

tion with a gas or water pipe; if possible it should be at a brass section of the pipe rather than an iron or lead, and it should be soldered when possible. The surface should be thoroughly brightened and the wire given ten or twenty turns around the pipe. In cases where a gas or water connection cannot be reached, a very good ground can in many cases be made by driving a rod of iron five or six feet into the ground; this will generally work well if the wire is soldered to it. A sheet of zinc or galvanized iron of say 10 square feet surface will answer every purpose if the soil is not too dry. It should be set in a vertical position. I have a galvanized sheet iron ground which has worked well for six years. In sections of country where the soil is shallow a greater surface will be necessary to make up for the lack of depth. I have made good grounds by soldering a number of old oyster cans to a wire, and by burying iron turnings and filings in a trench. A failure of any of these methods should not discourage, as it often happens that a change of a few feet in the location will find success.

(27) G. W. L. asks how to enamel paper tubes and packages to contain butter, lard, etc., and similar substances. A. A sirupy alcoholic solution of bleached shellac mixed with terra alba or other opaque harmless earth has been employed for similar purposes.

(28) H. M. J. asks how phosphor bronze is made. A. See p. 411 (30), vol. 39, SCIENTIFIC AMERICAN.

(29) R. & T. write in answer to W. M. M., query No. 23, page 203, current volume of SCIENTIFIC AMERICAN: It is necessary for a practical man to have the millstone before him and to know what quality and quantity of work is required of the same, also to see the grain to be ground; because of the many different circumstances controlling the millstone, it is impossible to lay down any fixed rule for a stone, as we are governed solely by conditions, and as such, milling is not a science but an art, and must, therefore, be handled to suit circumstances and conditions.

(30) D. J. W. asks for a receipt for making a blue writing ink that can be made in small quantities, say 1/2 gallon, of these qualities: color bright blue, will not settle or thicken on exposure to the air, and flows freely. A. Couper's blue, also known by the name of indulin, dissolved in water in the ratio of 20 parts to 1,000 of water, forms a writing ink of a good color, which it retains when treated with chemical agents. It does not corrode steel pens. Anything added to ink to prevent evaporation also tends to prevent it drying when written with. Replace the water lost by evaporation occasionally.

(31) W. H. H. asks: 1. Will ordinary coal lose a part of its weight by being exposed to the air and sun? A. Yes, if it contains much moisture and sulphides. 2. If it does, what per cent of its weight will it lose? A. It depends upon the amount of moisture, sulphides, etc., present in the coal, and the conditions, time, etc., of exposure.

(32) H. L. writes: I have a good deal of trouble with my lard, which I work every day in the hot weather; it gets sour very often. Can you suggest anything that will keep lard sweet? A. In hot climates a small quantity of calcium sulphite is sometimes used, a few grains to the ounce.

(33) D. W. C. writes: In your issue of March 29, page 203, W. M. M. asked: "In laying off a millstone in furrows, what draught is given; what amount of the space of a stone is given to furrows and what to grinding surface?" The draught of the furrows of millstones should be in proportion to their diameters, that is, to give stones of different diameters equal draughts, the distance of their furrows from the center must be in direct proportions to their diameters. A stone four feet in diameter, the draught of the leading furrows should be two inches from the center of the stone, and all other small furrows should be parallel to the leading furrows; the whole surface of the face of the stone should be given to furrows, to form edges; because the principle of grinding is that of shears clipping; the furrows serving as edges to cut the grain; therefore, it is plain that the more cutting edges the stone has, the faster it will grind. The best dress that I have put on a stone is laid off in this form: divide the face of the stone into sixteen leading furrows; then divide the sections of the stone into as many straw furrows as possible. These straw furrows should be very narrow, and be made parallel with the leading furrows.

(34) C. M. D. writes: Please inform G. M. A., in "Answers to Correspondents," that he can get a very good and durable coat of brown on his gun, by allowing it to get covered with salt spray and letting it rust for a day or two, after which he must rub off the loose rust and give the barrel a couple of coats of oil.

(35) S. B. G. asks: 1. Should a violin be left in tune when laid away? A. Yes. 2. At what angle to the axis of the wheel should the wings of a wind power be set? A. The mean angle should be from 15° to 17° from the plane of rotation of the wheel. 3. If a small log be split into halves or quarters it will spring outward, and appears as though the heart side is longer than the bark side. What is the cause of it; does the wood of the bark side contract, or does the wood of the heart side lengthen? A. The moister sap wood probably contracts most on exposure to the air.

(36) J. H. asks: 1. What kind of wax or varnish is used in etching on steel with nitric acid? A. Beeswax or paraffin. 2. What parts of a locomotive are called the journals? A. The cylindrical parts of the axles, which revolve in the boxes. 3. A friend of mine has been disputing with me about governors; he says that they are all self-regulating, while I claim that the engineer has to judge from the speed of the balls. A. All governors are intended to be automatic or self-regulating.

