.

(4681) J. C. W. writes: Please explain the following: During the present cold spell, many of the water pipes in our dwelling houses have been frozen, and singularly enough the hot water pipes were often closed than the cold ones, where hot and cold water were in use. Upon inquiry I find that this was not in isolated cases, but very generally, and in many instances the hot and cold pipes lie together. A. The heating of the water expels the air, which is often seen to sputter from the hot water faucets. Water without air, or from which air has been expelled by heat or otherwise, freezes slightly easier than aerated water.

(4682) G. W. R. asks how wide Behring Strait is at its narrowest point, and also the depth of the Strait at this point. A. Behring Strait is 60 miles wide. A small island is in the Strait 40 miles from the Alaska shore. Water of the Strait 25 fathoms deep.

(4683) F. K. H. writes: I would like you to please give me an answer why a bell worked on one wire, a galvanized wire, the wire three blocks distance, and I use the ground for return, have got six cells of battery. At the end of the line where the bell is, the current is so strong it can hardly be held in the month, and when the wires are touched to the bell it does not ring. I know that it is not the fault of the bell, because when it is connected direct from the battery it rings. A. Probably the difficulty with your electric bell is that its resistance is too great, or that you have not sufficient battery power to overcome the resistance of both the line and bell.

TO INVENTORS

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INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

February 7, 1893,

AND EACH BEARING THAT DATE.

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

Table listing inventions with patent numbers, including: Acid, making nitric, O. Guttmann; Air compressor, hydraulic, G. H. Walker; Aluminum and forming alloys thereof, electrically reducing, T. L. Willson; Animal trap, G. Andrews; Anti-rail trap, L. Herman; Artificial board, J. E. Eaton; Axle box, J. M. Smith; Bag or pouch, F. M. Turck; Barrel filling apparatus, P. H. Shumway; Bear net, anti-friction, F. Beckman; Bearing plates, manufacture of center, C. T. Schoen; Bed, A. F. Conant; Bed, O. G. Franks; Bicycle, F. Sweetland; Bicycle gear, W. Mahoney; Bicycle lock, E. Byusse; Bicycles, combined coasting pedal and lock for, W. G. Fay; Board, See Artificial board; Game board; Bobbin winding machine, C. S. Mar ball; Boiler, See Ceramic boiler; Steam boiler; Wash boiler; Furnace gas producing furnace, steam, O. W. Ketchum; Bookcase, revolving, W. F. Berger; Book for bookkeeping, G. D. Thomas; Boots or shoes, making, G. W. Day; Boring machine, C. F. Hotchkiss; Bottle, A. L. Straus; Bottle stopper, E. Hutter; Bottle stopper, J. Lamborn; Bottle stopper, G. W. Gardner; Bottle washing machine, L. A. Ensigner; Bottles, tool for finishing the necks and mouths of, C. H. Beach; Box, See Post office lock box; Brake, See Car brake; Bridge gate, safety draw, Hoeftler & Chapman; Brush, blacking, T. Haswell; Buckle, J. Barkley; Buckle, J. N. Faust; Buckle, A. E. McClure; Burr wheel, R. W. Gormly; Button fastener, centrifugal, A. Washlin; Button fasteners into the eyes of buttons, machine for threading, A. W. Ham; Button, suspender, Staylor & Schnur; Cabinet, parcel, H. B. Taylor; Calking strip, metallic, F. W. Fincher; Can tap and filler, oil, N. Hardoin; Car and air brake coupling, combined, J. C. Smith; Car brake, M. E. Ellsworth; Car brake, M. E. Stahr; Car buffer, T. L. McKean; Car coupling, M. J. A. House; Car coupling, J. H. Brown; Car coupling, H. C. Buhoup; Car coupling, G. Eklund; Car coupling, J. Joes;

