

of the lenses are as 1 to 3, and their distance apart is equal to half the sum of their focal distances. The lens of greatest focal length is the field glass. The diaphragm should be placed about midway between the lenses, and its aperture should be as small as possible without cutting down the field. Eye-pieces of different focal lengths may be used with the same objective.

(32) L. O. asks what to apply to old plaster Paris busts, that have become dirty, that will make them look like new. Dust has settled in the pores and I can not remove it. A. Give them a dead coat of calina white, or you may varnish them and apply a coating of silver, gold, or bronze colored bronze powder.

(33) W. D. S. writes: 1. I have a vertical boiler, 4 feet high, 27 inches diameter (including furnace, which is internal and 18 inches high); boiler has nineteen 2 inch flues; is made of five sixteenth iron; engine, 3 inch bore, 7 inch stroke, running 350. We have not enough power to run a small planer; we use from 60 to 80 lb. steam pressure. Could we with safety increase this pressure; the boiler has been in use only 2 years; or could we run a larger engine with the same boiler, say 4 1/2 x 4 1/2? A. If your boiler is five sixteenths inch thick, of good iron, and well made, you may carry 120 lb. without hesitation. 2. I noticed in a recent number of the SCIENTIFIC AMERICAN a correspondent wants to know if oil will stop priming. I frequently use the common black lubricating oil, feeding it with feed water with good effect. Will it injure the boiler? A. No.

(34) G. H. P. asks: 1. What is the expansion of glass between 32° and 212° Fah? A. Glass which at 32° F. is 1,000,000, at 212° becomes 1,000,861. 2. How to solder brass on to a valve seat of a steam cylinder. A. Clean the valve seat, coat it with solder by means of a heavy soldering iron. Tin the brass plate, heat it quite hot, and put its tinned side downward on the valve seat. If the brass plate has not sufficient thickness to admit of this treatment you may "sweat" it on.

(35) S. A. B. asks: 1. How can I put a very high polish on steel? A. The steps in the process are as follows: 1st. Coarse wet stone; 2d. fine wet stone; 3d. buff wheel having fine emery applied; 4th. crocus, different degrees of fineness. 2. On brass? A. Finish as finely as possible with files, then with Scotch gray stone, and finally, with the powder of Scotch gray stone and oil, or with rotten stone and oil. 3. How is the so-called "Florida sea bean" polished? A. After smoothing, use powdered pumice stone and water. Finish with rotten stone and water or oil.

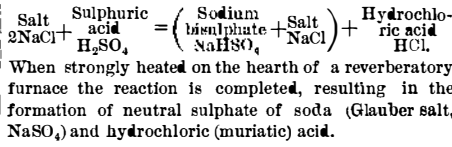
(36) S. F. writes: I have an induction coil, of Ladd's make (London), of the following dimensions: Length of coil proper, 11 1/2 inches; diameter of coil proper, 5 inches; diameter of core, 1 1/2 inch; base board containing condenser, 19 1/2 by 9 inches; condenser plates, 19 by 8 1/2; number of condenser sheets, unknown; length of primary wire, estimated, 75 feet; number of secondary wire, 3 miles (16,000 feet). This coil was sold promising to give a spark in air of 4 inches, but I never realized more than 3 inches, and then a feeble spark. The battery which I employed with this coil consists of four 1 gallon jars, in each of which there are immersed a zinc plate 6 by 8 inches between two carbon plates of the same size. The construction of the battery is that of Grenet; the solution in which the plates are immersed is saturated solution of bichromate of potash and sulphuric acid. Is the battery not strong enough to give the desired result, or can you suggest any other reason? A. Your battery seems to be ample. The coil may have been injured by an internal discharge, or it may be that the interrupter is not properly adjusted. If the spark from the primary coil is large it would be well to increase the surface of the condenser.

