(37) J. E. H. asks (1) how to make the solution for a bichromate battery (one gallon size) using two carbon, and one zinc (carbons 2½x4½ inches). A. Dissolve bichromate of potash in warm water to saturation. Pour the solution, while warm, into a vessel capable of resisting acids, and allow it to cool. Add sulphuric acid slowly to this solution until one pound of acid has been added for every pound of the solution, and finally add a small quantity of bisulphate of mercury, say one drachm to the pound of solution. 2. How to connect two or more such batteries together? A. If you want a "quantity" current, arrange the cells in parallel circuit, *i. e.*, connect all of the zincs with one conductor and all of the carbons with the other conductor. If you want an "intensity" current, arrange the cells in series, *i. e.*, connect the zinc of one cell with the carbon of the next, and so on; the zinc of the first cell and the carbon of the last cell being connected with the circuit wires. 3. How many volts would one (gallon size) battery be? A. About 1¾. 4. Would two or more such batteries double the number of volts in one? A. If connected in series, the electromotive force would be very nearly doubled. 5. How many such cells would I need for an Edison incandescent lamp, 6 candle power? A. Five or six.

(38) W. H. S. H. writes: 1. I want to put horseradish in bottles, in its pure state. Is anything put in to keep it, such as vinegar? A. The preparation is best made as follows: 6 tablespoonfuls scraped or grated horseradish, 1 tablespoonful white sugar, 1 quart vinegar. Scald the vinegar; pour boiling hot over the horseradish. Steep a week, strain, and bottle. Exposure to the air will discolor. 2. Is there such a thing as making inks by machinery? A. No. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 157. 3. How is bluing made by the barrel, 30 gallons, for the trade? A. Bluing in liquid form may consist of a mixture made up as follows: Take 4 ounces of soft Prussian blue, powder it, and put in a convenient vessel with one gallon of clear rain water, and add 1 ounce of oxalic acid. A teaspoonful of this mixture is sufficient for a large washing. 4. Give me a powder for horses and cattle. A. The following condition powder may be what you desire: Resin and niter each 2 ounces, levigated antimony 1 ounce; mix for 8 or 10 doses, and give one night and morning. When it is given to cattle, add 1 pound Glauber's salts.

(39) C. J. P. writes: We have a pear tree which has small sweet pears; it is also an early pear, but for several years they have black spots, become cracked and hard, and some are so very small. Can you tell me what to do with the tree, that it may bear better fruit? A. Enrich the ground round the outer roots of the tree with a liberal dressing of unbleached wood ashes.

(40) J. H. M. asks for a fireproof paint. A. Take a quantity of the best quicklime, and slake with water in a covered vessel; when the slaking is complete, water or skim milk, or a mixture of both, should be added to the lime, and mixed up to the consistency of cream; then there must be added at the rate of 20 pounds alum, 15 pounds of potash, and 1 bushel salt to every 100 gallons of creamy liquid. If the paint is required to be white, 6 pounds plaster of Paris or the same quantity of fine white clay is to be added to the above proportions of the other ingredients. All these ingredients being mingled, the mixture must be strained through a fine sieve and afterward ground in a color mill. When roofs are to be covered, or when crumbling brick walls are to be coated, fine white sand is mixed with the paint, in the proportion of 1 pound sand to 10 gallons of paint; this addition being made with a view of giving the ingredients a binding or petrifying quality. This paint should always be applied in a hot state, and in very cold weather precautions are necessary to keep it from freezing. Three coats of this paint are deemed, in most cases, sufficient. Any color may be obtained by adding the usual pigments to the composition.

(41) N. B. P. writes: I have a 2 inch tubular flowing well, 140 feet deep, which discharges 6 gallons of water per minute; and by attaching a pipe to the top of tube in well, I find that the water will rise 8 feet above the top of the well. I wish to convey a portion of the water to higher ground, 100 feet distant and 25 feet higher. Can I attach hydraulic ram directly to the top of the tube in well, and have it do good work, or will it be necessary to set rams on a lower level? If so, how much lower, and what distance from well? A. You can attach the ram directly to a reservoir at a distance above the ground that will insure a sufficient flow from the pipe, setting the ram as low as will admit of draining the waste water off; and in this way obtain 5 or 6 feet fall from the reservoir to the ram with a length of from 15 to 20 feet of pipe in a straight line. With this device and a flow into your cistern of 6 gallons per minute you may expect to discharge one gallon per minute into a reservoir 25 feet high. You cannot make the well pipe act as a ram pipe or feed. First find how much water will flow at a height something less than the height that it rises in the pipe above the ground, or level at which you can drain the water away.