Table listing inventions with patent numbers, including: Car coupling, J. C. McEwen; Car coupling, W. F. Richards; Car coupling, W. F. Starkey; Car coupling, M. E. Wallace; Car couplings, unlocking lever for, J. Timms; Car roof covering attachment, A. N. Monteer; Car sand box, street, E. F. De Witt; Car signal, J. G. Tomlinson; Car ventilator, Bancroft & Hawcroft; Car wheel, W. J. Willits; Cars, automatic coupling for steam and air pipes for railway, J. E. Marble; Cars, heating and ventilating railway, J. J. Burwell; Cars, switch for electrical tram, M. Immisch; Carbon, arc light, J. McLaughlin; Card, playing, F. Ames; Carding engine, F. A. Flather; Carding engines, apparatus for grinding flats of, J. Jones; Carriage machine spring presser, J. D. Stanwood; Case, See Bookcase; Cash and parcel carrier apparatus, E. A. Owen; Cash recorder, A. J. Walters; Casket handle, J. McCarthy; Casting ingots, apparatus for, T. Kaye; Cement, B. Dreyfuss; Cement, E. C. Greer; Chair, See Dental chair; Folding chair; Reclining chair; Suspended chair; Chair, A. Vose; Chair pad, Totman & Wheeler; Charm of other article of jewelry, watch chain, Stahl & Klipper; Chemical cutting machine, Lewis & Grundy; Cleas, I. Coe; Cleaner, See Flue cleaner; Clip, See Insulator clip; Clock, alarm, E. B. Winger; Clock, electric, J. H. Dyson; Clock, pocket, J. Sholle; Clothes pounder, G. Seeger; Clutch, C. K. P. Okles; Clutch mechanism, T. Griswold, Jr.; Coat collar supporter, W. P. Culver; Coffee or tea pot, G. W. Goodwyn; Coin actuated machine, W. A. Smith; Coin meters, W. C. Greer; Combination lock, J. D. Craig; Continuous kiln, P. L. Youngren; Conveyor, M. Garland; Core bar, F. L. Clark; Cork cutting machine, Rote & Landis; Corn product, J. G. G. G. G.; Corn machine, B. Hall; Coupling, See Car coupling; Car and air brake coupling; Pipe coupling; Thill coupling; Coupling gauge, Hazlehurst & Cole; Crane, Jib, E. W. Taylor; Crank shaft, C. K. Longenacker; Crates, N. M. Thomas; Cultivator, double shovel, Hinkle & Gaither; Culvert, C. B. Davis; Cup, See Paint or varnish cup; Curing iron heater, electric, S. B. Jenkins; Cutter head, T. B. Reese; Damper, rotating apparatus, F. & J. St. Mary; Dental chair, A. P. Gould; Dental engine, A. P. Gould; Dental engine, ankle attachment, S. P. Sharp; Dental use, surgical forceps for, C. E. Blake, Sr.; Desk, adjustable, S. J. Reynolds; Diarrhoea, J. M. Thomas; Die stock, B. Thayer; Dies for producing designs on soft metal, making, B. F. Kelsey; Door check, G. W. Wright; Door hanger, J. W. Conchar; Door opening, J. F. Mueller; Door spring, G. W. Wright; Door spring and check, G. W. Wright; Draughtregulator, P. W. Cornwell; Draw bars, manufacture of, J. Green; Drawing, testing and correcting free-hand, A. K. Cross; Drift, V. C. Byrne; Driving mechanism, J. V. Motter; Drying in vacuum, apparatus for, E. Donard; Dye, blue black azo, T. Diehl; Dye, brown, Gnehm & Schmidt; Dye, violet-blue induline, Schmidt & Mohler; Edges, making pure carbonic acid, E. Jenkens; Eiders, gravity dog for game, Tarrant; Electric lock, Moyer & Rhodes; Electric machine, dynamo, Parrot & Reiglier; Electric switch and door lock, combined, J. H. L. Holcombe; Electrical machine, bipolar, T. H. Hicks; Elevator, See Car; Emery wheel dresser, W. W. Brisbane; Engine, See Dental engine; Gas engine; Rotary engine; Steam engine; Traction engine; Extractor, See Bottle stopper extractor; Butter extractor; Extremities of and apparatus for making, J. E. McCarty; Fan, T. F. Davis; Fan, G. W. Fowler; Fan, G. W. Kirkman; Fan, vehicle, M. H. Tripp; Fence, J. E. Kline; Fence wire, E. C. Kline; Ferro-ferric and ferric oxides, apparatus for producing, Crosley & Jones; Fertilizer or insecticide distributor, D. J. Manning; File cases, temporary binder for, A. Dom; File cases, temporary binder for, A. Dom; Firearm magazine, A. W. Savage; Fire escape, P. A. Burgess; Fire kindler, A. Johnson; Flue cleaner, P. A. Burgess; Fluid meter, Kent & Price; Fly catcher, G. D. Horton; Folding chair, C. H. G. G.; Fracture apparatus, J. F. Rowley; Fruit picker and pruning implement, combined, J. H. Griswold; Funnel, A. Gersdorff; Furnace, See Boiler gas producing furnace; Desulphurizing furnace; Smoke consuming furnace; M. W. Keene; Furniture fastening, S. H. Stiggleman; Gauge, See Coupling gauge; Game apparatus, C. Trudgen; Game board, G. H. Monks; Garment fastener, E. Bernstein; Garment hook, G. B. Mershon, Jr.; Gas, apparatus for the manufacture of, J. B. Archer; Gas, apparatus for the manufacture of, J. Askins; Gas engine, J. S. Biggar; Gas, making pure carbonic acid, E. Jenkens; Gas manufacturing, J. B. Archer; Gas meter, T. F. Downey; Gate, See Bridge gate; Railway gate; Gearing, chain, E. J. Garrard; Generator, See Steam generator; Glass batch mixer, D. Fugh; Glass, L. E. L. E.; Governor, L. P. Lochmann; Grand stand, P. F. Cuplin; Grease, etc., composition of matter for removing, B. Eham; Gridiron, electrically heated, W. Mitchell; Guns, ejector mechanism for drop-down, J. Ross; Gyration, weight holder for cabinet, J. E. Whitney; Hame staple, C. A. Nelson; Hand power attachment, F. M. Foster; Handle, See Casket handle; Hanger, See Door hanger; Harness tool, J. Cunningham; Harrow, N. W. Beck; Harrow, W. W. Green; Harrow tooth holding device, J. G. Stowe; Harvester reel, A. Rekart; Hat trim softening device, W. Mitchell; Hay rack, A. H. Parker; Heated vessel, electrically, S. B. Jenkins; Heated vessel, electrically, W. Mitchell; Heater, See Hot water heater; Water heater; Heel plate, H. E. Van Benschoten; Hides, machine for treating, Pullman & Smith; Hoist elevator, E. J. Garrard; Hoisting machine, C. Smith; Hook, See Garment hook; Hook and eye, C. E. Barnes; Hooks and eyes, machine for carding, J. W. Granger; Hooks and eyes, machine for manufacturing, J. W. Granger; Hook, See Garment hook; Hook, R. C. Manville; Horse power, J. Dages; Horsehoes nails, manufacturing, W. W. Miner; Hose holder, L. F. Pearson; Hot water heater, mantel, T. Holland; House, J. L. Comly; Ice making apparatus, M. Hart; Ice making apparatus, L. Pusey; Ice plow tooth fastening, J. G. Bodenstein; Insulated magnetic coil, T. E. Morford; Insulating electric conductor, T. E. Morford (r.);

