

the same result if the field and armature were cast? A. If cast iron of the same size as the wrought iron parts were used, the magnetism would be cut down about one-half, and the motor reduced in power to the same degree. 2. What size propeller for high speed would it run if put in a model boat? A. A very small one, perhaps four inches. 3. What would be the number of the wire on field and armature if a motor were made one-half as large, and how many feet of same on same? A. We have no data for the motor except as published. It would be a very small toy if reduced to half size.

(8063) J. L. C. writes: Kindly inform me the most practical dimensions, etc., of an induction coil suitable for gas engine ignition upon motor bicycle. A. SUPPLEMENT No. 1281, price 10 cents, gives valuable data for a coil for igniting a gas engine by means of a battery.

(8064) L. A. T. writes: Please give, through Notes and Queries, the process of case-hardening of tools such as taps, dies, etc. A. Heat the surface to be case-hardened sufficiently hot to melt yellow prussiate of potash (potassium ferro-cyanide) powdered and sprinkle on, and again insert in fire and heat to "cherry red," when treat to bath of clear cold water. Remove scale with sandpaper or emery-cloth. The forge is as good a place to harden small or single subjects as a regular carbonizing furnace. In factories where much carbonizing is done, a cheaper article, "bone dust," is employed. The subjects are placed in an iron box and filled with bone dust, then placed in the furnace, and when sufficiently hot treated to the water bath. Parings of horse or ox hoofs, or the hoofs of any animal, to which is added common salt, make a very cheap and effective carbonizer.

(8065) C. W. B. writes: Please give me the rule for finding the horse power of an engine. Also state what proportion of the power of the engine is required to operate the ordinary slide valve. A. To obtain the horse power of a steam engine with any reasonable accuracy without taking an indicator card, the cut-off of valve and the exact pressure in the steam chest should be known. Sometimes engines are run with the steam partly throttled, which with the length and friction in the steam pipe will give less pressure in the steam chest than is indicated by the gage at the boiler. From the known cut-off the mean pressure may be taken from the steam tables or rule for mean pressure in Haswell's "Engineers' Pocket-Book." We give the mean pressure for the points of cut-off in ordinary use, viz., 3-10 = 0.692; 3% = 0.766; 4-10 = 0.787 of the initial pressure. Then the diameter of the piston in inches by the mean pressure per square inch by twice the stroke in feet by the number of revolutions per minute equals the total foot-pounds. The total foot-pounds divided by 33,000 equals the horse power. The power required to operate the slide valve varies from one to two per cent of the power of the engine.

(8066) E. P. asks: 1. Please tell me whether a person on a private ground-circuited telephone line should hear the conversation on other private, ground-circuited telephone lines, if he were not connected at the switchboard? It is this way with our telephone lines. A. Whenever telephone wires run side by side, what is said over one line will be heard over the other. This is true whether the line is a grounded line or not, unless the wires are crossed at intervals. 2. Would a return circuit wire be the best way to remedy the trouble? A. A metallic circuit with the wires twisted or crossed at regular intervals is the only way to prevent "cross talk." 3. How many amperes strong should be a dry battery $2\frac{1}{2}$ by $6\frac{1}{2}$ inches? A. A dry cell cannot be said to have any amperes. At least the current varies so rapidly that it can hardly be measured before it has changed. The voltage is about 1.3. The internal resistance varies very rapidly. The amperes therefore vary with equal rapidity.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending

FEBRUARY 5, 1901,

AND EACH BEARING THAT DATE.

