screw power to do the work than the pulley which runs slower and does the work direct. P claims that there will be no difference of set screw power required, or, if any, the slower pulley would require less on account of having no countershaft to drive. Which is right?—S. B.

(132) How would I proceed to harden a razor which is hollow ground and quite soft, so much so that it requires honing every three or four weeks. It will not hold an edge. Are there any chemicals that I could use without resorting to tempering in the forge? —W. H. M.

(133) I want to transform a current of carbon monoxide (CO) into carbon dioxide (CO_2) by other means excepting combustion. Will you kindly show me a solid substance, cheap and abundant, that contains oxygen in such statethat, on passing by it, the carbon monoxide takes oxygen, and therefore turns into carbon dioxide?—J. A. M.

(134) If one has a 20 horse power engine, is it more economical (leaving first cost out of the question) to have a 20, 30, or a 40 horse power boiler?—C.

(135) Inform me through your columns how I can make and use a preparation for silver plating and one for gold plating.—A. A.

(136) 1. My neighbor owns a thrashing outfit, in which the power is conveyed from the horse power to the separator by means of a tumbling rod, in four sections, connected by four knuckle joints. The total deflection of the tumbling rod is about 40°. What percentage of the power is absorbed by the knuckles? 2. What course would you advise a young man to pursue who desires to become an electrical engineer? He has a good common school education. 3. As a profession, how will electrical engineering compare with civil engineering, during the next twenty-five years?—C. B. S.

(137) Please tell me what it would cost to make an induction coil as that described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 161. Please tell me if aniline green contains any copper in solution. If not, what gives it the copper appearance when in a liquid state?—Wm. R.

(138) Will you kindly inform me the initial electro-motive force and the strength of current of the following batteries: 1. The Disque Leclanche. 2. The Fuller mercury bichromate battery. 3. The perforated cup battery, size 4 in. square. 4. The Bunsen battery spoken of in correspondence No. 34 of SCIENTIFIC AMERICAN of December 1, 1888. Which is desirable for electric bells, a battery of high E. M. F. or one of considerable strength of current? For miniature incandescent lamps? What kind of iron is the best to use in a casting of the field magnet of the simple electric motor? If this motor be used as a dynamo, what current will it produce?—J. G. P.

(139) I want to make a cold box in an ice house, but without altering the ice house very much. It keeps ice all right, but my cold box inside of the ice house I can't get below 50°.—A. G. D.

(140) In a family of sixty, we use between 500 and 1,000 bushels of apples. Apple sauce is on the table three times a day, and the same with tomato sauce. We want vessels to cook these in, that will not poison us. Have tried the best we could find in market—copper washed with tin, agate, marbleized iron, etc., but all fail to give satisfaction; we are poisoned. If you can help us in this dilemma, it will be an act of humanity. The sisters want something light to handle.—F. W. E.

(141) Would you kindly inform me of any publication treating about the different trials in the United States of explosives, such as robinite, melinite, bellite, carbo-dynamite, graydonite, smolianoff, snyder, and where such works or publications may be had?—H. B.

(142) I have a quantity of pure chloride of silver, and would like to know how to convert it into pure nitrate of silver.—G. O.

(143) I have made the electro motor described by you some time since, with some slight variations, the principal one being cast iron field magnets, and have had quite good success. I now wish a machine to run as a dynamo to light an Edison 20 C. spiral lamp, which requires 30 to 38 volts, 1 to 1·5 amperes, and has a resistance of about 0·34 ohms. Can I make an armature which will take the place of the motor armature and give the required current? If not, can magnets and armature both be wound so as to produce the required current? If the resistance of machine cannot be kept low enough, will not a slightly increased voltage answer to produce required current? Lastly, if machine can be made, at about what speed should it be run?—H. M. P.

(144) Please inform me whether there are any chemicals, when put into a quantity of water (a tub of water for example), which will cause it to freeze, and what they are? What is the process for making ice? I am trying an experiment for keeping apples. I am going to make double wall building out of concrete, with about 18 inches space between the walls, and then fill the space full of water. And then I want to freeze the water in a body. Will I be able to accomplish it? How would fruit keep with just water alone in the space? Would it keep the temperature inside as low as 36 degrees? Would the water be liable to leak through the concrete walls? Apples will not keep well in California, in cellars under ground. They seem to keep better in double wall buildings above ground. Now I want to try and make a fruit house after the principles of these cold storage companies, so as to be able to preserve fruit perfectly for four or five months. Now can you give me any light on the subject?—H. W. C.