Table listing inventions with patent numbers, including: Insulation of dynamo armatures, T. E. Morford; Insulator, A. R. Lane; Insulator, W. V. Garrard; Iron, See Gridiron; Smoothing iron; Soldering iron; Iron, apparatus for the purification of cast, A. P. G. Rollet; Jack, See Window jack; Jack, See Window jack; Knitting fabrics, W. Zlock; Knitting machine cam cylinder, R. Kirkpatrick; Knitting machine needle, R. Kirkpatrick; Knitting machines, extra thread feeding device for, L. N. D. Williams; Knitting machines, needle picking device for circular, W. Diebel; Lamp, duplex electric arc, C. E. Scribner; Lamp, electric arc, W. E. Freeman; Lamp socket, E. R. Elliott; Lamps, windless for lowering or raising street electric, C. R. Eddy; Last, E. C. Eddy; Last boring machinery, D. C. Robhun; Latch, C. P. Herrmann; Lathe, A. Catchpole; Lathe tool and support, W. L. Cheney; Lawn sprinkler, J. Jett; Lock, See Bicycle lock; Combination lock; Electric lock; Lock, M. Higgins; Look for metallic plates, W. H. Brooks; Loom, circular, A. H. Soret; Loom fringe attachment, K. Engsborg; Loom, swivel, B. Haycock; Loom, automatic stop motion for, Smith; Lubricator, W. Garrison; Lubricator, T. Poore; Lubricator, C. Tregoning; Lubricator, E. E. Witter; Lug, supporting, G. H. Drake; Mangle, S. Wiggins; Map or chart stand, adjustable, J. H. Kaufman; Mapping or drawing lands, apparatus for, J. F. D. Schrader; Match, C. M. Bowman; Match lighter, automatic, R. Kraus; Matchbox, method of and device for making, C. M. Bowman; Measuring instrument, electrical, E. G. Will; Meter, See Fluid meter; Gas meter; Milk coagulating product, C. P. Eyre; Milk can, electrically heated, W. Mitchell; Moulding materials, machine for centrifugally treating, O. B. Peck; Motor, See Spring motor; Mower or reaper cutting apparatus, W. S. & W. S. Elliott, Jr.; Mowing machine cutter bar, M. C. Sooter; Musical instrument, J. F. Luscomb; Musical instrument, mechanical, F. Pietschmann; Nut lock, J. L. Hayward; Nut machine, M. F. High; Oil burner, B. Roberts; Oil burner, See Oil burner; Padlock, permutation, J. A. Halden; Pall, butter, L. Daugherty; Paint or varnish cup, G. W. Davis; Pans, implement for lifting, Watkins & Bayless; Patterns on woven fabrics, product leaf metal, F. Lehmann; Pen, See Pen; Pencil sharpener, Odell Smith; Pew back etc., W. H. & C. Roehr; Piano, W. P. Haines; Piano action, F. A. Guth; Picture mat cutting device, E. L. Gaylord; Pipe, See Tobacco pipe; Pipe, See Tobacco pipe; Pipe wrench, W. J. Walker; Pipes, double testing plug for soil, J. F. McCartney; Planter, grain, O. F. Yarbrough; Planter, seed, Learmonth & Beltman; Planters, furrow closing attachment for corn, A. W. W. Piers, parrot, Vonhaus & Becker; Plow, W. H. Ammons; Plow, F. B. Rowland; Post office lock box, F. R. Riddell; Pot, See Coffee or tea pot; Pottery clay for, W. M. B. Wer; Power, See Horse power; Power, electrical transmission of, C. S. 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Belling; Salt manufacturing apparatus, J. Runciman; Sash balance, E. L. Bullock; Sash balance, F. P. Johnson; Sash fastener, A. Barton; Sawmill carriage setting device, J. H. Dodds; Sawmill carriage, mechanism for operating, E. A. Reese et al.; Sawmill carriages, mechanism for operating, J. N. Ritchey et al.; Scale beam, L. G. Woolley; Scalper, A. Van Camp; Screw cleaning device, W. F. Stevens; Sealing device, bottle, M. N. & E. P. Lynn; Sealing device, bottle, E. P. Lynn; Sealer, broadcast, E. H. Grafunder; Seller, merchandise, F. Towle; Sewing machine attachment, R. A. Sheppard; Sewing machine, book, D. M. Lytt; Sewing machine, tension device, G. F. Ruby; Shears, W. B. Clarke; Shelf, hanging, C. W. Edgerton; Ship, steam, C. Harris; Shock binder, C. S. Unruh; Shutter fastener, L. M. Froberg; Signal, See Car signal; Smoke consuming furnace, W. Arnesman; Smoothing iron, electrically heated, S. B. Jenkens; Snap and buckle, D. W. Simmons; Soda fountain, A. 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