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

Acetylene burner with two or several flame rays, K. Thurmauer.....	667,608
Acid and preparing same, trimethyl pseudo uric, E. Fischer.....	667,388
Acid, manufacturing acetic, J. Behrens.....	667,583
Adjustable chair, J. H. Giese.....	667,363
Alcohol for use in the arts alone, producing, G. H. Benjamin.....	667,359
Alkoxy caffeine and making same, F. Ach.....	667,380
Amido aldehyde and making same, aromatic, L. Ach.....	667,382
Anvil, N. H. Snyder.....	667,593
Arrow, pneumatic, H. O. Kratz-Boussac.....	667,639
Atomizer, O. H. Brigham.....	667,497
Automatic switch, J. D. Edwards.....	667,705
Bag holder, A. S. Beck.....	667,645
Bag or envelop fastener, F. M. Turck.....	667,375
Bale tie, E. T. Warn.....	667,471
Baling apparatus, cotton, F. L. Dyer.....	667,362
Baling press, J. S. Tuttle.....	667,376
Ball. See Practice ball	
Band cutter and feeder, W. Morley.....	667,242
Basin waste, B. Jansen.....	667,443
Beams, manufacturing structural, C. F. Dickinson.....	667,198
Bearing, roller, R. D. Camp.....	667,647
Bearing, roller, J. A. Perkins.....	667,633
Bearing, shaft, J. F. Appleby.....	667,644
Bed, folding, M. W. Hall.....	667,439