(42) R. asks the reason that cast iron water pipes on being tested will burst at a low pressure when they contain air, whereas the same pipes will stand a very much higher pressure if all the air is allowed to escape from them before the pressure is applied. A. Pipes of iron or any other material will stand the pressure of water, air and water, or air alone, to the same extent, provided there is no disturbance to produce a water ram or hammer, which alone is the cause of the cracking of cast iron or other brittle pipes under low pressure. Letting water into pipes quickly generates waves along the pipe that has been known to crack cast iron pipes of large size without any pressure.

(43) J. N. H. asks the proper proportions and materials for a good fireproof cement, which when hard shall be solid and firm and not liable to crush easily. A. To 4 or 5 parts of clay, thoroughly dried and pulverized, add 2 parts of fine iron filings free from oxide, 1 part manganese dioxide, ½ part of sea salt, and ½ part of borax. Mingle these thoroughly and render them as fine as possible, then reduce them to a thick paste with the necessary quantity of water, mixing thoroughly well. It must be used immediately. After application it should be exposed to a heat gradually increasing to almost a white heat. This cement is very hard, and presents complete resistance to a red heat and boiling water.

(44) A. A.—Stenciling is done on glass in the same manner as on window shades and for fresco figures on ceilings. Cut the patterns in oiled paper or bookbinders' press boards. Lay the pattern on the work, holding it firmly, and with a medium stiff brush fill in the spaces with the desired colors.

(45) T. W. B. writes: I have 59 tubes to portable boiler. To-day they all leak, to-morrow only a few, and in the course of two or three days they all stop, or nearly so. Then they commence leaking, say two or three, at bottom; then change to one side, where several will leak for two or three days, and then cease leaking on that side, and change once to the other side of furnace. Can you explain this? It is an enigma to me. After expanding tubes, should the bedding be reset to flue sheet? What is the distance between centers of 5 foot 6 inch and 2 foot pulleys for 30 foot belt? A. The tubes that leak are not tight in the head, which allows a slight movement of the tube in its socket by pressure in raising steam, and also by variation of pressure in boiler during the day. The sediment in the boiler tends to stop the leaks by percolation. Getting up steam the next day will again spring the head and start some of the loose tubes leaking. The fact of their leaking on alternate sides we think accidental; much depends on the kind of expander that is used. A roller expander should have the ends of the tubes beaded over to insure stability of the head under pressure. Distance between centers or pulleys should be 34 feet 1 inch.

(46) W. L. T.—It is a very difficult process for an amateur to make good japan varnish. Better buy the red japan from a varnish maker, and thin it with turpentine to the proper consistency for dipping. It will do for wood, but requires two coats, as the first coat dries in and will not give a gloss. The hard japans require 260° for baking. There are japans that are not so tough, that dry at 212° upward, and others that are called air-drying japans.

(47) J. N.—Fresh brewer's yeast will cause bread to rise in 2 to 4 hours' time. The following recipe is used for aerated bread: Divide 3 pounds flour into two portions; mix up the first with water, holding in solution 2 ounces bicarbonate of soda, then mix the second portion of flour with water, to which 1 ounce of muriatic acid has been added; knead each mass of the dough thoroughly. When this is done, mix both portions together as rapidly and perfectly as possible, form the mass into loaves, and bake immediately. This bread contains no yeast, and is very wholesome. You can, if you prefer, use a baking powder such as the following:

Powdered cream tartar	30 ounces.
Bicarbonate of soda	15 "
Flour	6 "

All well dried; mix thoroughly and keep dry.

(48) T. W. writes: I have an opera glass with achromatic objective 1 5/8 inches in diameter and 4½ inches focus. Can I use it for making stereoscopic views with camera? A. You can, but with a limited field; it needs two sets for a proper arrangement for a stereoscopic lantern.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted,

September 15, 1885,

AND EACH BEARING THAT DATE.

