

(4131) E. N. H. writes: I intend making a motor like the one described in "Experimental Science" on pages 497-509 reducing it one-half. I am going to have castings made for the field magnet and the armature. Could not the armature be cast with wedge like projections to facilitate the winding? A. Cast iron should not be used for the core of the armature. 2. What size wire should the field magnet and the armature be wound with? (In making it  $\frac{1}{2}$  size.) A. It depends upon the source of the current and the E. M. F. Probably No. 22 or No. 24 would answer for a battery current. 3. Should I put the same number of layers and convolutions as in making it full size? A. Yes. 4. If it is not a good plan to have the armature cast, could I not cut out some pieces of the shape described from Russia iron? A. Yes.

(4132) S. M. S. says: Can you give me a formula for sensitizing albumen paper that does not need fuming with ammonia? One of my friends can make a sensitizing bath that works nice, do not need to fume the paper. A. Try this:

Water..... 1 oz.  
Nitrate of silver..... 40 grs.  
Nitrate of ammonia..... 30 grs.  
Liquid ammonia..... 3 min.

Floot the paper for 3 minutes. The hydrometer should register from 54 to 56. Very important to keep bath alkaline.

(4133) X. Y. Z. says: I have a negative from which I have been making silver prints, and the silver from the paper has got on to the negative, on account of dampness, I expect, and spoiled it for printing. Can you tell me of any method of removing it? A. If the negative is varnished, remove the latter by soaking in alcohol for a few minutes, then apply the following to the stained part:

A. Sulpho cyanide of ammonia.....  $\frac{1}{2}$  dram.  
Water..... 1 oz.  
B. Nitric acid.....  $\frac{1}{2}$  dram.  
Water..... 1 oz.

Mix A and B and apply. A fresh solution should be made for each negative. Follow by washing and applying a saturated solution of chrome alum.

(4134) W. H. W. asks: 1. What would be the result if a motor or dynamo were constructed the same in every respect, that is in the "Experimental Science," Fig. 485, with the exception of the armature core, or in other words, if the wire of the armature were wound on a wooden core (the shaft being also wood) and everything else being the same as in Fig. 485? How much current would such a machine give, run as a dynamo, and how much current would it take as a motor to run it? A. The result of the construction described by you would be to produce a very slight current when used as a dynamo, and as a motor it would possibly rotate itself, but it would not be a success. 2. What would be the result if I wound the armature and put all the wire on the outside of the core, made as directions, winding back and forth over pins in the sides of the core, bringing all the wire of the section on one side? A. The result would be a machine incapable of being used either as a motor or a dynamo, as the currents in the different portions of the winding would counteract each other.

(4135) D. P. sends us diagrams showing two halos concentric with the sun and four sun dogs or parhelia on a horizontal line with the sun at the intersection with the halos, and asks explanation. Both halos are surmounted by inverted colored halos tangent to each of the white halos. The phenomena is attributed to the existence in the upper atmosphere, in the region of the cirrus clouds, of snowflakes thinly dispersed through the air, which reflect and refract the light of the sun at certain angles. As the snowflakes are crystallized in a great variety of forms, the reflections and refractions from their surfaces and through their angular forms seem to account for all the known variation in halos, coronas, sun dogs or parhelia and prismatic colors of the inverted halos.

(4136) E. L. says: Noticing your directions for coloring photos, in SCIENTIFIC AMERICAN of February 20, 1892, page 119, I beg to ask: 1. Will not the solution render the oil colors soft and flow over the other part of the paper when rubbed with the finger? A. We think not, since the color is first thoroughly dried. 2. Are the effects permanent, and for how long? A. Probably for several years.

(4137) T. W. K. asks for the ingredients that compose luminous paint, to make numbers that can be seen in the dark. A. Barium and calcium sulphides formed by ignition are characteristic ingredients. See our SUPPLEMENT, Nos. 229, 197, 249, 539.

(4138) G. A. L. says: Please let me know through your paper what direction the north star is from the north pole? A. The pole star is now about  $1\frac{1}{2}^\circ$  from the true pole. When the middle one of the three stars in the handle of the dipper (Mizar) is on the meridian below the pole star, the true pole is  $1\frac{1}{4}^\circ$  below the pole star. In any position of the line between the two stars the true pole is  $1\frac{1}{4}^\circ$  from the north star toward Mizar.

(4139) C. E. D. asks how to find the altitude of a triangle when the base and the sum of the altitude and the hypotenuse is given. A. Altitude = sum of altitude and hypotenuse squared minus base squared, the whole divided by twice the sum of hypotenuse and altitude.

(4140) W. W. asks: 1. How can I explode a cannon with electric battery? Will you please let me know how to proceed, what kind of battery to use, etc.? A. You can explode the charge in a cannon by means of an electric fuse having a small platinum wire surrounded by fine powder. A current from a Grenet battery heats the wire to redness, and explodes the powder, the latter igniting the charge of powder in the cannon. 2. Is cast iron preferable to soft iron for the field magnet of a dynamo? A. No; soft iron is preferable. 3. Which is right? A says that if an article like tooth powder or face powder is put up and sold, that its sale can be stopped by law if it is not patented, while B says, if it is beneficial and harmless, its sale cannot be stopped and that a patent is only to protect it? A.

Taking out a patent does not oblige the patentee to sell, nor does the mere fact that a patent is not taken out prevent selling an article unless it infringes an existing patent. 4. Also what is the meaning when they say such an article (face powder, etc.) is liable to stamp? A. It probably refers to the internal revenue stamp. The application of a stamp to articles of merchandise is not now required on articles of the class named.