(37) W. S. W. asks: 1. Can a young man get enough knowledge of locomotive engineering by hard study, to materially lessen the time required on an engine as fireman? If so, what time would it require and what books would you recommend? A. Yes. "Bourne's Hand Book of the Steam Engine," and "Forney on Locomotives," and "Reynolds' Locomotive En-

gine Driving." 2. How long should a young man, who has a taste for the business, fire a locomotive before being qualified for promotion to engineer? A. It depends upon his intelligence, application, and observation. 3. What traits of character are required in order to become a good locomotive engineer? A. System; habits of close observation; readiness of resource; a cool head, and great presence of mind. 4. Is there any difference in the power of two locomotives of equal weight, one having 4 and the other 6 drivers, the drivers to be of the same diameter? A. No, if friction is not considered. 5. What is about the average weight of American locomotives? A. 36 to 35 tons.

(38) C. B. asks: 1. Have any vessels been constructed to go under water? A. Yes; Fulton constructed one, and in the early years of the late war there were at least two successfully operated in New York harbor. 2. Have any electrical engines of one horse power or more been invented? A. Yes, there have been many made of small power. You will find descriptions of both of them in the back numbers of the SCIENTIFIC AMERICAN.

(39) B. F. asks: Does it take any more power to force a column of water through 1,000 feet of pipe on an inclined plane and raise it 70 feet than it does to force a column through 70 feet perpendicularly? A. Yes, by the amount of friction of the increased length of pipe required.

(40) J. D. asks: What size wire cable was in use at the hauling off the steamship Americas into deep water at the time she was stranded on Long Branch Beach, and also what power engines were in use on her to get her off? A. No wire rope used, but four 18 inch hemp cables, with blocks and falls from the cables to the drum of the ship's hoisting engines.

(43) M. O. D. asks: 1. Do you know of any materials that are preferable to infusorial earth and wrought iron turnings for use in a vessel for filtering drinking water? Will it answer to mix them together in one mass? A. Well burned granular charcoal is in many cases preferable to iron in such a filter. You will find an excellent article on the purification of drinking water on p. 414 et seq., Science Record for 1874. See also p. 346, vol. 39, SCIENTIFIC AMERICAN. For the purification of water containing much organic matter, Dr. Crookes recommends the addition in the proportion of from one to two parts of the following mixture to every 1,000 parts of the water: Permanganate of lime, 1 part; sulphate of alumina, 10 parts; fine pipe clay, 30 parts; intimately mix. After settling for 15 minutes the water can be drawn off from the sediment without filtering. 2. Is there any objection to a brass vessel tinned inside? A. Yes, wood is preferable. 3. Are tinned iron wire screens objectionable; how fine should the mesh be? A. Stout cotton cloth will be found more serviceable, and is less objectionable. 4. Will the same filtering materials answer for boiler feed water? If thoroughly cleaned once a day how long a time will the filtering materials last? A. It would depend much upon the water.

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

L. S. S.—21. A green trap rock, contains pyrite, quartz, and garnet. 22. Similar to No. 21 with serpentine. This sample contains traces of gold.—J. C.—Apatite, calcium phosphate, containing more or less calcium chloride and fluoride.—E. H. A.—Fossiliferous limestone.—C. I.—Arsenical pyrites in talcose slate. It contains traces of gold.—J. R.—No. 1. Chiefly hornblende and calcite containing graphite (plumbago). No. 2. To get the value of mineral specimens you should address some dealer in minerals.—E. E. C.—The bead is composed chiefly of lead. It contains a trace of silver.

COMMUNICATIONS RECEIVED.

On the Whirlpool. By T. P. R. On Consumption. By R. R. G. On the Autopsy of an Elephant. By A. J. H. On the Destruction of Insects. By F. L. J. Removing Stains. By J. C. W.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