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

Adjustable chair, G. Wilson, Jr. 326,369
Alarm. See Feed water alarm. Low water alarm.
Amalgamator, F. L. Downend. 326,483
Animal trap, W. T. Moore. 326,513
Animal trap, R. M. Tate. 326,460
Anvil, drill, and vise, combined, H. Childers. 326,402
Auger blades, machine for shaping post, C. L. Carter. 326,399
Automatic sprinkler, A. K. Rider. 326,155
Axle box, car, W. D. Cooper. 326,405
Axle box, car, S. R. Hughes. 326,219
Axle lubricator, car, D. Ross. 326,524
Axle, vehicle, G. M. Forbes. 326,284
Bag. See Feed bag.
Barber's chair, Hoffmann & Ferst. 326,503
Barrel cover holder, S. E. Vincent. 326,177
Barrel crozing and howeling machine, G. J. Miller. 326,234
Basket, H. P. Gross. 326,499
Beading tool, Kendall & Vose. 326,435
Bed bottom, C. Bigeon. 326,096
Bed bottom, folding, J. Ainslie, Jr. 326,375
Bed, folding, H. & E. Williams. 326,387
Bed screen frame, G. D. Marsh. 326,437
Bedstead, invalid, A. J. Goodwin. 326,111
Bedstead, wardrobe, R. Mitchell. 326,316
Binder, twine, W. S. Davey. 326,204
Blast furnace, Weimer & Euston. 326,182
Blind, J. G. Wilson. 326,371
Board. See Wash board.
Bolting chest, R. M. True. 326,175
Bolts, locking, N. H. Brown. 326,101
Boot or shoe sole and heel, G. F. Butterfield. 326,476
Boot or shoe soles, attaching, F. F. Raymond, 2d. 325,150
Boot or shoe soles, tool for piercing holes in, Seaver & Mork. 326,160
Boot strap, J. M. Wilkinson. 326,187
Boring machine, S. F. Cohin. 326,202
Bottle stopper, G. W. Canterbury. 326,272
Box. See Knockdown box.
Boxes, etc., composition of matter for lining or coating, A. Hollner. 326,115
Brick kiln, W. N. Graves. 326,286
Brick machine attachment, W. N. Graves. 326,287
Brick machine, hydraulic, W. N. Graves. 326,288
Brick machine mould and frame therefor, W. N. Graves. 326,289
Bridge system, railway cable, J. G. Ogden. 326,322
Broiler, A. Pillault. 326,328
Broom and tool rack, combined, J. H. Barber. 326,193
Brush and broom holder, D. D. Lavery. 326,225
Buckle, R. M. Dillard. 326,410
Buckle, C. A. Draper. 326,279
Buckle and cup, combined belt, W. R. Johnston. 326,296
Buckle attachment, W. P. Tinsley. 326,350
Buckle, hook, V. Berthelot. 326,385
Bullet, F. Manning. 326,231
Bung and bush, C. Kuhner. 326,127
Burner. See Gas burner.
Button, C. V. Goddard. 326,211
Button and button fastener, C. Ritter. 326,332
Button fastener feeding machine, F. H. Richards. 326,153, 326,246
Button fasteners, stock for making, F. H. Richards. 326,152
Can. See Creaming can. Milk can.
Car brake, G. L. Adams. 326,191
Car coupling, F. A. Casey. 326,401
Car coupling, J. Fish. 326,415
Car coupling, J. G. Gammon. 326,421
Car coupling, E. N. Gifford. 326,285
Car coupling, Horsley & Jull. 326,218
Car coupling, C. D. Meigs. 326,442
Car coupling, J. G. Williams. 326,188
Car pedestal, Briody & McHale. 326,394
Car, street railway, T. B. Stewart. 326,527
Car ventilator, W. E. Eastman. 326,411
Car wheel, R. W. Jess. 326,433
Car wheel, N. Washburn. 326,256
Cars, propelling railway, G. Pardy. 326,144, 326,145
Cards, manufacturing show, J. Thoubboron. 326,174
Carriage runner attachment, D. E. Roche. 326,456
Carrier. See Cash carrier. Cash and parcel carrie.
Cart, road, A. P. Ferguson. 326,414
Cash and parcel carrier, Lamson & Giles. 326,128
Cash carrier, D. Lippy. 326,130
Cash carrier, Lippy & Ott. 326,131
Caster, M. Schwerin. 326,159
Casting steel and other metal bars, rods, etc., apparatus for, Pielsticker & Muller. 326,147
Casting stereotype plates, paper mould for, L. H. Allen. 326,376
Catch or fastening, spring, Ripson & Watson. 326,331
Cellulose, making solid compounds from soluble nitro, Hyatt & Everding. 326,119
Center or other table, W. T. Burroughs. 326,102
Centrifugal reel, B. Kniffler. 326,509
Chain, drive, R. F. Ludlow. 326,307
Chair. See Adjustable chair. Barber's chair. Convertible chair. Dentist's or photographer's chair. Nursery chair. Photographer's chair. Rocking chair.
Chair, G. Wilson, Jr. 326,368
Chair, J. Short. 326,165
Chalk rack, sectional, J. G. Plowman. 326,453
Channeler, adjustable concentric, J. C. Smith. 326,342
Check rein hook, Hobart & Coombes. 326,217
Chest. See Bolting chest.
Churn dasher, W. L. Monroe. 326,318
