(32) Q. C. asks: 1. How many degrees or what portion of a degree is an ohm according to Oersted's law? A. That depends upon a number of conditions, and consequently varies with different instruments. You will find full information on the subject of testing rods in No. 1 of the SCIENTIFIC AMERICAN SUPPLEMENT. 2. How can I tell if a current of electricity is passing through a lightning rod? A. If occasional tests show little or no appreciable resistance, there is no occasion to trouble oneself further. As a general thing, however, it may be assumed that currents are always traversing the rod. 3. Could a pocket compass be arranged for that purpose? A. See article above referred to.

(33) J. A. asks: 1. Which is the most effective, a glass or a hard rubber plate, for an electrical machine? A. Ebonite plates are recommended as preferable to glass. 2. Is the construction of the machine the same with either plate? A. Yes. 3. Must an amalgam be used on the cushions of a hard rubber plate machine? A. Yes.

(34) E. A. F. asks: Why is it that a circular saw, after being used long enough to require two or three gummings, becomes rim bound, or, in other words, becomes expanded in the center, and the saw becomes dished? A. There exists in the minds of many persons, who are not fully acquainted with the principle upon which circular saws are made, an erroneous opinion that a saw should work the same until worn out, if it is not accidently sprung in use, or strained in gumming. So far as any damage to the saw is concerned, there is no difference between the use of a burr gummer and a file; but if proper care is not exercised in the use of the emery wheel, there is more danger from their use than with the file or the burr. After a few times gumming, the saw will be enlarged on the rim, so that the slightest warmth will cause it to buckle, and there is no remedy left but to send it to a saw maker and have it rehammered. Some, however, entertain the erroneous impression that a saw rehammered will never run as well as when new. Never was there so great an error; on the contrary, a saw rehammered will generally run better than when new, because all the elasticity (or nearly all) is worked out of the saw by using, and it generally works stiffer than when new. A saw must become red hot to change the temper. Inserted toothed saws are not as liable to become expanded on the rim as solid saws.—J. E. E., of Pa.

(35) J. M. H. says: I wish to give a nice finish to the walls of my parlor, and propose to use the recipe on p. 53, vol. 12. Would you recommend it? Is the size spoken of a paste or preparation of glue? Please give me proportions of ingredients, etc.. A. We have not tried the process referred to, and cannot vouch for it. We presume the size intended is the ordinary glue water. You would do well to try experiments with it on a piece of wall that it would not injure.

(36) S. B. Jr. asks: I. Which electro-magnet requires the least number of coils of a given sized wire, one to lift an armature weighing ½ lb. suspended $\frac{1}{16}$ of an inch from its poles, or one where the distance is $\frac{1}{32}$ of an inch and the weight 1 lb.? A. Electro-magnets, such as are used for telegraph sounders, having three or four ohms resistance, will answer for either case. 2. How many cells of Callaud battery are required to enable such an electro-magnet, through the medium of ½ mile of ordinary line wire, to lift the armature as above? A. Six or eight cells of Callaud battery will answer, provided the resistance of the circuit does not exceed 30 ohms.

(37) C. F. S. says: I want to make a magnetizing coil that will take a core ¼ inch in diameter and 6 inches long, and magnetize it to saturation. Will you please tell me what size of wire, number of layers, and battery power will serve my purpose? A. A couple of sounder coils like those to be seen in any telegraph office, with two or three cells of battery, will charge a soft iron core highly.

(38) N. Y. S. asks: Is the compound used in charging fire extinguishers a secret? A. No. Carbonates of the alkalies or alkaline earths are commonly employed for this purpose, such as carbonate or bicarbonate of soda, carbonate of lime, etc, etc. These are placed in the lower part of a suitable vessel; and immediately over it is placed a vessel containing a strong acid, such as muriatic or sulphuric, so arranged that, when the instrument is required for use, the vessel containing the acid may be inverted, thus emptying its contents upon the carbonate below. A violent action immediately ensues, and carbonic acid gas is liberated in great quantity. This gas is the fire extinguisher. Various modifications of this instrument, in the method of placing and manipulating the reagents, etc., have been invented since the value of carbonic acid gas as a fire extinguisher was first recognized; but the principle is the same in all.