Bed foot rest, invalid, E. F. Stetson.....	667,260
Beer cooling and preserving apparatus, A. Cobley.....	667,504
Beer cooling apparatus, T. R. Faughnan.....	667,206
Beer storage house, E. F. Dyer.....	667,190
Belt, apparel, E. Robertson.....	667,252
Bench. See Washbench	
Bicycle, N. B. Fassett.....	667,432
Bicycle, E. S. Leaycraft.....	667,232
Bicycle driving mechanism, C. Soucy, Jr.....	667,584
Bicycle lock, E. McJohn.....	667,556
Bicycles, changeable speed gear for, J. Manning.....	667,238
Bill of fare holder, M. C. Robichau.....	667,578
Bivalves, dredge for collecting or gathering, R. F. Rogers.....	667,580
Blast cavity tester, W. Giboney, Jr.....	667,516
Boat clearing device, life, E. Wolfgang.....	667,480
Boiler. See Steam boiler	
Boiler, J. Leighham.....	667,326
Boiler sediment collector, steam, H. R. Churchill.....	667,502
Boiler tube cleaner, Forsyth & Bell.....	667,513
Boilers, feeding scale preventives into, G. Neubauer.....	667,559
Bolt and nut lock, Pardee & Morgan.....	667,568
Book, S. H. Stroup.....	667,638
Book cover and pincushion, combined, W. M. Butler.....	667,495
Book, record, G. E. Foote.....	667,479
Bottle, non-refillable, C. A. Gross.....	667,217
Bottle, non-refillable, S. Levin.....	667,234
Bottles, top for powder, cologne, or sauce J. A. Moller, Jr.....	667,550
Bracket for window shades, curtains, etc., J. Perus.....	667,259
Brake. See Car brake	
Brake shoe, electromagnetic, F. C. Newell.....	667,246
Bread or sausage cutter, F. Graff.....	667,264
Briquet machine, R. Schorr.....	667,254
Buckle, A. F. Fuller.....	667,307
Bunking roll, H. A. Webster.....	667,372
Building, sheet metal, W. Brandt.....	667,384
Bundle carrier, H. Heumann.....	667,623
Bust developer, H. L. Miller.....	667,447
Button for shirts, etc., C. A. Pierson.....	667,574
Button or stud, H. M. Larter.....	667,631
Can. See Sheet metal can	
Can opener, H. McCleary.....	667,243
Canned meats, machine for cooling, F. W. Bright.....	667,385
Canning apparatus, food, G. Lees.....	667,538
Cancelling apparatus, postmarking machine, mail, F. C. Ielfield.....	667,394
Capsuling machine, E. D. Harrington.....	667,518
Car brake, J. H. Diercks.....	667,507
Car coupling, C. Dietz.....	667,427
Car coupling, J. W. Fawcett.....	667,510
Card feeding machine, G. Geb.....	667,213
Carrier. See Bundle carrier	
Cartridge fired by electricity, Friese-Greene & Knell.....	667,435
Cartridge holding clip, C. R. Wagner.....	667,351
Caster, furniture, S. E. Medley.....	667,545
Casting metals, mold material for, G. H. Braabrook.....	667,488
Castle guard, Shaffer & Whippo.....	667,256
Cell case machine, J. H. Batchelder.....	667,287
Celloidin molding, G. H. Stevens.....	667,600
Chair. See Adjustable chair	
Chair seat, G. M. Smith.....	667,591
Cheekrein holder, N. O'Neil.....	667,566
Cheese case and knife, O. R. Weese.....	667,413
Churn, J. H. Foote.....	667,395
Churn, S. T. Porter.....	667,250
Clay, etc., treating, J. W. Ivry.....	667,222
Clevis, L. E. Waterman.....	667,610
Clock, alarm, A. Jungmans.....	667,326
Clothes drying rack, C. & J. St. Hilaire.....	667,465
Clothes line, G. E. Hoover.....	667,523
Clothes line, S. N. Parker.....	667,453
Clothes line support, D. H. Norton.....	667,562
Clothes pounder, J. G. Williamson.....	667,473
Coil or ore sprout, adjustable, J. L. Record.....	667,335
Cock, stop and waste, F. E. Johnson.....	667,627
Comb, metallic, F. M. Hamann.....	667,617
Collar fastener, horse, C. Block.....	667,289
Collars, etc., folding machine for, A. D. Fenwick.....	667,207
Colors, reproducing originals in, Truchelut & Rochereau.....	667,349
Confectionery mixing and cooling machine, S. E. Ball.....	667,177
Conveyer, chain, Acklin, Patterson.....	667,174
Conveyer, flight, T. A. Edison.....	667,201
Conveyer, ore, W. R. Craig.....	667,192