(4141) J. F. L., Jr., asks: 1. What is a 10 per cent solution? I have been told the following:

1. 1 oz. solid substance (480 grs.) 10 fl. oz. water.  
2. 6 grs. " " " " " " " " " " " "  
3. 6 grs. " " " " " " " " " " " "

A. A solution containing one-tenth its weight of the substance dissolved. This corresponds with your third formula. The second is altogether wrong. 2. How may I put up a formula as follows:

Dextrin..... 2 parts.  
Acetic acid..... 1 "  
Water..... 5 "  
Alcohol..... 1 "

A. Weigh all parts. 3. Can you me a formula for the fastest developer you know of for fast gelatin-bromide dry plates?

A. Eikonogen..... 1 oz.  
Sodium sulphite C. P..... 2 "  
Warm water..... 30 "

When cool add  
Carbonate of potash.....  $\frac{1}{2}$  "

If this develops too slowly add more carbonate of potash. 4. Can you tell me briefly how to form artificial crystals of alum, copperas, salt, sugar, etc., on a thread for crystallographic purposes? A. Simply make a strong solution and while hot immerse the threads. After crystallization place more solution in the vessel. Always let it cool a little before adding.

(4142) A. M. asks for the name of the acid used for stencil work on glass plates and how to use it? A. Hydrofluoric acid is used in etching glass. It can be purchased from wholesale druggists in New York prepared for use, or you can prepare it yourself by pouring sulphuric acid upon fluorspar. A lead dish is required for this operation. The glass is protected with wax, paraffine or varnish. Where lines are required the protecting coating is removed with a needle or scraper. The glass is placed over the lead dish and the hydrofluoric fumes rising from the dish attack the glass where it is exposed. Care must be taken to not inhale these fumes and to avoid getting the acid on the skin, as it is very corrosive and poisonous.

(4143) P. T. L. asks: What volume and fall of water will it require to furnish power to maintain 68 arc lights 2,000 candle power and 5,000 incandescent lights 16 candle power? What will first cost be in comparison with a steam plant of say 600 horse power? Will cost of maintenance be less? Is there less danger of stoppages? What is the life of a turbine working 16 hours per day? A. Your installation will require about 600 horse power actual from the water power motor. If a turbine of good make is used, the waterfall should be equal to 700 horse power, as this depends upon two elements viz., height of fall and quantity of flow. We must necessarily refer you to SCIENTIFIC AMERICAN SUPPLEMENT, No. 788, for illustrated description of the method of measuring a water power. The first cost of a turbine and head flume is much less than a steam plant, and in favorable places the dam and complete power plant may be brought within the cost of a steam plant. The economy of running expenses depends upon the cost of coal, but is no doubt much less than steam. With any degree of care against floods there is little or no danger of delays, far less than with the dynamos. Turbines run for many years without interruption.

(4144) E. W. H. says: I have a long fence with  $\frac{1}{2}$  inches by  $\frac{1}{2}$  inches Oregon fir posts set 3 feet in the ground. Fence has only been in position one year, yet the portion of the posts in the ground show considerable rot on the surface when dug down on. The posts were green when set. I do not want to take up the post, yet, at present rate, it would appear that they would rot off in three or four years. Would it do any good to bore into the posts, just above the ground, in a standing direction, and fill the holes with some mineral salt? If so, how large should the holes be and what should they be charged with? A. We do know that the plan proposed will fully preserve the posts, but will no doubt add several years to their life. Soaking the ends of posts in a strong solution of sulphate of iron or sulphate of copper for a day has been tried and found efficient for several times the life of posts without any application of preservative. We think it will pay to bore a  $\frac{1}{2}$  hole in as slanting a position as convenient, from 4 inches above ground, say at  $45^\circ$ , three-fourths through the post, and fill it with a saturated solution of sulphate of iron. In a few weeks again fill the holes and plug with wood or a cork.

(4145) W. W. M. asks: 1. Can you give a description in the SCIENTIFIC AMERICAN of the ginseng of Washington, Oregon, and Idaho, where found, and illustrate if you can? A. We refer you for articles on ginseng in general to the SCIENTIFIC AMERICAN, vol. 65, p. 104, vol. 64, pp. 19, 69, 309. 2. I send specimen of ash of burned flax. Can you explain what gives the color, etc.? A. The colors are due undoubtedly to the presence of iron, and possibly some carbonaceous matter.

(4146) J. K. M. — For the information you require regarding brazing and japanning, we refer you to "Scientific American Encyclopedia of Receipts, Notes and Queries, price by mail \$5.

(4147) C. M. T. asks: 1. Have you a good book on induction coils? If so, what price? A. SUPPLEMENT, Nos. 160, 166, 229, and 569, also Dyer's "Induction Coil," 50 cents. 2. How many electric light carbons will it take to give E.M.F. of one volt? (About 5 inches of carbon in fluid.) How much zinc? A. One carbon and one rod of zinc of any size will give an E.M.F. of nearly two volts. 3. I have a telegraph sounder that seems to have residual magnetism in the cores to such an extent that it affects the free movement of the armature. Is there any way to remove the magnetism? A. Remove the magnet cores, heat them red hot and bury them in ashes overnight, or until cool.

(4148) R. P. asks: Why do the English believe the occasional finding of a horseshoe to be a good omen? A. There is no reasonable explanation of the horseshoe superstition. There is no scientific connection between the finding of a horseshoe and good luck, excepting possibly the fact that one who picks up a horseshoe or anything else of slight value and saves or makes use of it is apt to have good luck. Possibly some of our readers may be able to give the origin of this peculiar notion.

(4149) C. H. B. writes: 1. I have been contemplating trying to use water glass as a substitute for glue in sizing spirits of turpentine barrels. I have been informed that it can be used for this. A. We think it would answer your purposes. 2. How is it prepared and used? A. It is made by dissolving silica in caustic soda solution under pressure. Apply with a stiff brush.

(4150) A. T. M. — The word "typewriter" does not indicate either sex, and is correctly applied to both; "typewritist" is an offensive eccentricity. "Cosmopolitan" is correctly used as a noun, and more frequently than "cosmopolite," though there is no objection to the latter if you prefer it. The word "macadamized" is usually employed as an adjective, accent on second syllable.