(39) J. H. P. asks: How is prepared rubber made? A. We do not recognize any material by this name. Do you mean ordinary vulcanized rubber, vulcanite, or ebonite?

(40) J. H. P. says: A lady in the N. Y. *Times* says that ¼ lb. saltpeter dissolved in 1 pint alcohol is an excellent remedy for swollen joints caused by rheumatism. I attempted to dissolve some niter in alcohol of 95 per cent, and it would not dissolve. What is the matter? A. Niter is almost absolutely insoluble in strong alcohol. Dissolve the saltpeter in the smallest quantity of cold water possible, and add the alcohol in small quantities at a time, with constant stirring. The addition of too much of the alcohol will precipitate the salt.

(41) P. L. & Co. ask: How can we make sensitive cards, which, when placed upon the hand, immediately curl up with the heat? A. By passing a good quality of gelatin, previously softened by hot water, between oiled rollers set so as to propuce a film of the required thickness.

(42) H. F. B. says: In constructing a grinding mill, the grinding being done by cast iron rings, it is very desirable to have them of the hardest metal. I believe that an extremely hard metal can be obtained by mixing cast iron with spiegeleisen. Am I correct? A. Yes. Aceording to the percentage of spiegeleisen employed, the percentage of carbon may be changed in the pig produced, with a similar change in properties.

(43) P. S. B. says: 1. I have in my possession an oriental ruby of great hardness, weighing about ½ lb. What is it worth? A. A ruby of extremely fine color, brilliancy, etc., is said to be even more highly valued than a diamond of the same weight. The exact value of your ruby could not be given without seeing it. 2. What book or books must I consult in order to obtain the most the most exhaustive knowledge of the finer metals and precious stones? A. Consult Emanuel on "Diamonds and Precious Stones," and Jones on "The Treasures of the Earth."

(44) D. L. asks: Would it be possible to restore vision in an eye of which the lens is destroyed, by putting in an artificial lens? A. Theoretically, yes; but the science of surgery has not, as yet, become sufficiently skilled to attempt such an operation on this most delicate and susceptible organ.

(45) S. R. asks: 1. Can sulphuric acid be concentrated to sufficient strength in lead kettles to treat the refractory silver ores of Colorado and Nevada? A. Concentrated sulphuric acid must be employed, and for this lead vessels are not adequate. Instead of making the ore digesters of platinum, the practice of late in Europe has been to employ digesters of cast iron, white or mottled iron being preferred. It has been found that these vessels are unacted upon by the strong acid, since the surface becomes coated with a thin layer of metallic silver. 2. In using iron pyrites and ores heavily charged with sulphur, what fuel would be the best? A. Such ores should first be calcined, either in a special furnace or in heaps in the open air; the ignition of the sulphur in the ore being effected by placing the latter upon a layer of brushwood. The roasting must not be carried too far, but sufficient sulphur must be left to produce a proper regulus. The roasted ore may then be reduced with coal, etc.

(46) S. C. P. asks: What is the origin of the symbols used in apothecaries' weight? A. These symbols are supposed to have been derived from inscriptions on the ancient monuments of Egypt. This supposition is made more probable by the recent discovery of a papyrus concealed between the bones of a mummy in a tomb of the Necropolis at Thebes. This papyrus contained a treatise on medicine, written about 1552 B. C., and is consequently more than 3400 years old. In it the volumes are indicated by special signs, and figures with dots above them represent weights. The unit of volume is thought to be the *tenat*, which is equivalent to $\frac{6}{10}$ of a liter. The sign for a half *tenat* bears a striking resemblance to our sign for a drachm.

(47) D. D. asks: Can you inform me how white wine or whisky vinegar is made? A. Obtain a large cask, and about a foot above the bottom construct a false perforated bottom. Above this fill the cask with good, well burnt charcoal in coarse lumps, over which pour first a sufficient quantity of good vinegar to thoroughly moisten it. Let the whole stand for a short time, when it will be ready for the introduction of the alcoholic liquors This should be introduced in small quantities at a time, and the apparatus kept in a moderately cool place to prevent too energetic an action. This method will give you a pure vinegar, which will suffer considerable dilution. Use a very small quantity of annatto as coloring matter.