(145) How much power does it take to run a coffee mill, grinding 1 lb. of coffee? Height of mill is 2½ ft. It has two flywheels of 2 ft. in diameter, made by Enterprise Co., of Philadelphia, No. 12. A boy of 16 can easily grind 1 lb. of coffee without stopping. Will a C. C. ⅛ h. p. battery motor run it? Battery has E. M. F. of 12½ volts.; internal resistance, 1 ohm. Motor has resistance of 1·7 ohm. Will a ⅜ round belt transmit power?—A. M.

(146) What will make a durable ebony finish for a Georgia pine soda water counter? Please answer through the columns of the SCIENTIFIC AMERICAN. —F. McD.

(147) Can you tell us how to make stamping powder, such as is used with perforated paper patterns for stamping fancy designs on cloth, etc.? Something that will not rub off from handling while working the pattern.—F. P.

(148) I am going to make a photographic camera as described in SCIENTIFIC AMERICAN October 13, 1888, page 231. Instead of a spherical wide angle lens, I bought a 75-cent microscope or magnifying glass, brass mounted, with two adjustable lenses, focal length a little more than an inch. In order to get a fixed focus for all distances, a diaphragm probably has to be used, but I don't know the size of the opening for making instantaneous photographs. Would you please inform me whether the diaphragm should be placed between the two lenses or in front of them? Can such a microscope or a 75-cent reading glass be used in the construction of a lantern for enlarging small negatives?—W. L. W.

(149) Can a horse do as much work on a tread power as on a common circular horse power with the same exertion?—J. I.

(150) I owned a locomotive steam boiler three years ago, and it is still in use, that was built before 1854, and has had very little repairs? Are there many older boilers in use in this country? She has copper fire box and brass tubes.—J. E. E.

(151) I would like to know the composition of the varnish used upon canvas boats, to keep them from leaking. Also if said varnish will exclude air or common coal gas?—J. A. W.

(152) Is there a process by which crude oil, say the Lima crude oil, can be used as a fuel in kitchen stoves or parlor stoves? Or is there a burner made using crude oil for fuel for household purposes?—P. F. B.

(153) The mixture of salt with mortar has been spoken of recently as an effectual prevention of the crumbling of the mortar from frost. Will you please inform me the quantity and mode of admixture, and oblige a constant and attentive reader?—J. A.

(154) Please tell me what kind of acids I can use to remove the sand and hard crust from the castings, so as to leave them a bright brassy color and take the grit, so as not to wear the edge off the tools, also is there any chemicals that I can use in a steel ball, 1 3-16 in., that the loadstone will not have any affect when it drops into its seat as to hold the two together, as I wish to use a steel ball and seat? I wish to use them in oil wells, where the magnets or loadstone is bothersome. Also would you please tell me how I can make my brass moulder's sand tough, so as it will hold together?—W. H. W.

(155) Will you please answer through the question column of the SCIENTIFIC AMERICAN whether it is possible to run three circular saws through a log at the same time on one saw kerf? Please let me know if it has ever been done, and how. It is reported by some men from Washington Territory that there are some mills there that have such machinery for cutting up the large timber of that Territory. Some have disputed the possibility of it, and we have agreed to submit the question to you for settlement.—W. W. Y.

(156) Will you kindly inform me how the acoustic properties of a hall can be improved, the dimensions of which are 46 × 60 feet, and whose ceiling is oval-shaped? It is 12 feet to beginning of the curve of ceiling, and about 22 feet to top of same.—G. A. C.

(157) Which of the two boilers would be the more economical, using wood for fuel: No. 1, shell 5 ft. × 12 ft. with 86 three-inch tubes; No. 2, shell 5 ft. × 12 ft. with 150 two-inch tubes? Also which would last the longer? What per cent saving in fuel is there between a common slide valve and an automatic cut-off engine of 40 horse power?—W. McV.

Replies to Enquiries.

The following replies relate to enquiries recently published in SCIENTIFIC AMERICAN, and to the numbers therein given:

(52) Polishing Wire by Pickling or Galvanizing.—Neither of the processes you name will polish wire. The proper treatment depends on its material and how badly corroded it is. Rust may be removed from iron wire by soaking in solution of chloride of tin. Emery of increasing degrees of fineness, followed by rouge, putty powder, whiting, or rotten stone will polish metal.