(4151) J. V. D. asks: Would a five horse power electric motor (500 volts, 10 amperes) afford sufficient power to drive a 10 in. circular saw for cutting cordwood? A. Five horse power would be ample for driving a 10 in. cross cut saw.

## TO INVENTORS.

An experience of forty years, and the preparation of more than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequalled facilities for procuring patents everywhere. A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low, in accordance with the times and our extensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broadway, New York.

## INDEX OF INVENTIONS

For which Letters Patent of the  
United States were Granted

March 8, 1892,

AND EACH BEARING THAT DATE.

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

Air moistening device, Frazer & Thuman.....	470,424
Alarm, See Fire alarm.....	
Alcoholic liquids, purification of, P. C. Rousseau et al.....	470,447
Amalgamating gold or silver with mercury, B. G. Noble.....	470,269
Animal trap, F. H. Keuthan.....	470,577
Armature conductors, connection for, G. Stephens.....	470,217
Atomizer, C. H. Fisher.....	470,375
Axle, C. L. Sheldon.....	470,361
Axle and shaft bearing, N. Bersin.....	470,330
Axle blanks and axles, manufacture of, O. C. Hall.....	470,239
Axle for vehicles, trussed, Reed & Clark.....	470,259
Axles, manufacture of, E. E. Slick.....	470,354
Bag, See Traveling bag.....	
Bag filler, T. Craney.....	470,475
Ball, A. C. Burgess.....	470,391
Band cutter and feeder, P. Swenson.....	470,265
Bar, See Horseshoe blank bar.....	
Barrel covers, locking device for removable, J. C. Tiffany.....	470,519
Barrel head, G. K. Bear.....	470,173
Basins, bath-tubs, etc., automatically opening outlet for, J. M. Carrere, Jr.....	470,179
Battery, See Electric battery. Galvanic battery.....	
Beading machine, J. P. Howe.....	470,573
Bedstead, G. Renfro.....	470,445
Beer, treatment of, L. Hoff.....	470,621
Billiard score keeper and game counter, H. S. Wooster.....	470,275
Block, temporary, J. J. & W. C. Johnson.....	470,338
Blast furnace and means for operating the same, J. Gill.....	470,481
Block, See Building or paving block. Tackle block.....	
Board, See Wash board.....	
Boat, See Submarine boat.....	
Boiler, cabin stand and carrier, M. S. Harlow.....	470,328
Boiler, See Steam boiler.....	
Bolt, See Safety bolt.....	
Book, index, L. Hill, Jr.....	470,380
Book support, W. H. Morrison.....	470,207
Book, safety, S. K. Burdin.....	470,470
Boot or shoe, C. B. Brown.....	470,316
Bottle, J. L. Vogeler.....	470,187
Bottle stopper attachment, H. Gerike.....	470,187
Bottle washer, W. M. Wise.....	470,387
Box, See Dice box. Fancy box. Music box.....	
Brake, See Car brake. Sled brake.....	
Bread and applying butter thereto, means for, E. W. Kiddle.....	470,200
Brine, purification of, C. G. Collins.....	470,181
Broom holder, H. H. Draper.....	470,490
Brush, fountain benzine, Banta & Bamberger.....	470,461
Buckle, M. Tuch.....	470,625
Buckle, trace, A. R. Hamilton.....	470,485
Building or paving block, G. M. Graham.....	470,377
Bung holes, temporary covering for, G. A. Will.....	470,415
Bureau, commodore, and writing desk, combined, F. Hamblin.....	470,378
Burner, See Gas lighting burner.....	
Button, cuff or sleeve, G. F. Peck.....	470,411
Button setting tool, E. Noelle.....	470,628
Can capping and crimping machine, M. Jensen.....	470,555
Can capping machine, W. Wedgwood.....	470,328
Car brake, electric, J. Redmond.....	470,505
Car coupling, U. Beausejour.....	470,464
Car coupling, F. D. Broca.....	470,416
Car coupling, D. Cole.....	470,180
Car coupling, F. W. Jost.....	470,198
Car coupling, J. P. & J. E. Kirwan, Jr.....	470,579
Car coupling, F. W. Wallis.....	470,228
Car coupling, Wilks & Whitus.....	470,230
Car, dumping, J. L. Koplin.....	470,229
Car, dumping, J. L. Koplin.....	470,589
Car, railway, J. M. Burton.....	470,326
Car wheel and brake, J. A. La Croix.....	470,202
Car wheel guard, J. Nagele.....	470,362
Cars, corner stay for, H. Cochran.....	470,392
Cars, safety keeper for, Bailey & Feger.....	470,536
Cars, ventilating, B. M. Ross.....	470,612
Cars, etc., ventilator for, W. Braidwood.....	470,540
Carving machine, W. S. Seaman.....	470,450
Case, See Collar and cuff case. Sacramental case. Sample case.....	
Case register, T. Kroth.....	470,423
Cash register, C. E. Lord.....	470,247
Cash register and indicator, E. E. Bartlett.....	470,463
Caster, C. O. Allen.....	470,325
Caster, R. W. Tanner.....	470,268
Casting, method of and apparatus for, C. W. Weiss.....	470,525
Cattle guard, W. E. Humming.....	470,426
Change receiver, Orthlieb & Garey.....	470,532
Chimney cap, J. A. Hodel.....	470,568
Chuck, lathe, J. H. Westcott.....	470,399
Churn, E. W. Allen.....	470,538
Churn, J. H. Pett.....	470,210
Cigarette machine, J. R. Underwood.....	470,289
Cleaner, See Grate cleaner. Lamp chimney cleaner. Tobacco pipe cleaner.....	
Clock, geographical, A. L. Silvernail.....	470,269
Cloth cutting machine, H. A. Calbreth.....	470,233
Clutch or coupling device, adjustable, D. W. Freeman.....	470,648
Coffin fastener and hinge, W. H. Dowling.....	470,291
Coke oven, J. Reiter.....	470,506
Collar and cuff case, traveler's combined, L. D. Dozier.....	470,553
Collar and cuff portfolio, Dozier & Hawley.....	470,554
Combination lock, T. W. McGrath.....	470,438
Comminuting machine, H. A. Hannum.....	470,395
Cooker, steam, G. H. Grodhaus.....	470,522
Copper matte, treating, F. Manhes.....	470,524
Copper ore, converter for, P. Manhes.....	470,534
Cores for journal boxes, machine for forming green sand, W. B. Sterritt.....	470,518
Cores, machine for making green sand, W. B. Sterritt.....	470,517
Corset fastening, Burns & Bartholomew.....	470,541
Cotton, apparatus for elevating and cleaning seed, A. S. Robinson.....	470,403
Cotton scraper, M. R. & R. B. Vinson.....	470,457
Couch, convertible, J. M. Morrison.....	470,251
Counter and alarm, automatic, T. C. Dexter.....	470,290
Counters, foot rail for, A. H. Herzog.....	470,348
Coupling, See Car coupling. Pipe coupling. Thrill coupling.....	
Crane or derrick, W. J. Bennetts.....	470,538
Cuff holder, M. G. Cook.....	470,182
Cultivator, G. W. Crawford.....	470,234
Cultivator, J. H. Hunter.....	470,574
Cultivator, D. F. Oliver.....	470,502
Cut-off, safety, M. Kerstein.....	470,382
Cut-off, wafer, G. Henkel.....	470,489
Cutter, See Band cutter.....	
Cutter head, B. F. Barnes.....	470,462
Damper, stove, E. D. Nells.....	470,439
Decoy duck, Henderson & Lumsden.....	470,564