(37) C. H. M. asks: 1. For a method of producing brilliants resembling diamonds. A. Pure caustic potash, 16 1/2 parts; white lead, 85; boracic acid, 4 1/2; arsenious acid, 1-6; pure quartz sand, 50. These materials, carefully selected, are ground together, placed in small glass pots (the French clay pots will answer if the first charge is discarded after several hours firing) and heated to quiet fusion in a suitable furnace for about 24 hours; then cooled very gradually and cut. The art of imitating the diamond and other precious stones has attained to great perfection in Egypt and Greece, as well as in France. The following analysis by Sonault gives the composition of the colorless French Pierres de Strass: Silica, 38.1; alumina, 1.0; oxide of lead, 53.0; potash, 7.9; borax and arsenious acid, traces—100. 2. Give a simple method of qualitative test for the presence of silver in ores. A. Reduce the ore to an impalpable powder by grinding, gradually heat it to redness for half an hour or more, with constant stirring; boil with pure nitric acid; filter; evaporate the filtrate to small volume, and add a few drops of hydrochloric acid—a white precipitate which does not dissolve in boiling water, and blackens on exposure to sunlight indicates silver. Gold, if any, remains in the powdered ore. If the ore contains chlorides the silver may escape detection by this test. It is safer to proceed as follows: Mix the ore with 10 or 15 times its weight of finely granulated test lead—free from silver—and 2 or 3 pieces of borax glass the size of peas, in a small scorifier, and expose in a nearly white hot open muffle until the ore is fluxed and the fused metal disappears beneath the liquid slag of litharge. Then remove, cool, break, hammer, and clean the lead button; place it in a dry bone ash cupel of equal weight, and expose in the muffle until all the lead is slagged and absorbed by the porous bone ash, leaving the silver, together with the gold, if any, as a bright, clear molten button in the bottom of the cupel. Very small quantities of silver and gold in an ore may be thus detected.

(38) J. A. writes: In my last SCIENTIFIC AMERICAN, April 5, No. 14, I notice in answer to L. B. you say that 8 inch cylinder, 12 inch stroke, 150 revolutions per minute, 60 lbs. steam, 20 horse power; by my rule I only make 13 7 horse power. My figures are: Piston 50x2656 square inch 60 lbs. steam. 3015-9380 h. p. 150 rev. perm. 33,000/45-380-4000 13 7 h. p. If I am wrong, please tell me where I make my mistake. I am only a novice any way. A. 150 revolutions per minute is 300 feet; double your result and you will be then

right, except that you have made no allowance for friction.

(39) W. A. J. asks: What chemical action takes place when sulphuric acid is applied to common salt? A.



When strongly heated on the hearth of a reverberatory furnace the reaction is completed, resulting in the formation of neutral sulphate of soda (Glauber salt, Na2SO4) and hydrochloric (muriatic) acid.

(40) H. S. asks how to arrange an earth battery for nickel plating. A. We could not advise the use of an earth battery for this purpose. You should use a Smee or a Daniell battery, or one of the forms of the gravity battery.

(41) A. E. asks how to make a drill point that will enable him to drill through glass, porcelain, or transparent china pictures. A. Make the drill of the finest quality of steel, heat it to a cherry red, plunge it in mercury, hold the extreme end in a pair of cold pliers, and draw down the temper except at the end protected by the pliers. Wet the glass or porcelain with turpentine to which a little gum camphor has been added.

(42) H. L. asks what size of engine and boiler to run a velocipede capable of carrying one person, at the rate of about 6 or 8 miles an hour. A. Perhaps some of our readers will furnish this information.

(43) S. R. E. asks whether or not honey will keep in glass cans. A. Yes, if the jars are well filled and sealed air tight. 2. What is the best noted cure for bee stings? A. Dissolve 3 parts of pure carbolic acid in 5 parts of good glycerine.

(44) J. M. asks: 1. How long will the carbon remain good in a Fuller bichromate battery? A. It will last for a number of years. 2. I am running a burglar alarm in my house, with a Fuller bichromate battery, 4 one gallon cells, and No. 32 wire. Please tell me how to make an electric light in my house with these 4 cells. 2. You cannot make an electric light with four Fuller cells.