Clasp. See Corset clasp. Spring clasp.
Clasp, J. J. Unbehend. 326,351, 226,356, 326,357
Clasp plate, J. J. Unbehend. 326,355
Clevis and link, plow, L. Gibbs. 326,210
Clinometer, J. F. Borchardt. 326,390
Clock pendulum escapement, W. Hart. 326,292
Clod crusher and pulverizer, T. F. Emans. 326,489
Clothes line, Savoye, Jr., & Searing. 326,250
Clutch, friction, A. B. Bean. 326,091
Coal elevator, W. Lawton. 326,129
Coffee, coating and coloring, W. S. Long. 326,227
Coffin, J. C. Meyer. 326,315
Collar fastener, horse, J. D. Lane. 326,436
Convertible chair, J. Preston. 326,241
Coop, poultry, H. J. Haight. 326,113
Corn shocker, E. W. Comegys. 326,403
Corset clasp, B. J. Malone. 326,230
Corset steel fastening, Alcorn, Jr., & Blake. 326,259
Coupling. See Car coupling. Pipe coupling.
Creaming can, H. Haak. 326,426
Crusher. See Clod crusher.
Crushing and grinding mill, W. C. Stiles. 326,253
Culm conveyer, R. Y. Mitchell. 326,445
Culm, transporting and sorting, R. Y. Mitchell. 326,446
Cultivator, G. W. Forbes. 326,208
Cultivator, wheel, W. P. Brown. 326,200
Cutter. See Hay and straw cutter. Vegetable cutter.
Dentist's or photographer's chair, O. C. White. 326,185
Desks, seats, etc., to floors, device for detachably securing, W. F. Young. 326,470
Digger. See Potato digger. Root digger.
Disinfectant, F. Y. Cromwell. 326,479
Door, check, J. E. Newcomb. 326,320
Doors and shutters, operating, E. Perkins. 326,325
Doubling and twisting silk and other threads, machine for, J. E. Tynan. 326,530
Drill. See Ratchet drill. Rock drill.
Drill rods, safety jack for holding, A. Ball. 326,380
Dust collector, P. Van Gelder. 326,176
Ear rings, ear wire catch for, S. F. Merritt. 326,135
Electric machines, automatic stop apparatus for motors driving dynamo, O. F. Jonsson. 326,223
Electric signaling apparatus, F. G. Sargent. 326,158
Electro-magnetic log, Favor & Jacobs. 326,207
Elevator. See Coal elevator.
Elevator brake mechanism, J. A. Hurley. 326,504
End gate, wagon, C. A. Gale. 326,420
Engine. See Steam engine.
Engines, electrical apparatus for controlling marine, L. M. Sanders. 326,337
Evaporating pan, T. F. Krajewski. 326,299
Evaporating pan, J. F. Porter. 326,149
Excelsior machine, G. Brooks. 326,395
Exercising machine, J. B. Root. 326,247
Faucet and air pump, combined, beer, M. L. Deering. 326,482
Faucet and bushing, H. Nadorff. 326,319
Feed bag for horses, M. Burton. 326,103
Feed water alarm, A. P. Urey. 326,465
Feed water heater, H. Cummings. 326,203
Feeder, automatic boiler, W. H. Page. 326,143
Fence, metallic, L. T. & W. H. Brookhart. 326,535
Fence, wire, W. J. Adam. 326,087
Filter for purifying water, submerged water, W. G. Himrod. 326,500
Firearm, W. H. Davenport. 326,276
Firearm, magazine, W. B. Franklin. 326,491
Fire escape, Sandberg & Akeson. 326,336
Fire escape, Steinebach & Wright. 326,169
Fish and method of preparing, cake of cured, A. B. Bray. 326,099
Fishing float, J. McNeal. 326,134
Folding machine, J. C. Kneeland. 326,125
Folding table, G. H. Allen. 326,260
Frame. See Bed screen frame.
Fruit jar cap, C. H. Fry, Jr. 326,492
Fruit jar fastening, C. F. Fisler. 326,416
Furnace. See Blast furnace.
Furnace for the combustion of liquid fuel, J. H. Selwyn. 326,161
Furnace grate, S. H. Huntington. 326,295
Furnace grate, C. Martin. 326,309
Furnaces, filling, Weimer & Euston. 326,181
Furnaces, steam and air injector for, W. Mathews. 326,232
Gauge. See Saw table gauge. Track gauge.
Garment supporter, C. C. Shelby. 326,162
Gas, apparatus for the manufacture of illuminating, F. Egner. 326,488
Gas burner, A. Vreeland. 326,358
Gas from escaping, means for holding and preventing, T. Prosser. 326,242
Gases, apparatus for utilizing wood, H. M. Pierce 326,451
Gases for metallurgical purposes, utilizing wood, H. M. Pierce. 326,452
Gate. Seed End gate. Railway gate.
Gate, W. G. Stone. 326,173
Gates, mechanism for operating road crossing, J. H. Clayton. 326,275
Generator. See Steam generator. Vapor generator.
Glove holder, self-closing, C. Connolly. 326,104
Governor, L. & A. Y. Gray. 326,497
Governor, steam, J. D. McRae. 326,441
Governor, steam engine, J. Begtrup. 326,092
Grain adjuster, H. Tuttle. 326,464
Grain binder, J. C. McLachlan. 326,233
