storage battery in as simple language as possible, with dimensions of lead plates, and the time necessary to charge it. A. For storage batteries we refer you to our SUPPLEMENT, Nos. 322, 323, and others which we can send by mail for 10 cents each.

(11) C. W. asks for a recipe for making substitute for white wine vinegar; will esteem it a favor. A. Dilute acetic acid with water until of strength to suit your taste.

(12) H. Poe asks for a composition for picture frames. A. Various formulæ are used. We give two: 1. Seven pounds glue are boiled in 3½ pints water; 3 pounds white resin are dissolved in 3 pints raw linseed oil by heat. Mix solutions and simmer for ½ hour carefully. Add enough whiting. 2. Three parts Flanders glue and 1 part isinglass, make into thin glue, dissolving each kind separately and mixing and straining. Mix with sawdust after cooling and reheating. Oil the moulds before introducing the composition.

(13) J. H. asks: 1. To what extent must I enlarge the motor described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 641, to run a small skiff, also what battery to use? The probable cost of such, and running expense. A. Enlarge it to twice the size, linear. Use a 16 cell plunging bichromate battery. Cost probably from $50 to $60. Cost per cell per hour to run, about two and one-half cents. 2. Size of a two-blade propeller wheel for skiff. A. Eight inch. 3. Can all wire used in connection with motor be No. 18 insulated, also the No. of layers and convolutions No. 18 wire in the sections on the armature. A. Use No. 18 on armature and No. 16 on field magnet. The number of layers is given in the article referred to.

(14) J. L., Jr., asks what the specific gravity of water in a vacuum is. A. The specific gravity of water is the standard for solids and liquids and is 1.000. In a vacuum it will be unchanged, but the water will weigh 1-815 more than in air on account of the loss of buoyancy due to the removal of the atmosphere.

(15) A. J. W. writes: I want to know of some substance that is a complete insulator of the magnetic current, such if placed between the poles of a magnet and the armature, will not itself be attracted to the magnet nor permit the armature to be. A. As we have often said in these columns, no such substance is known, and there is not least probability of such ever being discovered.

(16) J. B. H. writes: I have been troubled lately by accumulation of lime from water passing through water front in kitchen range. The clogging is so serious that sufficient pressure was made twice to rupture inch lead pipe. Can this deposit be dissolved in any way? I learn this occurrence is not an uncommon one here. A. The water back and pipes can be partially freed from incrustation by putting in a charge of caustic soda for a day, the same as is done for steam boilers. This would be a source of much trouble and delay for a range in a house. We can only recommend putting in a new water back and cleaning the old one for future use by closing one hole and filling the water back with a solution of 1 part sulphuric acid to 4 parts water by measure; let it stand for a day or two, when the lime can be washed out.

(17) A. S.—The observed phenomenon was not a rainbow. The colored circle around the moon as seen when light fleecy or cirrus clouds are passing is properly called a halo, when very close a corona. It is caused by the refraction of the moon's light by very small particles or vesicles of water forming the clouds. In the high region in which these clouds float, the vesicles of water are sometimes in a frozen condition, and may take the various forms of minute snow flakes, and in this form may reflect the moon's light, giving rise to the white halo. To the various sizes of the water vesicles and the snow flakes is attributed the various sizes of the halos. A rainbow is always due to the combined refraction and reflection of the sun's or moon's light in falling drops of rain.

(18) F. T. R. asks: Which will produce the most horse power—two engines 12 inches in diameter and 12 inches stroke, or one engine 15¼ inches diameter 17 inches stroke, all conditions being equal? A. The one engine 15¼ inches by 17 inches will do 25 per cent more work than the other.

(19) T. E. & S. ask: What is the proper speed for a sixty inch circular saw to cut 15,000 feet of lumber per ten hours? A. The saw should have a speed of 600 revolutions per minute, for best effect. It should easily cut 15,000 feet of lumber in 10 hours with 20 horse power.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

August 14, 1888,

AND EACH BEARING THAT DATE.