Conveying appliance, W. S. Halsey.....	667,440
Cooking utensil, G. L. Warner.....	667,353
Copper mattes, treating converter slag produced in bessemerizing, G. Mitchell.....	667,367
Cotton picker's truck, C. C. Sowder.....	667,370
Cotton Press, M. Swenson.....	667,371
Cultivator, W. K. Alshury.....	667,483
Cultivator, E. W. Stark.....	667,596
Cultivator, wheel, F. Bateman.....	667,207
Cush box, A. J. Tyler.....	667,265
Curd mill, Sodar & Bross.....	667,403
Cylinder concave, Halversen & Swenson.....	667,635
Decoration and making same, J. D. Kyle.....	667,444
Dental engine, W. G. Hughes.....	667,220
Dental mouth prop and mirror, W. Hare.....	667,441
Dental tool, Seeger & Dredick.....	667,464
Disinfecting transmitters and receivers of telephones, device for, C. F. Axtell.....	667,484
Distilling apparatus, N. H. Hiller.....	667,522
Door buck, metallic, R. J. Eidlitz.....	667,620
Dowel pin, J. N. Hieronymus.....	667,219
Drawer, money, S. T. Fisk.....	667,208
Drawers of cabinets, etc., extension slide for, E. J. Bain.....	667,288
Drilling machine feed head, G. D. Williams.....	667,277
Dust collector, Schreick & Hess.....	667,455
Dust guard, F. Hachmann.....	667,437
Dye and making same, blue sulfur, R. Bohn.....	667,483
Eartheware, china, or glass, device for decolorating on, W. F. Silverman.....	667,589
Educational appliance and number wheel, F. D. Jones.....	667,397
Electric circuit breaker, automatic, Hopkins & Talbot.....	667,625
Electric meter, J. Harris.....	667,519
Electric motor, G. E. Weisenburger.....	667,275
Electric motor controller, T. W. Eaton.....	667,619
Electric wire conduit, E. D. Page.....	667,567
Electrodes, means for connecting, H. Blackman.....	667,421
Electrolyzer, W. T. Chapman.....	667,498
Elevator. See Hydraulic elevator	
Elevator, Alloways & Ramsay.....	667,281
Elevator, A. Robinson.....	667,404
Elevator controller, E. Dubinski.....	667,430
Envelope, self sealing, A. H. & A. P. DeLong.....	667,446
Eraser cleaner, D. Little.....	667,540
Erasers, device for applying liquid chemical ink, E. P. Lecher.....	667,233
Escapement, M. Baier.....	667,176
Excavator, O. Hettleson.....	667,313 to 667,315
Extension table, W. E. Depp.....	667,387
Fabric, See Pile fabric	
Fabric and stand for producing same, W. M. Stevenson.....	667,601
Fabric cutting machine adjusting device, H. A. Meyer.....	667,240
Fastener, J. D. Stirckler.....	667,554
Fastener setting machine die, W. B. Murphy.....	667,188
Faucet, W. E. Clavey.....	667,257
Faucet, peer, J. F. Dredge.....	667,301
Fence tie, J. E. Johnson.....	667,530
Fertilizing device, plant, G. M. Sherman.....	667,487
Fifth wheel, vehicle, E. F. Holmes.....	667,333
Filter, water, Marx & Wolff.....	667,239
Fire escape, F. J. Hugh.....	667,526
Fireproof roof, J. E. Brooks.....	667,292
Fish car, E. R. Edson.....	667,283
Fish trap, Welch & Lamley.....	667,472
Fishing bait, mechanical, Shakespeare & Loche.....	667,257
Flushing apparatus, F. Walker.....	667,352
Fly paper holder, Cherry & Radke.....	667,293
Fly trap, Cherry & Radke.....	667,294
Folding chair, A. E. Brockett.....	667,492
Fruits, etc., machine for pitting and stuffing, S. M. Brown.....	667,423
Fumigating or perfuming rooms, apparatus for, J. W. Tighe.....	667,488
Furnace. See Garbage furnace	
Furnace, W. E. Minshall.....	667,549
Furnace grate, F. F. Maier.....	667,399
Gage. See Water gage	
Gage and jig, combined, W. M. Ammermann.....	667,282
Garbage, ashes, etc., receptacle for, J. Brooks.....	667,422
Gasoline burner with two or several flame rays, K. Thurmauer.....	667,608
Acetylene burner with two or several flame rays, K. Thurmauer.....	667,608
Acetylene burner with two or several flame rays, K. Thurmauer.....	667,608
Acetylene burner with two or several flame rays, K. Thurmauer.....	667,