(48) E. G. A. says: A glass globe has two yellow spots marked on the opposite sides. The globe holds five gallons, and is placed close to the wall on a table directly between two windows. The light from the windows passes through the water in the globe and strikes the opposite side. The spots are of a soft, slimy nature, easily rubbed off. Can you tell me what they are composed of? A. The spots may consist of several substances. Send some of the material, and we will tell you what it is and the mode of formation. It is not improbable that the water held bicarbonate of iron in solution, which gradually became decomposed on standing in a warm room, and, from some peculiarity in the currents generated in the vessel, deposited hydrated sesquioxide of iron in the manner indicated.

(49) W. C. says: Please give me a recipe for dyeing veneers green. A. Put the veneers in a box or trough with clean water, and let them remain immersed for 3 or 4 days, changing the water once or twice as occasion may require. Let them dry for about 12 hours before they are put into the dye: by observing this the color will strike quicker, and be of a brighter hue. Prepare the dye as follows: To 1 gallon of strong vinegar add 1 lb. of the best verdigris finely ground, 2 ozs. sap green, and 2 ozs. indigo. Place this in an iron or copper vessel, with as many of the veneers as the liquor will cover, and boil for several hours or until the requisite intensity of color is obtained.

(50) J. M. says: I am building a small engine. The boiler is 5 feet long x 16 inches in diameter, without flues; it is made of ⅛ inch iron. Could this boiler afford steam enough to run a drag saw requiring 2 horse power, and what pressure could it stand to the square inch with safety? A. We do not think the boiler would be large enough to do the work satisfactorily. You could maintain a working pressure of about 50 lbs. per square inch.

(51) A. J. H. asks: 1. What preparation will produce a good sensitive surface? A. A collodion film holding iodide and bromide of silver. 2. Can the camera obscura be utilized for photography? A. Yes, but not so conveniently as the ordinary camera. 3. Does any number of the SCIENTIFIC AMERICAN contain directions for photography? A. No complete treatise, but valuable suggestions will be found in almost every number.

What is the enclosed substance? A. Caramel and salt.

(52) C. L. asks: What effect (if any) do the many steam mills, locomotives, and steam vessels have upon the humidity of the atmosphere? A. We do not know of any observations especially relating to this point: but we imagine that the effect, if any, is very slight and strictly local.

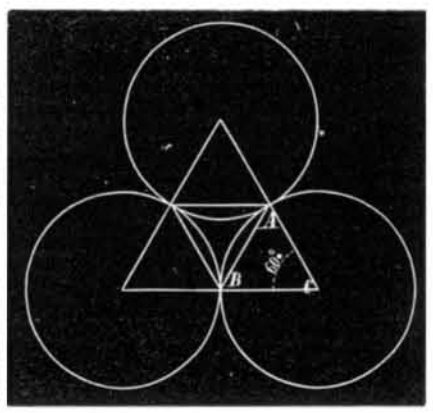
(53) F. G. W. says: The Boston and Albany Railway Company has some 240 locomotives, most of which have no steam domes; and if you ask the men who handle these engines how they carry their water, they will tell you that no engines work drier steam or less water than they do, under all circumstances. It is well known that much of the track of this line, on the mountain slope between Westfield and Washington, lays on a grade of 83 feet per mile. Steam domes are not only expensive, but are a decided injury to a boiler, and if locomotives work as well, they are certainly much better without them. This company is continually building locomotives without domes, which seems to be the best evidence possible that they are as useless as a steeple to a church. A. There are many locomotives which have no steam domes. The celebrated Crampton engines, made in 1847, had none, and gave excellent results. It is usually considered, however, that drier steam is obtained from the top of the dome than from the shell of the boiler.

(54) W. H. B. asks: Where was the first railroad located? A. Railroads or tramways, used in mines, worked by horses, are very old. The first mining road worked by steam was at Killingworth, England; the first passenger road worked by steam was the Stockton and Darlington Railway, England.