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

Album with separable leaves, photographic, H. A. M. Dittmar 387,629
Ales and similar liquids, device for cooling, W. B. Hawkins 387,785
Aluminum bronze and other alloys, preparing, P. Heroult 387,876
Armor plates, etc., hardening and tempering, A. Evrard 387,712
Automatically-closing can, G. A. Poole 387,959, 387,960
Axle bearing, D. E. Hull 387,719
Axle washer, automatic, C. M. Hubbard 387,883
Axles, sand band and clip for vehicle, N. S. Ketchum 387,646
Back band hook, E. G. Bennett 387,849
Baling press, H. W. Schwarzburg *et al.* 387,923
Barrels, device for venting, Nicklas & Beyer 387,902
Basket, fruit, J. H. Marvil 387,895
Basket, provision, J. Goldsmith 387,639
Batteries, apparatus for charging and discharging secondary, M. Pfatischer 387,988
Batteries, electrolyte for galvanic, D. H. Fitch 387,679
Battery. See Galvanic battery.
Bearing for oscillating disks, crank, J. Thomson 387,829
Beating engine, C. Aitchison 387,840
Bed bottom, spring, A. Huber 387,787
Bessemer converters, apparatus for introducing sand or other powdered or granulated substances into, J. J. Fronheiser 387,952
Billiard tally, E. D. Waterbury 388,006
Blanket clasp, D. Walker 387,834
Block. See Carriage top prop block.
Blotter, roller, Campbell & Shaw 387,968
Board. See Multiple switch board.
Boiler. See Locomotive boiler. Steam boiler.
Boiler, Orewiler & Larcomb 387,805
Bolting reel, G. A. Gilbert 387,872
Book, T. C. Ranshaw 387,917, 387,918
Boots or shoes, staple for, E. H. Buckley 387,854
Box. See Tobacco box.
Brake. See Car brake.
Bridge bars, upsetting, F. H. Smith 387,824
Bridge, draw, W. J. Briggs 387,708, 387,852
Brush for washing tumblers, etc., revolving, J. M. Mungiven 387,728
Bucket, conveyer, F. A. Lockwood 387,649
Bucket, feed, A. M. Smith 387,821
Buckle, F. W. Hoffmann 387,881
Bugs, cultivator attachment for gathering potato, J. Hunt 387,720
Buildings, heating and ventilating, W. N. Heaton 387,681
Burner. See Gas burner.
Calendar, H. S. Hack 387,784
Can. See Automatically closing can.
Can heading machine, J. G. Hodgson 387,880
Car brake, A. Reese 387,695
Car coupling, W. R. Cbadsey 387,766
Car coupling, G. W. Pero 387,916
Car coupling, J. Rhule 387,999
Car, dumping, Barber & Finigan 387,618
Car heater, R. Whelan 387,937
Car heater, railway, Lanning & Young 387,956
Car heating, system of, C. L. Kline 387,722
Car mover, L. B. Gifford 387,871
Car starter, J. H. Parmelee 387,807
Car starter, J. H. Pendleton 387,914
Car wheel, L. M. Bullitt 387,855
Car wheel, W. G. Richards 387,813
Cars, cable grip for railway, J. H. Pendleton 387,906
Cars, equalizing device for, H. J. Tate 387,827
Car, grip and brake gear of cable tram, N. H. Richards 387,920
Cars, grip for cable railway, J. H. Pendleton, 387,911, 387,912
Cars on cable railways, attachment for, J. H. Pendleton 387,990
Carpet fastener, R. W. Howerton 387,882
Carpet stretcher, J. Story 387,930
Carriage top prop block, A. A. Lines 387,893
Carrier. See Endless carrier.
Cart, dump, Bex & Heunsch 387,850
Cart, road, I. G. Gay 387,637
Cartridge capping and decapping implement, W. M. Farrow 387,868
Cartridge shells, making, H. S. Maxim 387,651
Cartridges, percussion cap for gun, W. Lorenz 387,723