Grate, L. L. Culver. 326,481
Grinding mill, W. H. Browne. 326,264
Hame, C. H. Fields. 326,490
Hammocks, net attachment for, A. Nickerson. 326,321
Hand and arm rest, A. C. Perry. 326,326
Hanger. See Lamp hanger.
Harness support, J. E. Ricker. 326,330
Harrow and cotton planter, combined, W. A. Dobb. 326,206
Harvester and binder, grain, G. F. Messinger. 326,443
Harvester, cotton, E. F. O'Haver. 326,142
Hat forming machine, D. Almond. 326,377
Hay and straw cutter, W. Barrett. 326,382
Hay rake, horse, P. F. Fleming. 326,417
Headlight signal, locomotive, W. W. Richards. 326,523
Heater. See Feed water heater.
Holder. See Brush and broom holder. Sad iron holder. Sash holder.
Hook. See Check rein hook.
Hopping wort, J. C. Bauer. 326,383
Horse blanket fastening, F. A. Look. 326,228
Horseshoe, W. W. Hallenbeck. 326,290
Induction coil, W. Burnley. 326,270
Injector, steam, J. Desmond. 326,408
Inkstand, M. J. Hughes. 326,118
Inkstand and calendar, combined, F. A. Woodmansee. 326,468
Insulating wires, applying gum balata for, P. C. Matherson. 326,132
Ironing table, I. C. Reid. 326,455
Jack. See Lifting jack.
Jewelry pins, etc., catch for, C. E. Carpenter. 326,477
Journal lubricator, W. Robinson. 326,156
Kiln. See Brick kiln.
Kitchen dresser, J. F. Roth. 326,248
Knife handles, machine for inserting rivets in, W. A. C. Oaks. 326,141
Knockdown box, H. T. Boulden. 326,262
Knockdown table, H. F. Gray. 326,112
Ladder, extension, W. N. Derby. 326,205
Lamp chains, friction pulley for, J. S. Oakley. 327,140
Lamp, electric, J. Du Shane. 326,487
Lamp, electric arc, R. F. Jones. 326,123
Lamp hanger, electric, W. S. Weston. 326,363, 326,364
Lamps, arch for supporting electric, P. H. Griffin. 326,498
Lamps, bulb case for incandescent electric, S. H. Sprague. 326,459
Lamps, overflow device for pump, T. W. Hamilton. 326,427
Lantern, F. Meyrose. 326,136
Lantern, signal, A. W. Hazelrigg *et al.* 326,293
Latch, Woodrich & Langbein. 326,258
Lens for optical instruments, A. Wagner. 326,255
Lifting jack, J. C. Silsbee. 326,340
Lithographic stone, artificial, W. Van Pittler. 326,254
Lock, A. Kelly. 326,507
Log turner, J. Evered. 326,280
Low water alarm, H. Wilson. 326,370
Lubricating apparatus, C. M. Long. 326,304
Lubricating composition, A. A. Martinez. 326,311
Lubricator. See Axle lubricator. Journal lubricator.
Lubricator, J. Powell. 326,517 to 326,521
Malt floors, spraying apparatus for, O. Bothner. 326,197
Milk can, E. Slaght. 326,341
Milk cans, non-conducing covering for, T. Williams. 326,189
Mill. See Crushing and grinding mill. Grinding mill.
Mould. See Brick machine mould.
Moulding as an article of manufacture, interlocking spiral, M. Y. Ransom. 326,329
Money drawer register, W. G. Hennings. 326,114
Motive power by aid of air and hydrocarbon oils, apparatus for manufacturing, using, and furnishing, I. James. 326,480
Motor, H. R. Horton. 326,117
Musical instruments, keyboard attachment for, W. R. Eddington. 326,412
Musical instruments, keyboard attachment for, C. F. Meyering. 326,444
Musical instrument, mechanical, F. Stone. 326,172
Nails, machine for making shoe, A. Prestat. 326,240
Net, fishing, B. K. Moscopoulos. 326,139
Nursery chair, M. M. Gooch. 326,110
Nut lock, T. Decker. 326,407
Nut lock, F. F. Robb. 326,333
Nut lock, F. Taylor. 326,345
Odometer, H. O. Brooks. 326,396
Oil, drying, C. A. Wittmack. 326,467
Organ action, F. Stone. 326,171
Organ action, electric, G. G. Wacker. 326,359
Organ stop action, reed, M. Clark. 326,274
Oven, steam, T. C. St. John. 326,170
Ox bow, fastening, J. Lowe. 326,229
Packing for axle boxes, E. Waite. 326,179
Pan. See Evaporating pan.
Paper box machine, F. Schoettle. 326,338
Paper feeding machine, J. C. Kneeland. 326,124
Pencil, J. Hoffman. 326,502
Photographer's chair, child's, O. C. White. 326,184
Piano, G. Cook. 326,105, 326,106
Piano action, C. E. Rogers. 326,335
Piano cover, S. E. Richey. 326,154
Pianos and organs, mechanical keyboard attachment for, W. R. Eddington. 326,413
Pianos, repetition action for upright, L. F. Deming. 326,278
Pipe. See Stove pipe. Stove and furnace pipe.
Pipe coupling, permanent, F. E. Youngs. 326,469
Pipes, connection for lead and other like, F. George. 326,425