Dental mouth mirror, R. F. Phillips.....	470,211
Dental plugger, E. Ebl.....	470,184
Dice box, F. W. Mader.....	470,488
Die, See Rotary die.....	
Dish washer, E. W. Allen.....	470,532
Display rack, J. W. Morrison.....	470,206
Door catch, J. G. Murtz.....	470,203
Door check, W. Gilfillan.....	470,188
Door check, T. S. Miller.....	470,433
Door lock, sliding, W. H. Montz.....	470,434
Door, roll-in or sliding, Gollink & Lea.....	470,191
Drier, See Grain drier. Wool drier.....	
Drill, See Hydraulic drill.....	
Draughtsman's micrometer scale, E. Jones.....	470,490
Dust collector, R. E. Wardhaugh.....	470,523
Dust collector, electric, R. E. Wardhaugh.....	470,608
Electric battery, V. Riatti.....	470,260
Electric cable, underground conduit for, C. A. W. Hultman.....	470,329
Electric circuit closer, G. W. Price.....	470,596
Electric current meter, J. W. T. Olan.....	470,441
Electric cut-out and safety device, C. R. & A. W. Weston.....	470,204
Electric generator, C. J. Van Depuy.....	470,521
Electric motor or dynamo-electric machine, H. H. Hoeford.....	470,194
Electric motor or generator, R. Kennedy.....	470,199
Electric search light, R. S. Dobble.....	470,638
Electric wire conduit, C. A. Freeman.....	470,237
Electrical switch, A. Cuthbert.....	470,518
Elevator, See Mail elevator. Water elevator.....	
End gate, G. H. Johnson.....	470,197
End gate, wagon, H. C. Bennett.....	470,465
Engine, See Rotary engine.....	
Envelope machine, H. D. & D. W. Swift.....	470,218
Evaporating apparatus, T. Crane.....	470,476
Evaporating pan, J. B. Copeland.....	470,548
Excavator, steam, I. N. Hennessy.....	470,565
Extractor, See Fence staple extractor. Penetrator.....	
Fancy box, A. G. Williams.....	470,599
Fare register, L. C. De Sloovere.....	470,273
Felt making machine, P. Le Grand.....	470,496
Fence machine, W. H. Mason.....	470,581
Fence staple extractor, J. T. Pomeroy.....	470,595
Fence, truss rail, B. F. Osborn.....	470,442
Fertilizer distributor, R. B. McLean.....	470,325
Fertilizer distributor, J. A. Simmons.....	470,324
Fertilizer distributor, A. P. Williams.....	470,528
File, J. J. Tremble.....	470,223
File, letter, W. I. Ohmer.....	470,440
File, letter or paper, C. L. Page.....	470,336
Filter, W. H. Johnson.....	470,630
Filter, J. Sutton.....	470,338
Filter, drive well, D. Wisner.....	470,274
Filter, water, E. A. Gross.....	470,192
Fire alarm and telephone apparatus, E. H. Amet.....	470,231
Fire extinguisher, A. H. Durand.....	470,233
Fire extinguisher, or other purposes, vessel for, G. W. Hogen.....	470,599
Fireplace attachment, C. A. Howe.....	470,244
Fire pot, J. Schill et al.....	470,509
Fish hook, J. Stretch.....	470,311
Fish net or trap, W. R. Barker.....	470,312
Fishing reel, W. B. Byler.....	470,314
Fishing rod, Coleman & Guyer.....	470,473
Flower pot, H. H. McIlhenny.....	470,437
Fly scare, J. C. Baker.....	470,537
Force feed lubricator, J. F. Vensel.....	470,522
Forging horseshoe nails, machine for, C. E. Forster.....	470,322
Frame, See Scale frame. Velocipede frame.....	
Fruit jar, F. A. Potter.....	470,366
Furnace, See Blast furnace. Hot air furnace. Smoke consuming furnace. Smoke consuming or preventing furnace.....	
Furnace for burning liquid fuel, S. Cox, Jr.....	470,420
Furnaces, water heating attachment for hot air, H. A. Tinkham.....	470,267
Furniture fastening, C. Liebe.....	470,246
Galvanic battery, J. H. Davis.....	470,552
Game counter, J. J. & F. B. Schnell.....	470,601
Gas, apparatus for making illuminating, T. H. Paul.....	470,629
Gas lighting burner, electric, H. A. Tinkham.....	470,256
Gate, See End gate.....	
Gate, E. R. Smith.....	470,264
Gate, A. M. Tyler.....	470,225
Generator, See Electric generator. Steam generator.....	
Glove fastener, E. J. Kraetzer.....	470,642
Glove fastening, O. G. Alderman.....	470,170
Grain binder, O. S. Ellithorp.....	470,236
Grain binder, A. Stark.....	470,453
Grain binder and carrier for, A. Stark.....	470,453
Grain conveyor for binders, etc., G. Schubert.....	470,213
Grain conveyers, delivery apparatus for pneumatic, F. E. Duckham.....	470,555
Grain drier and ventilator, Vanderveer & Shedd.....	470,607
Grate cleaner and cinder and ash separator, T. H. Paul.....	470,212
Grinding mill, A. J. Robinson.....	470,601
Grinding tools, tool holder for, Jacobson & Stein.....	470,196
Guard, See Car wheel guard. Cattle guard.....	
Gun, breech loading, J. B. G. A. Canet.....	470,287
Gun carriage or mounting, J. B. G. A. Canet.....	470,287
Gun loading apparatus, J. B. G. A. Canet.....	470,285
Guns, mechanism for quick-firing, H. Schneider.....	470,449
Hair clipper, J. K. Priest.....	470,597
Hammer, brush, C. Holden.....	470,570
Harness, plow, W. Richmond, et al.....	470,549
Harrow, H. Richmond.....	470,383
Harrow and sander, J. G. W. Packer.....	470,383
Harrow, spring tooth, A. Bostick.....	470,390
Harvester, corn, Reimers & Schneekloth.....	470,588
Harvester, corn, E. E. Witter.....	470,618
Harvester, grain binding, L. Miller.....	470,250
Hot air, See Grain drier.....	
Hay or grain ricks, cover for, J. G. Wiegand.....	470,527
Hay press, J. A. Hayes.....	470,488
Hay rake, horse, J. Macphail.....	470,300
Heater, See Water heater.....	
Heater, H. Ball.....	470,345
Heel, rolling, J. H. Huggins machine, C. E. Corner.....	470,354
Hinge, K. L. Karo.....	470,354
Hinge, P. S. Nunn.....	470,310
Holdback, vehicle, W. T. Terry.....	470,330
Holder, See Broom holder. Cuff holder. Sash holder.....	
Holder, See Fish hook. Trolling hook.....	
Hop press, P. Riggs.....	470,600
Horseshoe blank bar, C. H. Perkins.....	470,352
Horseshoe blank bars, die roll for making side-weighted, C. H. Perkins.....	470,364
Horseshoe blanks, method of and means for making, C. H. Perkins.....	470,351
Horseshoe blanks, roll for making, C. H. Perkins.....	470,353
Horseshoe nail pointing and finishing machine, C. E. Moore.....	470,321
Horseshoes, method of and apparatus for manufacturing blanks and blank bars for side-weighted, C. H. Perkins.....	470,365
Horseshoes, side-weighted blank and blank bar for use in making side-weighted, C. H. Perkins.....	470,400
Hose band, F. T. Baldwin.....	470,344
Hot air furnace, D. S. Richardson.....	470,146
Hub for vehicles, metallic, J. H. Coyle.....	470,216
Hub, wheel, E. Smith.....	470,216
Hydraulic drill, C. H. Oxley.....	470,593
Ice cream freezer, J. Heberling.....	470,591
Incubator, M. T. Greenleaf.....	470,334
Index, C. L. Rathin.....	470,514
Insulator, for telegraph and telephonic railways, H. D. Winton.....	470,336
Insulator, for overhead electric railways, H. D. Winton.....	470,336