Case. See Organ case.
Casting beam blanks, mould for, E. M. Butz 387,764
Casting teeth of diamond saws, mould for, W. F. Myer 387,986
Casting the teeth of diamond saws, mould for, T. A. Jackson 387,644
Centering machine, S. B. Minnich 387,901
Centrifugal machine, T. H. Muller 387,801
Chain, detachable, J. F. McCreary 387,680
Charcoal, apparatus for the manufacture of, J. Scherffius 387,817
Check hook, J. S. Matchette 387,863
Check row machines, attaching device for, L. Scofield 387,819
Chimney cowl, H. Heisel 387,682
Cigar mould, C. F. T. Melzer 387,796
Clamp. See Paper hanging clamp.
Clasp. See Blanket clasp. Parcel clasp. Pocket book clasp.
Cleaner. See Seed cotton cleaner.
Clock synchronizing system, electric, C. J. Hexamer 387,974
Clock system, electric, Warner & Bennett 387,704
Clocks, circuit closer for electric, C. D. Warner 387,703
Closet. See Water closet.
Cloth, machine for beetling, D. Stewart 387,749
Clothes rack, D. K. Barnhart 387,758
Clutch, friction, J. C. Potts 387,810
Coffin lid, J. D. Ripson 387,921
Combined gauge and square, E. K. Beckwith 387,966
Combustion and extinguishing sparks, promoting, R. H. Coleman 387,623
Conveyer, J. F. Simmons 387,820
Copy holder, E. A. Bennett 387,706
Core drill, J. F. Gourley *et al.* 387,680
Corn husker, T. H. Mehring 387,795, 387,985
Corset, I. Weed 387,753
Coupling. See Hose coupling. Thill coupling. Vacuum apparatus coupling.
Crimping tongs, L. L. Sagendorph 387,658
Cuff, apparel, W. Kahler 387,790
Cultivator, S. Draper 387,778
Cultivator, C. A. Swearingen 387,751
Cultivator and harrow, H. G. Cady 387,856
Cultivator, orchard and vineyard, G. W. Campbell 387,765
Cup. See Oil cup.
Cuspidor, F. B. Clench 387,622
Cutter. See Paper cutter.
Cutter head, S. J. Shimer 387,925
Cutter heads, tool holder for, S. J. Shimer 387,924
Dental plugger, D. D. Peabody 387,655
Digger. See Post hole digger.
Distance instrument, J. B. Faucette 387,633
Door, W. A. Schussmann 387,698
Door check, W. D. Scarborough 387,735
Door mat, Fischer & Ewald 387,678
Door mat, W. Smith 387,928
Doors, device for hanging, W. A. Schussmann 387,697
Draught regulating device for plows and cultivators, A. Lyon 387,699
Drier, W. McPherson 387,652
Drill. See Core drill.
Drum, heating, I. H. Fry 387,715
Drum, heating, J. J. Sullivan 387,750
Drum, winding or driving, Diescher & McGill 387,775
Dust collector, J. S. Ash 387,617
Electric currents, measuring alternating, O. B. Shallenberger 388,004
Electric currents, meter for alternating, O. B. Shallenberger 388,003
Electric cut-out, J. A. Powers 387,732
Electric machines, regulator for dynamo, Buckingham & Lemp 387,853
Electric motor, B. A. Fiske 387,714
Elevator. See Water elevator.
End gate, F. Selle 388,002
Endless carrier, A. L. Middleton 387,727
Engine. See Beating engine.
Exercising machine, C. M. Bartholomew 387,845
Extractor. See Lemon juice extractor.
Eye bar upsetting apparatus, F. H. Smith 387,822
Eye bar upsetting machine, F. H. Smith 387,823
Eye, face, and lung protector, P. Baggerly 387,843
Eye protector, A. P. Cole 387,709
Feather renovator and sorter, H. O. Mooney 387,800
Feed rack, G. W. Light 387,891, 387,892
Feed water heater and filter, P. Rohan 387,696
Fence machine, W. A. Clary 387,860