(53) For Enamels for Clay Goods consult Spon's Encyclopedia of Industrial Arts, part 25. Also SCIENTIFIC AMERICAN SUPPLEMENT, 387 and 402.

(54) 1. Making Small Flat Springs.—Cut them off a watch or clock spring. To perforate, punch an indentation with a sharp-pointed punch and file off the projection or drill it. It may be necessary to draw the temper for this. If so, reharden again and draw to a blue color. 2. Printing Name on Velvet in Gold.—Dust with finely powdered resin or mastic and stamp with hot metal type. Afterward wipe off excess of gold. Or paint the letters with gold size and apply with cold type.

(55) Large and Small Hose Nozzles.—Other things being equal, a large nozzle will throw a jet of water higher than a small one. If the supply is insufficient, the small nozzle may throw the highest. The stream of water should not be "wire drawn" or throttled for either nozzle to work well.

(56) Horse Power Transmitted by Compressed Air.—A pipe 5 feet diameter and 1 mile long at 100 pounds pressure at inlet would transmit about 55,000 horse power; at 200 pounds pressure about 82,000 horse power. If 30 miles long, about one-fifth as much.

(57) Horse Power required to heat Iron Plates.—I have calculated this according to one formula with the following results: In heating a round iron plate 2 inches thick and 6 inches diameter to 1,000° Fah., about 160 electrical horse power would be absorbed. To heat it twice as hot, about 320 electrical horse power would be required. Allowing for conversion loss, etc., these figures might safely be increased to 200 horse power and 400 horse power respectively as giving the power of the engine. To heat a plate 4 inches thick and 8 inches in diameter to 2,000° Fah. would require about four times as much as for the smaller plates. No allowance is made for loss by conduction.—S. V.

(58) Tests for China Clay.—The quality may be judged by observing its whiteness and freedom from grit. It may bring from $10 a ton upward.

☞ Books or other publications referred to above can, in most cases, be promptly obtained through the SCIENTIFIC AMERICAN office, Munn & Co., 361 Broadway, New York.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

December 25, 1888,

AND EACH BEARING THAT DATE.