(55) I. L. asks: 1. How can I construct a float, to use in a steam boiler to indicate the water level or to operate a valve? Can it be made sufficiently light and yet stand the external pressure of 100 lbs. per inch? A. Make your float of copper. 3. I have thought that a float made of common tin, made airtight, with a small quantity of water in it, would answer, as the water inside the plate would be converted to steam from the heat of the steam outside the float, the quantity of water used to be equal to that required to fill the float with steam at the required pressure. Would this be practicable? A. Your plan of a tin float is impracticable. 3. Is the fusing point of common tinner's solder sufficiently high that 100 lbs. of steam would not fuse it? A. Yes.

(56) R. W. R. says, in answer to W. H., who asks as to preserving a cotton rope used in the open air: We are carrying 20 horse power by a cotton rope 1 inch diameter and 800 feet long, over V-shaped pulleys 5 feet in diameter. To protect it from wear and the weather, it is slushed occasionally with ⅛ black lead and ⅔ tallow.

(57) W. C. S. says, in solution of his problem proposed on p. 107, vol. 34: The answer is as follows: Assume that R, the radius, =1. Then area of circle=3·14159264, area of sector, A B C,= 0·52359877, area of triangle=0·4330127, area of segment A B=0·09058507, area of centerspace=0·16125449, Thesefore 0·16125449: 43560 (feet in an acre) :: 1: 271032. 271032=520·6+feet, the required radius.



J. E. N., F. L. R., M. B., F. E. B., D. E. Q., J. H. B., C. J. T., J. W. I., C. A., E. L. W., M. R., P. J. D. S., J. E. N., A. W. F., Dr. B., J. R. D., E. I. T., T. S. M., S. N. M., J. M. G., F. W. W., G. W. C., A. G. F., M. C., P. M., R. F., A. F. C. & Co., and K. Q. X. send answers which, like the above, are approximately correct. J. S. W., C. H. B., G. D. T., E. McC., L.B., N. M. B., V. P. B., F. G. G., I. D. S., H. M. A., G. D. T., R. C., R. J. McL., W. J. McG., and G. H. O. send erroneous answers; and L. S. W. sends different solutions with no results stated. C. W.M.'s answer is incomplete. C. says: "One curious fact I notice is that the division of the 160 rods by the exact figure, which is a trifle less than 0·162, gives the following regular arrangement of numerals, the root of which we extract for the answer: $\sqrt{987654321}$=31·4269."

(58) H. S. says, in answer to F. H. D.'s query as to cast iron and steel sleigh shoes: Wrought steel sleigh shoes are not tempered, as it would crook them out of shape; and cast iron shoes, if they are what they ought to be, are made of quite hard iron, that cannot be drilled or filed, and shows a white crystaline fracture when broken.

(59) G. G. W. says, in reply to several correspondents who ask for recipes for caseharden-ing: To caseharden wrought iron, take wood soot and urine, mix and work them up into a dry mastic, and cover the article to be hardened with it: heat to a red heat slowly in a charcoal fire, so as to heat through. Take out and knock off the soot, and plunge in cold water; then draw the temper, as done with steel.

E. M. M. asks: How can I make and use a good oil finish, similar to that used on parlor organs?—A. S. B. asks: Can you give me information as to the actual number of miles of railroad laid in England, Ireland, and Scotland?—E. P. asks: How is printing in gold or bronze done, to produce a smooth surface and a clear, sharp, outline?—J. J. T. asks: How is wall paper varnished after it has been hung?

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On the Resources of Georgia. By M. E. C.
On the Angora Goat. By H. G. O.
On Magic Squares. By J. S.
On the Epicycloid. By L. F.
On Spontaneous Combustion. By J. S. W.
On a First Class Tool Maker. By D.
On the Power of Figures. By G. B. M.
On a Singular Medical Case. By R. W. B.
On Spirit Photography. By C. M.
On Head Work. By J. K.
On Bank Vaults. By S. K.
On Food. By C. S. P.