Planter check rower attachment, corn, L. J. Odell 326,449
Planter check rower, corn, R. Faries 326,282
Planter, corn, J. M. Bolton 326,388
Planter, corn, F. H. Rybacek 326,525
Planter, harrow, and cultivator, combined, J. M. Walker 326,180
Plaque stand, adjustable, E. Blaesius 326,387
Pliers, cutting, A. L. Pickett 326,327
Plow, gang, H. W. Wynne 326,534
Plug, turning, J. H. Blessing 326,195
Plush articles of clothing, making, Theinert & Christiansen 326,348
Pneumatic tool, J. S. McCoy 326,312
Pole or shafts, vehicle, T. Lauzon 326,301
Pole tip, vehicle, A. W. Bagg 326,379
Potato digger, C. S. Torrey 326,461
Powder gun, J. A. Peer 326,324
Press. See Sheet metal cutting press.
Printer's case, job, G. W. Butler 326,475
Printer's locking quoin, J. N. O. Hankinson 326,428
Printer's quoin, Drodzewski & McConnell 326,484
Printer's quoin, J. McConnell 326,435
Printing machine, inking apparatus, J. T. Hawkins 326,215
Printing machines, sheet delivery for oscillating cylinder, J. T. Hawkins 326,216
Pruning shears, I. M. McKay 326,314
Puller. See Stump puller.
Pump, J. P. Cobb 326,201
Pump, L. A. Kelly 326,434
Pump and water elevator, automatic, A. H. Bryan 326,266
Pump, hydraulic air, W. S. Taylor 326,346
Pump, etc., portable, R. Phillips 326,146
Pump, single-acting, W. H. De Valin 326,409
Pumping machine for stone saws, F. R. Patch 326,323
Punch, ticket, W. H. Bonnell 326,389
Punch, ticket, J. F. Hanscom 326,429
Quilting frame, J. H. McGee 326,133
Rack. See Broom and tool rack. Chalk rack.
Radiator, C. E. Ashcroft 326,473
Railway, cable, A. Bonzano 326,536
Railway gate, A. Lowe 326,306
Railway gate, G. F. Oehrl 326,515
Railway rail fish plate, Bridgers, Jr., & Good 326,383
Railway, street, cable, J. D. Isaacs 326,120
Railway switch, Davies & Penglase 326,406
Railways, etc., construction and operation of permanent, W. F. Goodwin 326,212
Railways, etc., electrical conductor for, Perry & Ayrton 326,237
Railways, hydrometer for street, R. F. Bridewell 326,198
Rake. See Hay rake.
Ratchet drill, J. J. Banta 326,381
Reel. See Centrifugal reel.
Register. See Money drawer register.
Rice cleaning machine, W. B. Vardell 326,532
Rivet, W. C. Bray 326,100
Riveting machine, W. H. H. Sisum 326,252
Roads, forming tracks or ruts in ice covered logging, A. Gallinger 326,209
Rock drill, A. McConnell 326,511
Rocking chair, base, G. A. Watkins 326,361
Roller mill feeder, Nolden & May 326,447
Roller mill feeder, J. Mooney 326,512
Roller mill, roll, J. W. Jackson 326,121
Rolls, dressing, R. Brown 326,263
Roofing, B. B. Adams 326,374
Root digger, C. S. Torrey 326,462
Rotary shears, E. Shepard 326,163
Roundabout, G. Bungarz 326,474
Rubber, gutta-percha, etc., manufacture of compounds of India, A. H. Huth 326,220
Saccharine compound, C. Fahlberg 326,281
Sad iron holder, W. M. McIntyre 326,313
Safe, O. Gassett 326,424
Sash fastener, F. A. Bascom 326,090
Sash holder, H. Lawrence 326,226
Saw filing machine, gin, F. M. Sisk 326,167
Saw gummer and sharpener, S. J. Randall 326,243
Sawmill set works, Hanson & Clark 326,291
Saw set, J. S. Long 326,305
Saw set, G. Marsh 326,308
Saw swage, W. D. Sherman 326,164
Saw swaging machine, P. R. Ward 326,360
Saw table gauge, H. T. Rawlings 326,454
Saws while being ground, device for supporting, Campbell & Mills 326,397