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

Abdominal supporter, H. N. Gray 395,050
Air, apparatus for pumping and compressing, E. Kaselowsky 395,060
Alarm. See Electrical alarm. Fire alarm.
Animal trap, O. Huffman 395,054
Annunciator, A. Rosenberg 395,251
Anti-friction compound, J. B. Deeds 395,216
Architectural purposes, composition of matter for, C. Straub 395,091
Armature for dynamo-electric machinery, W. S. Belding 395,260
Armatures of dynamos, core for the, D. J. Hauss. 394,978
Bag. See Mothproof paper bag.
Bar. See Grate bar.
Batteries, flexible sealed cell for secondary, Bailey & Warner 395,028
Bearing, roller, R. W. Hent 395,052
Bed lounge, M. Clune 394,957
Bed, sofa, J. P. Miller 395,247
Beds, clothes clamp for, F. M. Conner 395,035
Belts, battery cell for electric, S. Colling 394,958
Belts, means for preventing the running off of, Barber & Gabriel 395,201
Beverages, apparatus for the manufacture of, Malmstrom & Dummer 395,244
Binder, temporary, J. H. Louder 395,158
Binders, etc., roller tension for self, E. B. Karn ... 395,059
Bisulphites, apparatus for preparing solutions of, G. Schenck 395,082
Blanking presses, feeding mechanism for, R. A. Breul 395,211
Blind stop, T. Warren 395,020
Board. See Electric switch board.
Boiler. See Steam boiler.
Boiler, J., Jr., & W. T. Hopson 395,142
Bolt. See Rotary bolt.
Bolting reel, C. S. Alderman 395,026
Book, bank account, W. Thomson (r) 10,977
Book cover fastener, memorandum, L. A. Lipmau 395,155
Boots, device for drying, W. E. Laird 395,063
Bottles, device for finishing the necks of, Finerty & Moore 395,220
Box. See Locomotive journal box.
Box corner fastening, W. O. Tegtmeyer 395,015
Box frame bending machine, S. Valentine 395,094
Bracelet, A. Johnstone 395,148
Bracket. See Lamp bracket.
Braiding machine, M. H. Fouillet-Chevance 395,270
Brake. See Car brake. Engine brake. Steering brake. Vehicle brake.
Brick machine, G. Campbell 395,212
Brick machine, G. Haut 394,979
Brick mould sander, A. Naylor (r) 10,976
Bucksaw frame, Roberts & Sanford 395,294
Burner. See Gas burner.
Bustle, C. C. Shelby 395,183
Butter worker, J. A. Graves 395,049
Button, composition-faced, I. Smith 395,186
Cable support, electric, C. H. Bowen 395,207
Calipers and dividers, F. Motz 395,167
Can or jar top cover, A. L. Mitchell 395,289
Candlestick, G. Werntz 395,097
Cane, flask, and drinking cup, combined, J. E. Hale 395,224
Capsule filler, S. E. Heineman 395,138
Car brake, W. A. Stoefer 395,012
Car brake, automatic, W. R. Wood, Sr. 395,104
Car coupling, J. E. Allison 395,107
Car coupling, E. Buckley 394,954
Car coupling, Davis & Fisher 395,040
Car coupling, F. Ott 395,072
Car coupling, E. Savage 395,177
Car heating device, street, J. J. Sands 395,081
Car platform, J. M. Taggart 395,014
Cars, air or steam coupling for railway, M. D. Stocking 395,089
Cars, die for forging truss rod anchors for railway, J. Reilley 395,173
Cars, fender for street, L. Hachenberg 394,975
Carburetor, R. S. Lawrence 395,152
Card punching machine, Jacquard, H. B. Payne .. 395,075
Cards, machine for lacing Jacquard, Payne & Campion 395,076
Carriage, child's, F. Isell 395,277
Cart coupling, road, B. D. Shaw 395,296
Case. See Show case. Traveling case.
Cash carrier apparatus, pneumatic, M. Barri 395,203, 395,204
Cash carrier apparatus, pneumatic, J. L. Given ... 395,130
Cash carrier apparatus, pneumatic, W. M. Hinman 395,141, 395,273
Cash carrier apparatus, pneumatic, Pain & Webber 395,293
Cash carrier apparatus, pneumatic, Perkins & Stuart 395,170
Caster, Hatch & George 395,136
Chimney top, W. J. Smrcka 395,010
China kiln, N. M. Fitch 395,128
Chuck, brace, J. S. Fray 395,222
Cigar printing machine, J. W. & G. F. McIndoe ... 394,987
Cigar rolling machine, O. Hammerstein 395,227
Clam extract, A. H. Bailey 395,199
Cleaner. See Slate cleaner. Window cleaner.
Clock striking mechanism, C. Aronson 395,110
Cloth fuller, P. F. C. & A. A. Barette 395,202
Clothes hook, J. R. Anderson 395,108
Clutch, C. L. Hart 394,976
Cockeye, J. H. Charters 395,033
Coffee mill, E. H. & C. Morgan 395,290
Coffer dam for vessels, G. Clarke 395,265
Coffin fastener, W. Hamilton 395,226
Collar, horse, A. McKenzie 395,068
Coloring matter, C. Rudolph 395,080
Coloring matter from nitroso derivatives upon phenylene-diamines, blue, A. Weinburg 395,300
Coloring matter, production of, F. Bender 395,115