Insulator for trolley wires, Andrews & Ball.....	470,417
Iron, See Iron on.....	
Iron ore, reducing, E. R. Graf.....	470,640
Iron, treating, R. Southerton.....	470,606
Ironing table and clothes rack, combined, R. K. Boggs.....	470,467
Jar, See Fruit jar.....	
Joint, See Rail joint.....	
Joint, wiper, R. Beach (P.).....	11,229
Journal, Loveland & Henn.....	470,497
Knife, See Pocket knife.....	
Lacing, shoe, W. H. Gates.....	470,376
Ladder, extension, H. E. Skeels.....	470,515
Ladder, railway, J. A. Keel.....	470,374
Ladder, rolling shelf, G. A. Milbradt.....	470,459
Lamp, caboose, G. C. Dressel.....	470,292
Lamp chimney cleaner, C. E. Drury.....	470,383
Lamp, incandescent electric, A. C. Carey.....	470,471
Lamp shade, Curtis & Himrod.....	470,371
Lamp shade, adjustable, H. Schloerb.....	470,353
Lamps, regulating socket or holder for incandescent electric, Ries & Horny.....	470,402
Latch, gate, J. Bird.....	470,539
Lathe, W. F. Young.....	470,278
Lathe mandrel, adjustable, J. L. Williams.....	470,416
Lathes, backrest for turning, W. H. White.....	470,229
Lathes, feed mechanism for screw cutting, W. P. Norton.....	470,591
Lifter, See Transom lifter.....	
Light, See Electric search light.....	
Lighting conductor, H. Simpson.....	470,514
Limbo, artificial, G. E. Marks.....	470,431
Lock, See Combination lock. Door lock. Nut lock.....	
Lock, A. C. Colley.....	470,474
Lock, J. Roche.....	470,412
Locomotive, electric, S. P. Hollingsworth.....	470,527
Locomotive, electric, E. A. Sperry.....	470,516
Loom, J. H. Northrop.....	470,580
Loom for weaving chenille webs, R. Hartley.....	470,426
Loom for weaving double pile fabrics, T. I. Shuttleworth.....	470,452
Looms, attachment for the filling motions of, W. O'Brien.....	470,253
Looms for weaving pile webs, Jacquard mechanism for, R. Hartley.....	470,427
Lubricator, See Force feed lubricator. Piston lubricator.....	
Lubricator gland, C. J. Jerome.....	470,397
Mail bag protector, J. R. Matson.....	470,645
Mail elevator, J. A. Keel.....	470,374
Mailing apparatus, pneumatic, F. Knüttel.....	470,580
Mats, resilient frame attachment for, A. J. Worral.....	470,614
Measuring instrument, electrical, E. Weston.....	470,341
Measuring instruments, movable coil for, E. Weston.....	470,340
Meats or like substances, machine for indenting and crushing, G. H. Purdy.....	470,258
Mechanical movement, F. P. Burkhardt.....	470,599
Mechanical movement, A. E. Rhoades.....	470,492
Metal, casing with, I. Kennedy.....	470,523
Metal, plating, L. C. Schrade.....	470,425
Meter, See Electric current meter.....	
Mill, See Grinding mill. Roller mill.....	
Milling machines, tail stock for, Kempsmith & Smith.....	470,245
Mortises, machine for bushing, F. H. Wright.....	470,276
Motor, See Electric motor. Spring motor. Water motor.....	
Mower, lawn, E. Z. Kidd.....	470,578
Mowing machine, J. Farrington.....	470,331
Mules, nosing motion for self-acting, R. Drabble.....	470,479
Music box, A. Wolf.....	470,610
Nippers, G. H. Pangle.....	470,644
Nozzle, R. K. Pangle.....	470,410
Nut lock, J. J. Griffin.....	470,561
Nut lock, R. Kilmer.....	470,458
Nut lock, W. Timmis.....	470,528
Nut lock for buggy tops, W. L. Pike.....	470,630
Oiler, fountain type, Bant & Baubert.....	470,468
Ore separator, magnetic, Thompson & Sanders.....	470,455
Ore washer, McLanahan & Kirk.....	470,456
Organs, bellows for, F. W. Hedgeland.....	470,241
Organs, blowing apparatus for, F. W. Hedgeland.....	470,242
Oven, electrical, J. V. Capel.....	470,419
Oven, electrically heated, J. V. Capel.....	470,418
Ozone machine, F. M. Grumbacher.....	470,425
Packing, rod, F. P. & J. T. Martin.....	470,301
Padlock, W. F. Tross.....	470,398
Padlock, permutation, Beard & Shepard.....	470,349
Pan, See Evaporating pan.....	
Paper boxes, machine for making, G. P. Salisbury.....	470,414
Paper caps, capsules, etc., machine for making, J. Lackner.....	470,335
Paper fastener, J. H. Lynch.....	470,383
Paper, machine for cutting and delivering printed, W. Scott.....	470,308
Paper weight, P. S. Townsend.....	470,222
Pen extractor, H. E. Grant.....	470,296