Sawing machine, W. W. Smith 326,343
Scaffold binder, J. A. Moress 326,514
Scarf, neck, D. Schlesinger 326,251
Seal, E. J. Brooks 326,199
Seals, machine for making wires for metallic, F. A. Fay 326,283
Separator. See Thread separator.
Sewing machine, hand, R. W. Whitney 326,365
Sewing machine table top, N. A. Hull 326,294
Sewing machine take-up mechanism, J. E Wiggin 326,533
Sewing machines, attachment holding device for use on, J. P. Lavigne 326,302
Sewing machines, mechanism for controlling steam driven, J. H. Rohme 326,457
Shafts, vehicle, J. A. Johnson 326,505
Shears. See Pruning shears. Rotary shears.
Shears, J. L. Dufrane 326,485
Sheet metal cutting press, W. Werts 326,183
Sheet metal pipes, machine for forming and threading, M. K. Pierce 326,516
Shingle, metallic, M. G. Farmer 326,108
Ships and transferring curves, appraatus for moulding the frames of, Johnson & McDonnell 326,506
Shutter bower, G. F. S. Zimmerman 326,375
Shutter fastener, J. S. Dunham 326,486
Signal. See Headlight signal.
Silk, machine for throwing, J. E. Tynan 326,551
Sink trap, A. Koegel 326,126
Skate, roller, H. W. Barrows 326,261
Skate, roller, J. D. Kefuss 326,224
Skate, roller, C. D. Rice 326,151
Sled, C. H. Weisgerber, Jr 326,362
Soda, purifying ammonia, H. Gaskell, Jr 326,423
Soldering eaves troughs, clamp for, S. Yates 326,372
Speaking tube, P. Pereira y Albizu 326,450
Speed governor, J. Morton 326,235
Spigot and faucet, J. H. O'Connor 326,448
Spike blank, W. Koplin 326,298
Spinning and doubling yarn, machine for, W. Lancaster 326,300
Spoke tenoning machine, G. R. Kidder 326,508
Spooler, Gary & Heath 326,422
Spring clasp, J. J. Unbehend ..... 326,352 to 326,354
Sprinkler. See Automatic sprinkler.
Squib, miner's, J. R. Powell 326,239
Stamp, hand, W. A. Force 326,418
Stand. See Plaque stand.
Steam boiler, J. McEwan 326,440
Steam engine, C. M. Long 326,303
Steam engine stuffing box, S. C. Berry 326,384
Steam generator, W. H. Lewis 326,510
Steam generator, H. H. Ward 326,466
Steam generator, M. M. Whittemore *et al* 326,186
Steam trap, W. W. Taylor 326,347
Stopper. See Bottle stopper.
Stone or marble, manufacture of artificial, S. Mixer 326,317
Stove, L. F. Betts 326,386
Stove and furnace pipe, asbestus or amianthus, A. R. Bennett 326,093
Stove, gas, J. W. Baker 326,089
Stovepipe, decorated, A. R. Bennett 326,094
Stud, lacing, Piper & Reed 326,148
Stuffing boxes, gland adjuster for, J. Powell 326,522
Stump puller, H. L. Bennett 326,095
Stump puller, J. L. Martin 326,310
Supporter. See Garment supporter.
Suspenders, C. B. Bird 326,194
Table. See Center or other table. Folding table. Ironing table. Knockdown table.
Table and culinary receptacle, combined, A. W. Steers 326,526
Tag and tag fastener, O. W. Conner 326,404
Telephone, mechanical, H. Seligman 326,458
Telephone transmitter, W. Burnley 326,269
Telephonic receiver, W. Burnley 326,268
Thrashing cylinder, G. A. Roberts 326,334
Thrashing machine, J. W. Roweton 326,249
Thread separator and traveler cleaner, J. H. Osborn 326,236
Time check, system, J. S. Goldsmith 326,495
Time checks, apparatus for controlling the issue of, J. S. Goldsmith 326,493
Time checks, apparatus for receiving, J. S. Goldsmith 326,494
Toe calks, machine for making, I. W. Tucker 326,463
Tool, combination, W. B. Kennedy 326,297