May 13, 1879,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

Table listing inventions such as Angle plate, Animal trap, Apple corer, Axle box lid, Bales apparatus, Baling press, Ball trap, Barrel carrier, Bed bottom, Book cover, Boot and shoe sole shaper, Bottle case, Bottle stopper lock, Bread raiser and fruit drier, Bridge, Bridge truss, Bridle rosette, Bung extractor, Bung vent, Burlap case, Button hole cutter, Can, Car brake, Car buffer, Car coupling, Car door, Car hand, Car heater, Car wheel, Carpet stretcher, Carriage brake, Carriage child's seat, Carriage top, Cartridge closing machine, Casting hard metal, Chandeliers, Chart, Cheese turner, Chocolate, Churn, Churning apparatus, Cigar pipe, Clock, Clothes line fastener, Clutch, Comb cleaner, Compass, Corn drill, Cotton and hay press, Cultivator, Curtain fixture, Curtain fixture, Cut-off steam engine, Dental plugger, Dividers, Drawing board, Dredging machine, Elevator, Elevator brake, End gate, Engraving machine, Evaporating pan, Exercising machine, Extension table, Farming mill, Fatig gate, Fence, Fence bar wire, Fence post, Fence post, metallic, File, bill, Firearm, Furnace for recovering soda ash, Furnace grate, Fuse, Gas lighter, Gliding mouldings, Glove tree, Glycerine from fats, Grain binder, Grain binder attachment, Grain lifter, Grain sampler, Grate, Grinding and polishing wheel, Grinding mill, Grinding mill, middlings, Gum box and top, Harrow, Harvester, Harvester, corn, Hats and bonnets, Hats, manufacture of felt, Hay rake, Heating stand, Hinge, Hoisting and transferring heavy weights, Holdback, Honeycomb base, Horse detacher, Horse detacher, E. M. Shirley, Horse power, Horse power, P. K. Dederick, Horse power, P. C. McCune, Insulating telegraph conductors, Ironing machine, Ironing machine, W. & J. Coutle, Ironing machine, W. S. Kinsman, Ironing machine, Thomas & Smith, Ironing table, Jeweler's findings, Jewelry, manufacture of, Joint holder, Kitchen utensil, Ladder and trestle, Lamp chimneys, Latch keeper, Latch, reversible, Laundry rack or bracket, Liquors, process and apparatus for fining fermented, Loom temple, Mail bag fastener, Measure, liquid, Measuring device, Mechanical movement, Metal groover and swager, Milk cooler, Milk cooler, Mower, lawn, Musical instrument, Necktie, Nut cracker, Nut lock, Ore roaster, Ore roaster, P. Plant, Ore separator, Oscillating chair, Overallis, Packing, piston, Paper clamp, Paper cutting machine, Paper damping machine, Paper damping machine, S. D. Tucker, Paper machine, Paper vessel, Pease, preparation of, Pegging machine, Pen, pneumatic perforating, Permutation lock, Pianoforte key board, Picture exhibitor, Pitcher, ice, Plaiting machine, Planter, corn, Planter, corn, G. W. Brown, Plow, sulky, Plow, sulky, I. R. Gilbert, Portable press, Pruning implement, Puddling furnace, Pump joint coupling, Punching machine, Railway gate, Railway tank apparatus

Table listing inventions such as Reclining chair, Refrigerator, Rolling mill feeder, Rotary steam engine, Ruler, parallel, Safe, provision, Sash balance, Saw guide, Saw mills, feed and gig mechanism, Seed separator, Seeding machine, Sewing machine fan attachment, Shaft coupling, Shirt neck shaper, Shoe fastener, Shoe fastener, A. Sorg, Shoemaker's workbench, Shutter, L. Lefebure, Shutter fastening, Smokestack, locomotive, Snap hook, Snow flanger, Spectacles, Speed changer, Stalls, fastening and releasing device for cattle, Stamp, perforating, Stamp, perforating, B. D. Stevens, Stand for ice pitchers, Starching machine, Steam engine lubricator, Steam generator, Stool, piano, Stove, G. R. Prowse, Stove and furnace fire pot, Stuffing box, Suspension ring and hook, Tap, Castle & Strong, Teeth, filling, Tether, horse, Tobacco elevator, Torch, gas lighting, Torpedoes, weight for exploding, Toy pistol, Tug and trace, Turbine wheels, Type writing machine, Valve for steam engines, Valve, safety, Valve, steam, Valve, steam, H. F. Colvin, Vehicle spring, Ventilator, Vest, R. Vogel, Warper, R. H. Plummer, Watch chain bar, Water elevator, Water wheel curb, Well, bored and driven, Wire and sheet metal cutter, Yeast and producing specific fermentation, containing pure

TRADE MARKS.

Table listing trademarks such as Anti-febrile medicine, Bread, crackers, and biscuit, Canned meats, Cheating and smoking tobacco, Cigars, cigarettes, and smoking and chewing tobacco, Cigars, cigarettes, and smoking tobacco, S. Ottenberg, Cigars, cigarettes, and smoking tobacco, Straiton & Storm, Cough sirup, Cured fish, Drygoods, Eddystone Manufacturing Company, Fever and ague and liver pads, Flour, Woodward & Dwight, Flour, meal, etc., Texas Star Flour Mills, Ground coffee, A. P. Adams, Medical compound, C. A. Jerman, Medicated confection, J. La Forest King, Oatmeal, J. F. Tyrrell & Co., Oleomargarine and oleomargarine butter, The Commercial Manufacturing Company, Ore sacks, J. C. Todd & Co., Paints, transparent coatings, and putty or (cement), Porcelain Paint Company, Perfumery, L. U. Bean, Perfumery, Colgate & Co., Remedy for epilepsy, Bayse & Co., Wall brushes, painters' or glaziers' brushes and varnish brushes, The Chicago White Lead and Oil Company, Whisky, D. O. Davis & Co., Writing papers, Southworth Company, Yeast powders, B. T. Babbitt

DESIGNS.

Table listing designs such as Barbers' chairs, Carpet, Cooking stoves, Door knobs, Inside face of cloth, Oil cloth, Picture frame, Scotch suitings, Sewing machine stands, Stair rods, Toilet stands, Writing paper and cards

English Patents Issued to Americans.

From May 16 to May 20, inclusive.

Table listing English patents such as Chairs, manufacture of, Drawing frames, feeding apparatus, Knitting machinery, Mangles, C. Reese, Railways, elevated, C. Donkersley, Refrigerating rooms, Sewing machines, Spinning machinery, Tool handle, Transmitting motion, Try squares, Weighing machine for skins