(45) A. B. P. asks: Would it not be much better in making a Siemens hand power electric machine, illustrated in SUPPLEMENT No. 161, to make the electromagnets of malleable iron, and have them permanent magnets, or can common cast iron be permanently magnetized as well? A. Neither cast nor malleable iron retains the magnetic charge to any very great extent. You will get the best results by using the electro-magnet.

(46) J. P. B. asks: If a telegraph line of No. 14 galvanized wire be used, how small a piece of boiler iron could be used in damp earth as a ground plate, to give the electricity as free a pass to the ground as over the line? A. Use a plate having a surface of 10 or 12 square feet. A thin copper plate would answer better than the boiler iron.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated: A.—It is a variety of syenite or hornblende schist—it has little commercial value.—G. S. A.—The ore contains traces of silver.—J. H. G.—It is mica schist—of no value.

COMMUNICATIONS RECEIVED.

- On Binding. By E. C. M.
On Squaring the Circle. By C. P. K.
On a New Form of Telephone and Battery. By H. W. F.
Horse Shoeing. By C. S.
On Cleaning Lamp Chimneys. By S. B.
On a Rare Geological Specimen. By H. M.
On Animal Intelligence. By H. D. O.
Artificial Stone Foundations. By W. M.

INDEX OF INVENTIONS

FOR WHICH Letters Patent of the United States were Granted in the Week Ending March 25, 1879, AND EACH BEARING THAT DATE. [Those marked (R) are reissued patents.]
Agricultural engine, G. Kratz 213,511
Air tight vessel detachable cover, F. C. Prindle 213,682
Alarm and door knob, F. N. Cottle 213,547
Annunciators, circuit closer for electric, Egerton & Green 213,500
Apple mill and cider press, P. McManahan 213,672
Aspirator, concealed uterine cauterizer, and vaginal syringe, A. L. Palmer 213,588
Ax, W. H. Fix 213,646
Axle box lid, car, J. Seath 213,696
Axle, car, H. Watkeys 213,597
Ball for hollow ware, J. Murdock 213,524
Balloon, aerial, A. Apraxine 213,603
Barrels, handling, Clark & Wilhelm 213,545
Bed bottom, J. C. Gordon 213,561
Bedstead, invalid, Stice & King 213,706
Bleaching stool, boot, W. W. Shipman 213,533
Bleaching keir, T. Fletcher 213,647
Boiler head flanger, R. C. Nugent 213,545
Boot and shoe, G. Apfel 213,490
Boot and shoe, G. Champomier 213,619
Boot and shoe last, G. D. Paul 213,528
Bottle for holding compressed gases, and case, W. A. & W. F. Johnston 213,576
Bottle washer, Miles & Lovett 213,583
Bottles, marking, R. M. Atwater 213,606
Broiler, A. C. Selleck 213,582