Toy spring gun, D. L. Wilcox 326,356
Track gauge, R. Caffrey 326,271
Tractionengine wheel, C. M. Giddings 326,109
Trap. See Animal trap. Sink trap. Steam trap.
Trap for wash basins, automatic, Delehanty & Murphy 326,277
Traveling bag handles, manufacturing, F. Armbruster 326,471
Tricycle, D. H. Rice 326,244, 326,245
Truck, cable car, J. J. Endres 326,107
Trunk catch, W. Bruen 326,265
Truss, hernial, N. Jones 326,122
Tub. See Wash tub.
Tube. See Speaking tube.
Type writing machine, F. X. Wagner 326,178
Umbrella, F. Haitz 326,213
Umbrella support, F. Haitz 326,214
Urn for cooking purposes, water, J. F. Trout 326,529
Valve, steam engine, C. A. Carlson 326,398
Valve, stop, J. Pfau 326,238
Valves, mechanism for operating, J. H. Blessing 326,196
Vapor generator, M. Chase 326,478
Vegetable cutter, A. John 326,222
Vehicle running gear, N. L. Holmes 326,116
Vehicle spring, A. Armstrong 326,472
Vehicle, two-wheeled, H. B. Sorter 326,168
Ventilator. See Car ventilator.
Vessel for transporting liquid cargoes in bulk, L. V. Sone 326,344
Vise, V. M. Moore 326,137, 326,138
Wagon step, E. Bodman 326,098
Wall paper, W. Wilson 326,190
Wash board, H. C. Carter 326,400
Wash tub, G. W. Crouse 326,480
Washing machine, M. Baer 326,378
Washing machine, A. A. Hinds 326,501
Washing machine, Sell & Davis 326,339
Washing machine, V. Wilhelmi 326,257
Water closet attachment, W. H. Graham 326,496
Water closet valve, E. A. Straat 326,528
Water for sanitary purposes, appliance and arrangement for controlling, regulating, and arresting the supply of, G. H. Jennings *et al* 326,431
Water for sanitary purposes, etc., appliance and arrangement for controlling, regulating, and arresting the supply of, G. H. Jennings *et al* 326,432
Water, means for supplying, J. Baker 326,192
Water, purifying, J. W. Hyatt 326,221
Water raising apparatus, C. Burnett 326,267
Waterproof, rendering cloth, wood, paper, etc., N. A. Alexanderson 326,088
Wells, protecting, S. McEachen 326,439
Wheel. See Car wheel. Traction engine wheel. Wind wheel.
Wheelbarrow, D. B. Tiffany 326,349
Wind wheel, L. D. Abrams 326,086
Wind wheel, J. S. Roher 327,157
Wind wheel, T. J. Simpson 326,166
Winding and twisting machines etc., stop-motion mechanism for, J. Boyd 326,391
Windows, weight cord and attachment for, E. T. Bradburo 326,392
Wire drawing die, F. M. Blake 326,097
Wire stretcher, W. H. Forker 326,419
Wool or cotton, machine for picking and burring, Clark & Tindell 326,273

DESIGNS.

Arm rest support, T. A. Kochs 16,251
Candy box, B. Meyer 16,253
Card, show, F. Eberlein 16,246
Carpet, E. Fisher 16,247
Carpet, H. Horan 16,249, 16,250
Jewelry box, H. B. Sommer 16,254
Sofa, A. Hausske 16,248
Trimming, E. Kumke 16,253

TRADE MARKS.

Boots, shoes, and slippers, A. J. Cammeyer 12,567
Cholera preventive, G. C. Beresford 12,566
Dress goods, ladies', B. Priestley & Co 12,581
Glass fruit jars, Woodbury Glass Works 12,583
Leather, shoe kid, Rose, McAlpin & Co 12,582
Sheetings, shirtings, drills, and jeans, Fearon, Low & Co ..... 12,574 to 12,578
Silver plated tableware and fancy articles, Pairpoint Manufacturing Company 12,580
Soap, laundry, J. S. Kirk & Co ..... 12,568 to 12,573
Washing compound, J. S. Kirk & Co 12,579

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