Fence stay binder, wire, Newbanks & Shivlar 387,691
Filter, centrifugal, R. L. De Lisser 387,865
Fire escape, A. F. Bedell 387,619
Fire escape, W. J. Debus 387,772
Fire escape, rope, R. P. Lovejoy 387,650
Fire extinguishing compound, E. G. Penrose *et al.* 387,915
Flash light signal, W. H. Thompson 387,932
Flour stand, H. L. Starks 387,825
Folder, sheet metal, M. J. Stark 387,746
Frame. See Picture frame.
Furnace. See Glass smelting furnace. Hydrocarbon furnace.
Gauge. See Combined gauge. Mercury pressure gauge.
Galvanic battery, E. M. Hewett 387,642, 387,643
Galvanic battery, G. T. Woods 387,839
Galvanic battery jar, B. Overlack 387,654
Garment stays, pocket for, L. Moschcowitz 387,958
Gas burner, regenerative, J. W. Baker 387,844
Gas, manufacturing, G. S. Dwight 387,676
Gate. See End gate. Hatchway gate.
Gate, Park & Sanders 387,730
Gearing, F. J. Sprague 387,745
Geographical globes, apparatus for facilitating the reading of, Moreon & Durand 387,957
Glass smelting furnace and regenerator, Schlachter & Heintz 387,818
Glue, can for liquid, C. M. Martin 387,982
Grain separator, E. W. Flagg 387,869
Grinding machine, F. C. Hall 387,874
Harvester, corn, W. A. Conner 387,862
Harvesters, header attachment for, H. Bryan 387,763
Hatchway gate, elevator, Nickum & Bunker 387,653
Hat trimming machine, S. T. Newman 387,692
Hay press, A. Veilleux 387,967
Hay stacker, J. J. Wagaman 387,934
Heater. See Car heater. Feed water heater.
Hide scraping machine, A. Ott 387,908
Hinge, gate, J. H. Davis 387,771
Hoe, J. N. Parker 387,806
Hoisting heavy weights, machine for, M. V. B. Davis 387,626
Hoisting machine, Long & Atchley 387,687
Holdback, vehicle, E. Walrath 387,935
Holder. See Copy holder. Paper bag holder. Pen holder. Rein holder. Shade holder. Stovepipe holder.
Hook. See Back band hook. Check hook.
Hoop. See Mast hoop.
Horse detaching device, A. T. Teakles 387,664
Horse power, G. E. Burt 387,945
Hose coupling, J. Miller 387,899
Houses, apparatus for moving, F. B. Duffey 387,630
Houses, portable cooling apparatus for, R. F. Humiston 387,954
Hub boring machine, F. B. Deming 387,773
Hydrocarbon furnace, B. A. Moody 387,799
Ice shaving machine, C. C. Clawson 387,861
Incubator, W. P. Shepard 387,742
Iron. See Sad iron.
Jack. See Wagon jack.
Jar. See Galvanic battery jar.
Jar caps, machine for securing linings to, F. W. Perry 387,808
Jar fastener, T. B. Howe 387,683
Kitchen table and cabinet, M. S. Brack 387,760
Knitting machines, stop mechanism for, M. C. Yarwood 387,672
Lamp, F. Meyrose 387,897
Lamp, Argand, L. J. Atwood 387,756
Lamp for lighthouses, oil, J. R. Wigham 387,939
Lamp, reservoir, Evans & Ross 387,951
Lantern, J. H. Burrell, Jr 387,944
Lantern, W. W. Hutchins 387,976
Lantern, rotatable signal, G. Madden 387,980 387,981
Lantern, tubular, F. Dietz 387,970
Lasting machine, Sinning & Avery 387,926
Lathing, metallic, B. Scarles 387,740
Lemon juice extractor, E. Baltzley 387,942
Lifter. See Pie plate lifter.
Liquid mixer, Fulton & Cornelius 387,634
Lock. See Permutation lock.
Lock, H. Van Hoevenbergh 387,833
Locomotive boiler, M. G. Fuller 387,780
Locomotive coupler, A. P. Massey 387,725
Locomotive feed pipes, cleaning strainers of, J. M. Wallis 387,668