Burglar alarm, J. D. William 213,728
Butter, preparing and packing, J. Higgins 213,506
Can opener, T. F. Wilson 213,723
Candlestick, A. J. Smith 213,701
Car brake, railway, Veron & Edeline 213,714
Carriage top, J. E. Lines 213,513
Carriages, parasol for children's, J. M. Doubleday 213,552
Cement for leather, wood, etc., W. R. Hicks 213,567
Climbing apparatus, E. Von Mengden 213,715
Cock, gauge, J. B. Leger 213,669
Cockle separator, A. Wemple 213,720
Coffee mill, O. W. Stow 213,707
Coffins, bending lumber for, L. W. Drake 213,636
Coloring matter, J. P. Griess 213,563, 213,564
Colter, plow, J. Clayton 213,622
Corn sheller, hand, G. W. Grimes 213,651
Cultivator, carriage, T. Meikle 213,675
Cut-off, steam engine, A. A. Stewart 213,534
Dash board, J. E. Lines 213,514
Dental engine hand piece, Johnston & Browne 213,662
Desk, school, J. B. Sherwood 213,593
Desk or settee, school, J. K. Otis 213,557
Diaphragm meter, W. B. Mountney 213,680
Door holder, R. H. Barnard 213,611
Drying kiln, C. W. Boynton 213,542
Egg tester, D. W. Pomeroy 213,697
Electric light, M. G. Farmer 213,643
Elevator and conveying movement, G. Sanford 213,695
Elevator stopper, H. A. Guild 213,565
Envelope case, C. H. Norris 213,681
Fan, fly, Feldman & Schlag 213,644
Fare register, W. H. Hornum 213,657
Faucet and tap attachment, Kronenberg & Diehl 213,667
Fence, W. R. White 213,599
Fence post, L. C. Grant 213,506
Fire alarm, automatic, P. H. Van Der Weyde 213,536
Firearm, J. Bowles 213,616
Firearm, magazine, G. F. Evans 213,555
Firearm, magazine, W. W. Wetmore 213,538
Fire escape ladder, C. C. Chamberlain 213,544
Flour mill separator, L. Morgan 213,678
Flower and work stand, T. Murgatroyd 213,523
Fluting machine, J. E. Wilson 213,724
Folding chair, H. B. Smith 213,700
Fruit jar wrench, Sherwood & Dudley 213,608
Gas engine, Wittig & Hees 213,539
Gas generator and carburetor, J. F. Williams 213,600
Glass for ornamentation, grinding, J. Story 213,594
Glassware shaper and finisher, Atterbury & Beck 213,605
Grain, device for removing metallic substances from, A. McKain 213,519
Grain door, G. C. Banta 213,491
Grain elevator, pneumatic, F. Taggart 213,706
Grain, machine for separating metallic substances from, C. Wheeler, Jr. 213,598
Grain meter, A. Gleason 213,560
Grate, W. McClave 213,516
Grindstone tool holder, M. S. Curtiss 213,496
Hair, treatment of, J. Rene (r) 8,637
Harrow, O. Bayles 213,541
Harvester, S. C. Cobb 213,494
Harvester, J. F. Seiberling (r) 8,641
Hat stiffening machine, Yule & Stone 213,727
Hay elevator and carrier, G. H. Fowler 213,559
Hay fork, horse, J. R. Fitzhugh 213,645
Hobby horse, I. A. Stowe 213,708
Hoe, scuffle, T. V. Munson 213,584
Hog ringing implement, J. H. Brown 213,618
Honeycomb frame, Eggleston & Reed 213,638
Hoof expander, C. H. Shepard 213,592
Horse detacher, G. P. Jewett 213,574
Hose coupling, J. W. Kennedy 213,577
Hot air furnace, D. Milson 213,676
Hubs, drying, J. Urmoston (r) 8,633
Ice maker, C. B. Lee 213,668
Injector, A. Friedmann 213,648
Insect trap for protecting fruit, etc., R. H. Wells 213,719
Joint, valve, and trap protector for underground pipes, accessible, A. Harvey 213,653
Key fastener, A. E. Peck 213,590
Lamp, Clark & Kintz 213,620
Lantern, P. V. Coogan 213,627
Lantern, A. H. Greene 213,650
Lantern, J. W. Orphy 213,682
Last block sawer, McGregor & Kemper 213,517
Latch, reversible, B. Erbe 213,501
Lathe, wood turning, A. D. Waymoth 213,718
Lead and crayon holder, J. Hoffman 213,568
Level, bevel, and square, Davies & Hewitt 213,633
Lever and connecting rod, cam mechanism for changing the throw of a, B. Eastwood 213,553
Lightning rod, H. W. Farley (r) 8,625
Liquor register, J. B. Benton 213,492
Lock, A. E. Marshall 213,515
Lubricator, C. H. Parshall 213,559
Match box, A. Romatin 213,603
Measuring tool, combination, S. G. Otis 213,526
Milk, cow, J. Cooper 213,628
Musical instrument, mechanical, O. H. Arno 213,604
Neck band stretcher, P. O'Thayne 213,683
Nursery chair, C. H. Barnes 213,610
Nursery gate and clothes drier, W. H. Phillips 213,686
Nut lock, L. D. Allen 213,602
Ore washer, J. M. Bailey 213,540
Organ and piano case, Heymann & Burt 213,507
Ottoman, adjustable, N. Y. Landis 213,512
Oven, baker's, D. McKenzie 213,674
Paper organ pipe, G. Beach 213,612
Paper pulp engine discharge valve, P. P. Emory 213,640
Parasol, H. E. Israel 213,659
Pen, fountain, T. Prioux 212,689
Pen holder, G. R. Bickers 213,613
Pen holder, J. Hoffman 213,571
Pen, soluble ink, J. Hoffman 213,570
Photographic burnisher, W. G. Entekin 213,641
Pipe cutter, C. M. Fogelquist 213,503
Pipe cutting tool, H. Reichardt 213,691
Planter, check row corn, H. N. McConoughey (r) 8,640
Planter, seed, W. J. Ellis 213,639
Plasterer's tool, J. H. Lucas 213,671
Plow, W. S. Johnson 213,661
Plow, gang, J. Clayton 213,623
Plow, sulky, Black & Pates 213,614
Plow sulky, J. & A. T. Warwick 213,717
Plows, combined implement for setting the points and sharpening the sheaves of, J. D. & C. W. Kennedy 213,664
Preserving and condensing fresh food, C. Morfit 213,679
Printing machine, color, G. W. Woodside 213,725
Printing press, R. J. Stuart 213,535
Printing press, oscillating, G. W. Hunt 213,668
Propeller for boats, chain, M. H. Hall 213,652
Pump, force, R. Bean (r) 8,631
Pump, force, W. H. Richmond 213,492
Pump, valve, J. Scherer 213,531
Pumping engine, compound steam, G. F. Blake 213,615
Quartz mill, amalgamating, A. B. Paul 213,527
Railway bars, carriage for, T. Critchlow 213,690
Railway bed, J. M. Seymour 213,697
Range, Duparquet & Huot 213,499
Range or cooking stove, G. S. Sandner, Jr. 213,694