Pen, fountain, J. Friedmann.....	470,408
Pencil sharpening machine, slate, J. G. Wuchter.....	470,615
Phonograph, F. M. & J. A. E. Criswell.....	470,477
Piano action, H. S. Saroni.....	470,448
Piano, automatic, W. D. Parker.....	470,323
Piano damper, W. P. Hanscom.....	470,619
Pianos, electrical attachment for, F. A. Feldkamp.....	470,294
Pipe coupling, W. D. P. Aims, Jr.....	470,581
Piston lubricator, E. Glover.....	470,189
Planing and sawing machine, C. Ranger.....	470,444
Planing, machine, Bugbee & Danner.....	470,339
Planing machine, I. H. Venn.....	470,404
Planing machine (saw), Bugbee & Danner.....	470,338
Planter, corn, S. C. Miner.....	470,500
Plow, ditching, J. Jones.....	470,491
Plow shovel, E. Paulsen.....	470,503
Plow, wheel, Lamborn & Rickards.....	470,495
Plows, adjustable standard for, J. K. Teague.....	470,219
Plows, heels sweep seat for, D. S. Bradberry.....	470,469
Pocket knife, G. Schrade.....	470,635
Pole, vehicle, E. M. Van Valkenburg.....	470,271
Post or pole driver, C. E. McAuley.....	470,252
Pot, See Fire pot. Flower pot.....	
Power transmitting apparatus, T. Krieg.....	470,201
Press, See Hay press. Hop press.....	
Pressing and ironing machine, J. L. Shute.....	470,513
Printer's quoin, W. J. Busse.....	470,650
Printing machine sheet delivery apparatus, W. Scott.....	470,307
Printing presses, gripper for, A. De Vos.....	470,637
Protector, See Mail bag protector.....	
Pruning machine, J. M. Morgan.....	470,580
Pruning implement, J. M. Morgan.....	470,580
Pumping and measuring apparatus, J. C. Meyers.....	470,305
Pumps, etc., locking device for chain, E. G. Crawford.....	470,551
Punch, canceller, J. B. & G. M. Morris.....	470,435
Push button, G. D. Deane.....	470,372
Pyroxyline, manufacture of compounds of, A. Seher.....	470,451
Rack, See Display rack.....	
Rails, etc., method of and apparatus for the manufacture of iron, T. Bicheroux.....	470,466
Railway and car therefor, pleasure, L. A. Thompson.....	470,220
Railway and grip therefor, cable, C. Bolinger.....	470,280
Railway carriage, C. C. Burton.....	470,617
Railway construction, T. W. King.....	470,641
Railway, electric, E. Thomson.....	470,221
Railway, elevated, A. Anderson.....	470,534
Railway from automatic, H. A. Hancock.....	470,456
Railway rail joint, Agner & Armstrong.....	470,459
Railway signal, C. C. Morris.....	470,436
Railway switching cable, K. Rasmussen.....	470,306
Railway tie, Moffat & Wolf.....	470,585
Rake, See Hay rake.....	
Range finder, R. L. W. Haskett-Smith.....	470,487
Reamer, metal, Feldt & Mahler.....	470,235
Reel, See Fishing reel.....	
Register, See Cash register. Fare register. Revolution register.....	
Register, E. C. Beecher.....	470,174
Regulator, See Watch regulator.....	
Revolution register, G. G. Weitz.....	470,526
Rod, See Fishing rod. Wiping rod.....	
Roller mill, E. G. Dewald.....	470,235
Rolling axle blanks, mill for, L. D. Hill.....	470,243
Rotary die, A. B. Shippee.....	470,215
Rotary engine, S. Westfall.....	470,463
Sacramental case or box, H. Fummelen.....	470,310
Sad iron, W. R. Sanford.....	470,367
Safe, burglar proof, M. S. Goldsmith.....	470,442
Safety bolt, A. C. Goodman.....	470,238
Salt container and sprinkler, F. N. Dixon.....	470,421
Sample case, E. J. Deane.....	470,372
Sash holder, Hanscom & Ferguson.....	470,336
Saw machine, rip, Bugbee & Danner.....	470,357
Sawmill dog, E. Christman.....	470,289
Sawmill dog, J. Class.....	470,543
Saw frame, platform, J. W. Burroughs.....	470,177
Scraper, road, P. R. Mokant.....	470,208
Seal, B. E. Von Possner-Ehrnthall.....	470,257
Seaside seat, H. Petrie.....	470,255
Seat, See Seaside seat. Vehicle seat.....	
Seeding machine, Hildem & Carlsson.....	470,379
Separator, See Ore separator.....	
Sewing machine, J. Bolton.....	470,281
Sewing machine feeding mechanism, J. Bolton.....	470,282
Sewing machine shuttle, J. Bolton.....	470,283
Shoe fastener, A. Meyer.....	470,584
Shoe fastening, A. L. Dorris.....	470,183
Shovel, See Plow shovel.....	
Shutter work, D. Levy.....	470,349
Signal, See Railway signal.....	