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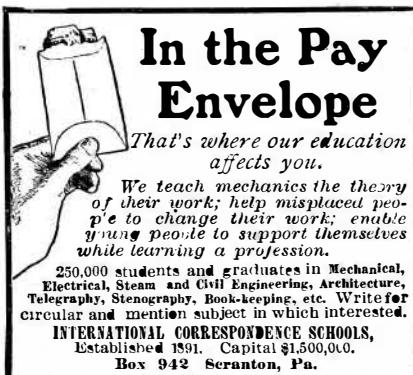
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Propeller, boat, J. W. Caffey.....	667,496
Protractor, F. A. Tibbals.....	667,264
Protractor, stereographic, S. L. Penfield.....	667,570
Pulley, expansion, S. W. Wardwell, Jr.....	667,268
Pulley, sheet-steel split, A. E. Brion.....	667,291
Pump actuated by steam or other fluid pressure, J. E. L. Ogden.....	667,331
Pump, air, G. W. Kellogg.....	667,224
Pump converting attachment, L. Nielsen.....	667,452
Pump governing mechanism, E. R. Hill.....	667,442
Pump handle coupling, M. N. Cray.....	667,650
Pump rod coupling, J. Jr. & E. Amstutz.....	667,283
Pumping engine, duplex, W. J. P. Moore.....	667,660
Pumping power, oil well, W. H. Norton.....	667,368
Puzzle, F. W. Jacob.....	667,528
Radiator, J. F. Thompson.....	667,606
Rail joint, R. B. Charlton.....	667,499
Rail piercing machine, F. J. J. Sloat.....	667,258
Railway, Ireland, centrifugal, E. Prescott.....	667,396
Railway coupling, automatic, Strathern & Solar.....	667,455
Railway current collector, electric, Esmond & Otis.....	667,636
Railway rail joint, R. B. Charlton.....	667,500
Railway switch, A. A. Strom.....	667,501
Railway tie, M. T. Schaeffer.....	667,637
Rake, See Hay rake.	
Rake, E. H. Doane.....	667,428
Rake and hay fork, combined, W. L. Lee.....	667,536
Refrigerator, J. Bettendorf.....	667
Refrigerator, Poirier & Edwards.....	667,249
Refrigerator, iceless, R. A. Maddox.....	667,446
Roof guard, J. O. Streeter.....	667,261
Releasing device, automatic, J. J. Lentz.....	667,539
Respiratory mask or helmet, C. H. Wood.....	667,481
Revolver, C. P. O'Neill.....	667,248
Riveting tool, O. Yager.....	667,278
Roll and cover therefor, rotary cushioned, H. A. Webster.....	667,273
Roller, Seed Spring roller.....	667,310
Rolling mill for making pipes, Bartlett & Kent.....	667,236
Rotary engine, L. C. Krammell.....	667,323
Rotary engine, F. C. Tucker.....	667,609
Rotary engine, W. N. Whipple.....	667,414
Rubber, synthetic production of India, W. J. Cordiner.....	667,191
Salt and pepper box, combined, M. V. B. Grish.....	667,655
Sash fastener, J. E. Blackburn.....	667,420
Sash lock and anti-rattle, R. Collins.....	667,616
Sash, window, J. Sweeney.....	667,640
Scalp, A. Du Vilbiss, Jr.....	667,652
Scale platform, Swiftian & Cross.....	667,410
Scale, spring balance, J. W. Culmer.....	667,425
Scraper, drag, J. Stubbs.....	667,605
Screen, See Wire cloth screen.	
Screw, coated, A. W. MacGahan.....	667,555
Separator, See Liquid separator.	
Sewing machine, shop, C. L. Eaton.....	667,200
Shade hanger, T. A. Sease.....	667,344
Shaft coupling, W. Carr.....	667,424
Shaft reversing device, P. Cunningham.....	667,298
Sharpening and shaping drills, machine for, A. Carstens.....	667,187
Sheet metal can, G. Lees.....	667,537
Ship sheathing, W. Stiven.....	667,603
Shooting gallery, G. W. Cox.....	667,505
Shutter fastener, C. Hill.....	667,521
Sideboard and table, combined, C. A. Geisz.....	667,390
Sign for street cars, etc. illuminated, J. H. Braker et al.....	667,490
Signal, See Trunk line signal.	
Signaling system, W. F. Follett.....	667,434
Skirt protector, L. M. Mabey.....	667,543
Slicing apparatus, Powter & Edison.....	667,251
Snip hook, Deiters & Bill.....	667,196
Soldering tool, W. F. Sonnes.....	667,401
Sorting device, J. Pfeiffer.....	667,214
Spring motor, O. A. Gilbert.....	667,215
Spring roller, O. M. Edwards.....	667,302
Stacker, bay, S. R. French.....	667,306