DESIGNS.

Car basket rack brackets, R. E. Goodrich 11,121
Carpet, W. L. Jacobs 11,087
Carpet, D. McNair 11,088
Carpet, H. Horan 11,107
Carpet, G. W. Piggott 11,059, 11,109, 11,110
Carpet, A. Beaumont 11,095, 11,096, 11,113
Carpet, E. Poole 11,090, 11,091, 11,111, 11,119
Carpet, O. Heintzke 11,085, 11,108, 11,112, 11,123
Carpet, J. L. Folsom, 11,081 to 11,084, 11,097 to 11,106, 11,114 to 11,118, 11,120
Clock case, S. C. Spring 11,092
Knitted fabric, H. Boot 11,125
Knitted fringe, C. Jackson 11,086, 11,126
Newel post, J. I. Healy 11,124
Riding saddles, R. E. Whitman 11,093
Shelf brackets, J. P. S. Otterson 11,112

TRADE MARKS.

Artists' materials, Winsor & Newton 7,133
Chopping axes, Boetticher, Kellogg & Co. 7,131
Concentrated lye, Udell, Schmieding & Co. 7,132
Corn planters, Beedle & Kelly 7,135
Medicinal compounds or preparations, W. Pfunder & Co. 7,138
Pens, Turner & Harrison 7,137
Plug tobacco, Dausman Tobacco Company 7,134
Plug tobacco, Ryan & Cummsiskey 7,136
Roasted and ground coffees, E. Guittard 7,129, 7,130

English Patents Issued to Americans.

From March 25 to March 28, inclusive.
Button fastening, G. Prentice, R. I.
Curtain fixture, G. M. & C. Cushman, Boston, Mass.
Cut-off for steam engines, N. V. Twiss, New Haven, Ct.
Electric signaling apparatus, C. H. Pond et al., N. Y. city.
Fare register, W. R. Bacon, New York city.
Horsehoes, manufacture of, J. L. Ewin, Washington, D. C.
Millstone dress, J. Thompson, Crestline, Ohio.
Picture frame, A. W. Hall, New York city.
Refrigerating apparatus, F. E. Pinto et al., Brooklyn, N. Y.
Sewing machine, S. Henshall, Philadelphia, Pa.