## Advertisements.

Inside Page, each insertion - - 75 cents a line  
Back Page, each insertion - - - \$1.00 a line  
The above are charges per agate line—about eight words per line. This notice shows the width of the line, and is set in agate type. Engravings may head advertisements at the same rate per agate line, by measurement, as the letter press. Advertisements must be received at Publication Office as early as Thursday morning to appear in the following week's issue.

**LATHE**  
Screw Cutting  
Automatic Cross  
Feed, etc.  
Seneca Falls Mfg. Co. 635 Water St., Seneca Falls, N.Y.

**FRET SAW or WOODS**  
Planned Ready for Use. Books of Design.  
Send stamp for catalogue.  
**CABINET WOODS AND VENEERS.**  
**THE E. D. ALBRO CO.,**  
Eastern Branch, 200 Lewis St., New York, U. S. A.  
H. T. Bartlett, Mgr. F. W. Honerkamp, Asst. Mgr.  
Mills, Cincinnati, Ohio.

**Improved Screw Cutting LATHES**  
Foot and Power.  
Drill Presses, Shapers, Bands, Circular, and Scroll Saws.  
Machinists' Tools and Supplies. Lathes on trial.  
Catalogue mailed on application.  
**SEBASTIAN LATHE COMPANY,**  
44-46 Central Ave., Cincinnati, O.

**ELECTRICAL LABORATORY FOR**  
Amateurs.—By Geo. M. Hopkins. Description of a collection of simple and easily made apparatus for conducting a complete series of electrical experiments. With 11 illustrations. Contained in a SCIENTIFIC AMERICAN SUPPLEMENT, No. 244. Price 10 cents. To be had at this office and from all newsdealers.

**SETS OF CASTINGS OF MODEL ENGINES**  
CATALOGUES FREE.  
ALSO TOOLS, GEAR WHEELS & PARTS OF MODELS.  
**GOODNOW & WIGHTMAN**  
BOSTON

**USE GRINDSTONES?**  
If so, we can supply you. All sizes mounted and unmounted, always kept in stock. Remember, we make a specialty of selecting stones for all special purposes. Ask for catalogue.  
**THE CLEVELAND STONE CO.**  
3d Floor, Wilshire, Cleveland, O.

**The Sebastian-May Co.**  
Improved Screw Cutting  
**Foot & Power LATHES**  
\$60  
Drill Presses, Chucks, Drills, Dogs, and Machinists' and Amateurs' Outfits. Lathes on trial. Catalogues mailed on application.  
165 to 167 Highland Ave.,  
**SIDNEY, OHIO.**

**THE "GARFIELD"**  
Locomotive Injector,  
Automatic Injector,  
Double Jet Injector  
and Ejector.  
Best Boiler Feeders known for Hot or Cold Water Lifting or taking water under pressure. Send for Price List.  
**The Garfield Injector Co., Mfrs.**  
P. O. Box 10, Wadsworth, Ohio.

**THE MODERN ICE YACHT.—BY**  
Geo. W. Polk. A new and valuable paper, containing full practical directions and specifications for the construction of the fastest and best kinds of Ice Yachts of the latest, most approved forms. Illustrated with engravings drawn to scale, showing the form, position, and arrangement of all the parts. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 624. Price 10 cents. To be had at this office and of all newsdealers.

**ROCK DRILLS**  
**AIR COMPRESSORS & MINING MACHINERY FOR QUARRY & RAILROAD WORK**  
**RAND DRILL CO. 23 PARK PLACE NEW YORK**

**WELL DRILLING MACHINERY.**  
MANUFACTURED BY  
**WILLIAMS BROTHERS,**  
ITHACA, N. Y.,  
Mounted and on Sills, for deep or shallow wells, with steam or horse power.  
Send for Catalogue.  
ADDRESS  
**Williams Brothers**  
ITHACA, N. Y.