Stacker, pneumatic straw, O. O. Kittleson.....	667,322
Stamp die, F. White.....	667,415
Stand, See Tripod stand.	
Steam boiler, W. Esty.....	667,431
Steering and stopping apparatus, ship, J. Albaria.....	667,482
Stones from earthy or other materials, apparatus for separating, A. Kuhneert.....	667,535
Store service system terminal, pneumatic, H. W. Forslund.....	667,209
Stove, air-tight heating, Rush & Mrascek.....	667,253
Stove, heating, H. Barber.....	667,285
Stoves, etc., food warmer for oil, M. Morris.....	667,552
Strawboard cutting machines, scoring attachment for rotary, R. G. Nall.....	667,245
Swinging mechanism, O. Hettlesacter.....	667,312
Tablet-making machine, E. V. Peckin.....	667,569
Tack and lathe nail machine, automatic, J. H. Yealey.....	667,279
Target, W. G. Smith.....	667,592
Telephone, fac simile, A. Pollak.....	667,454
Telephone circuit phonograph attachment, A. B. Clark.....	667,503
Telephone exchange apparatus, C. E. Scribner.....	667,460
Telephone switchboard apparatus, C. E. Scribner.....	667,461
Telephone switchboard connection, T. V. Davis.....	667,195
Telephone board signaling apparatus, C. E. Scribner.....	667,463
Telephone transmitter, T. Lidberg.....	667,327
Telephonic transmitter, L. Mellett.....	667,546
Testing plug, A. T. Plugh.....	667,333
Thill coupling, G. C. Bastable.....	667,179
Thread cutter, H. S. Svarthout.....	667,639
Threshing machine, J. Fahney.....	667,205
Title guard, F. N. Martin.....	667,330
Tin plate mill table, W. Constance.....	667,180
Toy, cup and ball, C. J. Thringren.....	667,373
Toy, detonating, W. H. Wythe.....	667,642
Toy money box, Oml & Thalheim.....	667,332
Trap, E. C. Rehfeld.....	667,303
Trap, Ramziere & Kreimeyer.....	667,531
Tray, hand grip, B. E. Rich.....	667,403
Tripod stand, B. P. Hogan.....	667,624
Trolley head, E. S. Reed.....	667,336
Trolley wire crossing, J. W. Perry.....	667,571
Trousers waistband, elastic, M. Miller.....	667,548
Truck piano, A. T. Raynor.....	667,575
Trunk, O. Rangnow.....	667,334
Trunk line signal, McBERTY & McQUARRIE.....	667,448
Twine box, S. K. Dennis.....	667,197
Type casting and setting machine, J. C. Fowler.....	667,210
Type casting, composing and justifying machine, J. C. & J. C. Fowler, Jr.....	667,212
Type-casting molds and matrices, producing, J. C. Fowler.....	667,211
Typewriter, P. E. Collins.....	667,295
Typewriter, A. C. Ferguson.....	667,649
Universal joint, Seeger & Dericik.....	667,433
Valve, G. A. Mumford.....	667,465
Valve, T. P. Walter.....	667,553
Valve and vapor tube, thermostatic, A. Kitson.....	667,227
Valve, automatic regulating, H. Drach.....	667,429
Valve, steam cylinder drain, H. W. McCombs.....	667,244
Valve, triple, G. W. Wildin.....	667,355
Vapor burner, G. R. Gillett.....	667,654
Vapor burners, portable ignition apparatus for, A. Kitson.....	667,225
Vaporizer, F. P. Boland.....	667,487
Vehicle, Ackins & Blair.....	667,280
Vehicle battery box or tray, motor, G. H. Condit.....	667,189
Vehicle rack, A. L. Bachar.....	667,493
Vehicle wheel, A. S. Hyde.....	667,221
Vending machine, W. K. Bowerman.....	667,613
Violin finger board, C. L. Becker.....	667,419
Wagon and tent combination, Winter & Stohwasser.....	667,475
Wagon Jack, C. J. Shirreff.....	667,468
Wagon, stock, H. C. F. & C. A. Lopinto.....	667,237
Washbend and ironing board, combined folding, C. J. Upp.....	667,266
Washing machine, R. S. Andrews.....	667,383
Washi... machine, Bisbee & Sies.....	667,184

(Continued on page 111)


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