Colter, D. Reynolds 395,250
Copying press, J. E. Donovan 395,122
Cork, substitute for, E. Langen 395,241
Corn or cotton dropper, W. F. Brown 395,262
Cornice machine, F. M. Leavitt 395,154
Cot, folding, J. W. Ruthmann 395,295
Cotton gin, D. B. Haselton 395,230
Coupling. See Car coupling. Cart coupling. Thill coupling.
Cuffholder, R. Ward 395,193
Cultivator, W. H. Wiggins 395,098
Cutter. See Ice cutter.
Dental engine, W. A. Knowles 395,150
Dental engine handpiece, S. I. Scott 395,252
Desk, F. E. Waring 395,194
Drawer, cabinet, F. Trovillion 395,192
Driving machanism, variable, E. F. Autenreith ... 395,258
Dropper. See Corn or cotton dropper.
Drum, heating, A. F. Keene 395,280
Dyeing yarn, apparatus for, U. Weldon 395,195
Dynamos, brush for, E. W. Rice, Jr 394,999
Easel, F. L. Rowand 395,263
Easel and hanger, combined, E. B. White 395,301
Electric light, toll apparatus for producing, Davies & Tourtel 395,215
Electric machine, dynamo, F. F. Loomis 395,157
Electric machines, circuit controller for dynamo, T. A. Edison 395,123
Electric machinery, dynamo, Von Hefner-Altenеck & Hoffmann 395,019
Electric meter, E. Thomson 395,018
Electric motor, D. F. Sweet 395,299
Electric switch board, I. H. Farnham 394,964
Electrical alarm, W. A. Barnes 395,112
End gate fastening, Gardner & Sisco 395,129
Engine. See Dental engine.
Engine, W. F. Dake 395,039
Engine brake, road, R. R. Schneider 395,003
Engine governing device, D. Higham 395,233
Eye bars, manufacture of, J. Kennedy 395,239
Fabric. See Terry fabric.
Fabrics, trimming or edging for, R. W. Scott 395,004
Fence post, M. B. Grove 394,973
Fifth wheel for vehicles, C. Thompson 395,017
File cabinet, letter, J. F. Atherton 395,197
File for letters, H. E. Hesseltine 394,981
Filter, P. Muller 395,291
Filter beds, apparatus for cleaning, G. H. Moore .. 395,070
Filtering machine, J. A. Crocker 395,038
Fire alarm annunciator, W. A. Barnes 395,111
Fire alarm, automatic, A. Watson 395,095
Fire engines, heating apparatus for, Trask & Carmichael 395,093
Fire extinguisher, W. Miller 395,069
Fishing spoon, J. Wood 395,103
Food package, compressed, J. Maggi 395,243
Frame. See Bucksaw frame.
Fumigator, Dillman & Kyle 395,042
Game apparatus, D. Brooks, Jr 395,261
Gas burner, regenerative, A. J. English 395,125
Gate. See Railway track gate.
Gelatine from bones, separating, A. H. Hobson ... 394,982
Glass, machine for grinding and beveling plate, J. A. & W. W. Heroy 394,980
Grain binding and harvesting machines, frame for, Miller & Butterfield 395,288
Grate bar, W. E. Kelly 394,984
Grinding mill, A. M. Hill 395,140
Guard. See Keyhole guard.
Gypsum, treating, W. Manning 395,159
Handcuff, Thomas & Smith 395,016
Handle for boxes, etc., G. W. McGill 395,162
Harvester, S. D. Maddin 395,284
Harvester, grain, J. N. Miller 394,989
Hasp lock, D. W. Fouts 395,221
Hat brim curling machine, J. Bigelow 395,117, 395,118
Hay carrier track, L. Y. Myers 394,991
Hay rake, horse, D. F. Graham 395,132
Heater, E. K. Baoyerlin 395,200
Hinge, W. Andrew 395,196
Hinge, lock, T. Spriggs 395,086
Hinge, spring, B. Colvin 395,266
Hoisting machines, overloading and slack cable stop for electrical, W. Baxter, Jr 394,952
Hoisting tackle, C. F. Batt 395,113
Holder. See Cuff holder. Rein holder. Sewing machine attachment holder. Signal holder. Spool holder. Thread holder.
Hook. See Clothes hook. Whiffletree hook.
Horse detacher, J. W. Howgate 395,144
Horse detacher, Jacoby & Luyties 395,235
Hose, joint and nozzle for, S. Sharples, Jr 395,009
Hydraulic motor, A. W. Tourgee 395,092
Hydrocarbon motor, Brunler & Capitaine 394,953
Ice cutter, D. Williamson 395,100
Ice machines, gas compressing pump for, T. Farnsworth 395,044
Indicator. See Musical indicator.
Ingot mould, C. Kellogg 395,001
Insect destroyer, E. F. Wells 395,022
Insecticide, O. C. Langseth 395,065
Insulated conductors, manufacturing, W. Siemens 395,083
Iron into malleable iron or steel, converting crude, G. L. Robert 395,175
Jack. See Lifting jack.
Journal boxes, dust guard for, C. G. Stearns 395,087
Keyhole guard, E. Barrett 395,259
Kiln. See China kiln.
Knee shoe, H. C. Harris 395,228
Knitting machine, circular, G. J. & W. L. Cathcart 395,214
Knitting machine, warp H. B. Payne 395,077
Lamp bracket, C. A. Roeber 395,000
Latch, Anasher & Spranger 394,949
Leaf turner, O. Lange 395,064