**ELECTRIC MINING PUMPS**  
OF ALL CAPACITIES.  
**ELECTRICAL MINING APPARATUS OF EVERY DESCRIPTION.**  
SEND FOR ILLUSTRATED CATALOGUE NO. 2.  
**THOMSON-VAN DEPOELE ELECTRICAL MINING COMPANY,**  
620 ATLANTIC AVENUE, BOSTON, MASS.

**PURE CONDENSED MILK**  
PREPARED IN THE MOHAWK VALLEY—THE FINEST GRAZING COUNTRY IN AMERICA—FROM ABSOLUTELY PURE FRESH MILK EVERY PACKAGE GUARANTEED PERFECTLY SWEET.—MOHAWK CONDENSED MILK CO., ROCHESTER, N. Y., U. S. A.

**45 sold in '88**  
**2,288 sold in '89**  
**6,268 sold in '90**  
**20,049 sold in '91**  
**60,000 will be sold in '92**  
**A Steel Windmill and Steel Tower every 3 minutes.**  
These figures tell the story of the ever-growing, ever-advancing, ever-improving **STEEL AEROMOTOR**. When one goes others follow, and we "take the country."  
Though sold, we were unable to make all of the 20,049 Aeromotors in '91. Orders often waited 8 weeks to be filled, but now we have very increased our plant and are prepared promptly to plant our towers in every habitable portion of the globe.  
Are you curious to know how the Aeromotor Co. in the 4th year of its existence, came to make many times as many windmills as all other makers combined? Look at the Steel Windmill, the Steel Fixed Tower, the Steel Tiling Tower!  
1st. We commenced in a field in which there had been no improvement for 25 years, and in which there seemed no talent or ambition, and none has yet been shown except to imitate our inventions.  
2d. Before commencing the manufacture, exhaustive scientific investigation and experiments were made by a skilled mechanical engineer, in which over 1,000 dynamometer tests were made on 61 different forms of wheels, prepared by artificial means, and therefore uniform wind, which rendered the study of the windmill a science, and the speed of wheel, the best form, angle, curvature and amount of sail surface, the resistance of air to rotation, obstructions in the wheel, such as heavy wooden arms, obstructive before the wheel, as in the vanes mill, and many other more subtle, though not less important questions. These investigations proved that the power of the best wind wheels could be doubled, and the AEROMOTOR daily demonstrates it has been done.  
3d. To the liberal policy of the Aeromotor Co., that guarantees its goods satisfactory or pays freight both ways, and to the enormous output of its factory which enables it to furnish the best article at less than the poorest is sold for. For 1/2¢ we furnish the most perfect bearings ever put in a windmill, and have made an exhaustive revision of the Aeromotor and Towers.  
If you want a strong, stiff, steel Fixed Tower—or if you want the tower you don't have to climb (the Steel Tiling Tower) and the wheel that runs when all others stand still—this costs you less than wood and lasts ten times as long (the Steel Aeromotor) or if you want a Geared Aeromotor to churn, grind, cut feed, pump water, turn windmills and saw wood, that does the work of 4 horses at the cost of one (1/100), write for copiously illustrated printed matter, showing every conceivable phase of windmill construction and work, to the **AEROMOTOR CO.**, 114 and 116 Southwell St., Chicago, or 12 Main St., San Francisco.

**SPECIAL NOTICE!**  
Two handsome photo-engraved display sheets entitled, "Recent Improvements in Air Compressors," "Recent Improvements in Rock Drills," mailed free to any one who will cut out this advertisement and mail it to us with his name and address.  
**INGERSOLL-SERGEANT DRILL CO.**  
No. 10 Park Place, New York, U. S. A.

**LIGHTNING WELL-SINKING**  
MACHINERY MANUFACTURERS.  
Hydraulic, Jetting, Revolving, Artesian, Diamond Drilling Tools, Engines, Boilers, Wind Mills, Pumps, Excavators, 1,000 Engravings, Earth's Strata, Determination quality water, mailed, 25c.  
The American Well Works,  
Ansonia, Ill.  
11 & 13 Canal  
St.,  
Chicago, Ill.  
Dallas, Texas

**THE WARDEN MFG. CO.,**  
Germantown Junction, Phila., Pa.  
**BOILERS**  
Horizontal, Vertical, Locomotive  
Manning Vertical Boiler, Large H. P. in small space.  
Warden Purifier, insures clean water for boilers.  
Atkinson Feed Water Heater, no back pressure on engine.  
Send for Catalogue.

**JENKINS UPRIGHT CUSHIONED POWER HAMMER.**  
Users of this hammer sustain us in saying that it has no equal in all good working qualities. Perfect cushion and a perfect blow, with perfect control. For particulars, J. & R. W. Jenkins & Co., 25 So. 4th St., Philadelphia, Pa., U. S. A.

**3,000 JOB LOT BICYCLES**  
20 to 50¢ off.  
And lowest prices on all '92 makes & 2d hand. Easy payments. We sell everywhere.  
'91 Union \$4.40 and balls \$4.40. '91 Victor \$4.40 and balls \$4.40.  
'91 Crescent \$4.40 and balls \$4.40. '91 \$135 Rambler \$4.40.  
'91 \$145 Union High Grade \$9.00. And 20 other styles as cheap.  
Largest stock and oldest dealers in U. S. Agts. wanted.  
Catalogue, **Rouse, Hazard & Co., 16 E. St., New York, N. Y.**

**Sprague, Duncan & Hutchinson,**  
Limited.  
**FRANK J. SPRAGUE,**  
**LOUIS DUNCAN, Ph. D.,**  
**ALFRED BISHOP MASON,**  
**CARY T. HUTCHINSON, Ph. D.**  
**Consulting Electrical Engineers.**  
**15 WALL STREET,**  
**NEW YORK.**