Looms, shuttle and operating device therefor for narrow ware, Cooke & Bottomley 387,863
Looms, Weft fork for, I. Jackson 387,788
Mast hoop, T. Clapham 387,767
Mat. See Door mat.
Mat, E. R. Landon 387,978
Measuring machine, coin released height, N. W. Hartwell 387,717
Mercury pressure gauge, F. T. Sutley 387,663
Meter. See Water meter.
Metal bars, machine for straightening, grinding, and polishing, J. Farmer 387,971
Metal flanging machine, J. Tetlow 387,665
Middlings purifier, J. Huxtable 387,955
Middlings purifier, V. Monnier 387,798
Molasses cups, hinged cover for, A. Taplin 387,826
Mould. See Cigar mould.
Moulding machine, T. B. Harkins 387,716
Mortars, pestle for, J. D. Belton 387,847
Motor. See Car motor. Electric motor.
Multiple switch board, M. G. Kellogg, 387,645, 387,888 to 387,890
Music leaf turner, L. Bernhard 387,707
Musical instrument, mechanical, M. Gally 387,635
Oil cup for burning crude petroleum oil, R. W. Smith 387,927
Oil in stoves, etc., apparatus for vaporizing and burning, C. A. Weirs 387,669
Oils, device for burning crude petroleum and other, J. T. Rader 387,811
Ore concentrators, belt or endless apron for, I. A. Woodbury 387,964
Organ case, C. H. Hubbell 387,884
Organs, pneumatic action for, I. Bassett 387,846
Package for containing and displaying merchandise, J. E. Cowles 387,769
Packing for piston rods, C. W. Mills 387,900
Paper bag holder, W. M. Nix 387,729
Paper boxes, machine for making and printing tubes or shucks for, G. M. Griswold 387,953
Paper cutter, G. H. Clarke 387,621
Paper finishing roll, J. D. Pickles 387,693
Paper hanging clamp, J. F. McAfee 387,792
Parcel clasp, W. S. Rock 387,737
Passenger mileage recorder, S. M. West 387,936
Pavements, laying artificial, J. W. MacKnight 387,724
Pen holder, reservoir, I. Leutner 387,686
Permutation lock, C. A. & S. E. Johannesen 387,789
Photographic print register, J. W. Allderige 387,841
Picture frame, E. Erschell 387,779
Pictures, etc., line or cord for suspending, G. Hookham 387,975
Pie plate lifter, A. L. Pomeroy 387,731
Pipe welding ball, A. M. Saunders 387,659
Pipes, machine for making cement, V. Hepp 387,641
Planing machine, wood, J. Baillie 387,757
Plastic material while planing them into sheets, securing blocks of, F. Curtis 387,947
Plow attachment, J. B. Tennison 387,699
Plow, double shovel, W. R. Craig 387,770
Plows, clearing attachment for, M. B. Sutley 387,962
Plows, lever for sulky, E. W. Drake 387,777
Plumbers' traps, return vent protector for, W. B. Ryan 387,961
Pocketbook clasp, S. Zinn 387,965
Pole tip, vehicle, F. A. Aldrich 387,754
Post for veranda railings, J. G. Schahfer 387,660
Post hole digger, W. Heaton 387,640
Power. See Horse power.
Press. See Baling press. Hay press. Stamping or embossing press.
Pressure or differences of pressure, apparatus for indicating and recording, C. Herschel 387,877
Printer's ink roller, F. E. Lang 387,647
Printing machines, sheet delivery apparatus for, C. B. Cottrell 387,768
Propeller, L. Greget 387,783
Propeller for vessels, H. B. Allison 387,616
Propeller, screw, T. T. Woodruff 387,671
Protector. See Eye protector. Eye, face, and lung protector.
Pumps, spring motor for, Reed & Frazee 387,736
Punching machine, check, J. N. Williams 387,705
Pyrotechnic helmet, C. B. Rockwood 387,657
Rack. See Clothes rack. Feed rack.
Railway bridge danger signal, J. W. Steele 387,747, 387,748
Railway, cable, J. H. Pendleton, 387,907 to 387,910, 387,991, 387,994, 387,995
Railway grip and crossing, cable, J. J. Graff 387,782
Railway heads, evener for, C. A. Upton 387,701
Railway passenger mileage register, O. E. Michaud 387,898
Railway rails, manufacture of, Meysenburg & Wostenholm 387,797
Railways, driving mechanism for endless cable, J. Walker 387,835
Railways, gripping device for cable, J. H. Pendleton 387,992, 387,993, 387,996, 387,997
Railways, means for picking up and dropping cables in cable, J. H. Pendleton 387,998
Railways, traction cable for, J. H. Pendleton 387,913
Railways, traction device for cable, J. H. Pendleton 387,989
Rake tooth, A. E. Roberts 387,815
Reaping machine, G. H. Howe 387,684
Receptacle for use in outhouses and like places, T. W. Carrico 387,857
Recorder. See Passenger mileage recorder.
Reel. See Bolting reel.
Refrigerator vehicle, W. E. Beard 387,943
Register. See Photographic print register. Railway passenger mileage register.
Rein holder, C. W. Gilman 387,638
Rice machine, E. Eaches 387,867
Roll, calendering, S. A. Hodgman 387,879
Roller. See Printer's ink roller.
Rowing apparatus, A. G. Smith 387,743
Ruching, machine for manufacturing, C. G. Hill 387,878
Sad iron, H. S. Pease 387,905
Sash balance, J. Sjostrom 387,662
Sash fastener, J. F. Pool 387,809
Sawing machine, W. P. Langley 387,648
Saws, device for setting, gauging, etc., the teeth of, W. N. Harsen 387,875
Scale, automatic coin controlled ticket printing weighing, E. H. Amet 387,842
Scale, weighing, A. Taylor 387,931
Scoop, crumb or dust, J. Pusey 387,734
Screen. See Window screen.
Screw, clamp, P. A. Whitney 388,007
Screw, countersinking, J. T. Rider 388,000
Seed cotton cleaner, L. F. Carr 387,674
Separator. See Grain separator.
Sewing machine feeding mechanism, R. D. Tucker 388,005
Sewing machine welt guide, R. D. Tucker 387,963
Sewing machines, needle for book, Smyth & Reynolds 387,744
Shade holder, L. J. Atwood 387,755
Sheathing and lath, combined wooden, T. H. Brown 387,967
Shoe, C. E. Diehl 387,948
Signal. See Flash light signal. Railway bridge danger signal.
Sleigh knee, O. L. Dodge 387,950
Sleighs, shifting bar for, A. T. McDonel 387,836
Smoke consumer, R. H. F. Sewall 387,661
Smoke consumer, E. Dobson 387,866
Sower, seed, H. Amundson 387,941
Spark arrester, R. H Coleman 387,624, 387,625
Spring. See Vehicle spring.
Stables, floor for, J. E. Dustin 387,632
Stamping or embossing press, J. Thomson 387,830
Stand. See Flour stand. Wash stand.
Staplemachine, H. E. Cunningham 387,946
Steam boiler, P. Donald 387,776
Steam through pipes, device for controlling the flow of, S. Braggins 387,851
Stone, apparatus for manufacturing artificial, Jochum & Ehrhardt 387,721
Stone, apparatus for transporting and setting, D. McDonald 387,794
Stove, W. F. Zimmermann 387,940
Stove for domestic purposes, gas, J. Galli 387,870
Stove, gas, P. J. Van Wie 387,666
Stovepipe holder, W. S. Welsh 387,837
Stove, vapor, F. J. Hubbard 387,786
Stoves, cut-off for gasoline, P. A. Reedy 387,656
Stoves or furnaces, heat regulator for, L. D. Farra 387,713
Switches, guide bar for stub, F. Nemacheck 387,803