Also inquiries and answers from the following:

S. G. H.—J. M. S.—Z. S.—J. G. McC.—H. J. M.—E. J. P.—T. G.—J. N.—J. H. M.—G. M.—J. K.—C. K—B. L.—W. B.—R. N.—T. W.—W. M.—M. H.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Enquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "Who makes rake teeth? Who publishes works on pottery and porcelain? Who makes phosphorus in large quantities? Who buys bone dust? Why do not makers of microscopes advertise in the SCIENTIFIC AMERICAN?" All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

February 8, 1876,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

Alarm and fare register, I. Hyde (r)	6,916
Atomizer, W. V. Wallace	173,194
Auger, earth, W. McK. Burns	173,207
Bale tie, S. H. Gilman	173,119
Bale tie, J. Noblit	173,328
Bale tie, cotton, S. H. Gilman	173,118
Bedstead, iron. Brown and Wood	173,109
Bedstead, surgical, O. Allen	173,264
Bell, clock, H. A Seymour	173,189
Bell, shaft, W. H. Nichols	173,176
Bellows, etc., smith's, J. T. Olinger	173,235
Bitters, J. S. C. Rowland	173,345
Boiler and flouring mill, steam, L. H. Maus	173,174
Boiler for heaters, J. M. Jordon	173,300
Boiler, sectional, E. M. Tucker	173,375
Bolt for sashes, etc., sliding, C. W. Saladee	173,181
Boot-sewing machine, C. D. Hunter	173,128
Boot-sewing machine, F. D. Ballou (r)	6,912
Boot toe protectors, S. Moore	173,231
Boot uppers, crimping, E. O. P. Andrews	173,153
Bottle stopper, J. Morschbauser	173,138
Bottles, making, J. L. Mason (r)	6,908
Box fastener, O. A. Stempel	173,365
Bridge, bascule, Adams and Krause	173,253
Bridges, protecting chords of, A. Spaulding	173,361
Brush, G. P. Herndon	173,287
Buckle, trace, Denormandie and Mitchell	173,273
Buttons, etc., attaching, S. W. Shorey	173,141
Cans, forming sheet metal, W. Green	173,120
Can, oil, Jetter and Foell	173,299
Can opener, E. M. Burchard	173,110
Candle holder, R. H. Kellogg	173,171
Candlestick, Schauble and Dohm	173,241
Cane and flag combined, W. R. Park	173,320
Canister, Snider and Bruns	173,360
Car coupler, H. Resley	173,343
Car coupling, E. A. Goodell	173,219
Car coupling, T. Hibbert	173,289
Car coupling, A. L. Miller	173,229
Car drawbar, street, J. Stephenson (r)	6,920
Car grab bandle, street, J. Stephenson (r)	6,918
Car platform, street, J. Stephenson (r)	6,917
Car, refrigerating, J. E. Winants	173,198
Car starter, J. J. Van Horn	173,376
Car step, street, J. Stephenson (r)	6,919
Car truck, railway, V. D. Beach	173,257
Car ventilator, A. Hance (r)	6,915
Car wheel, S. Stutz	173,369
Cars, fan attachment to, J. S. Williams	173,383
Cars with ropes, connecting, W. H. Paine	173,329
Carding and spinning machine, J. Hibry	173,290
Carding machines, screen for, W. J. English	173,165
Carriage spring brace, N. A. Newton	173,134
Cask tilter, J. Barton	173,203

Castings, preparing metal for, S. M. Carpenter.. 173,159
Chain link clamp, A. J. Gourdier..... 173,166
Chair, folding, B. F. Little..... 173,310
Chimney, globe, etc., W. R. Lindsay..... 173,227
Chuck, drill, T. R. Almond..... 173,152
Cigarette maker, pocket, Streeter *et al*..... 173,244
Clutch, friction, R. R. Osgood..... 173,384
Clutch, friction, G. H. Starbuck..... 173,362
Coach pad, A. Teas..... 173,371
Coffee strainer, Burkhardt and Hermann..... 173,265
Composing stick, W. H. Thomas..... 173,373
Cooler, milk, A. F. Burgess..... 173,158
Copying, transfer sheet for, T. F. Harrison..... 173,282
Corn sheller, Beall and Burroughs..... 173,106
Corset and skirt supporter, S. A. Meucher..... 173,323
Corset fastening, W. B. Cargill..... 173,210
Corset spring, C Judson..... 173,124
Cotton opener, beater, etc., R. Kitson..... 173,172
Cultivator, W. H. Mosher..... 173,324
Cultivator, J. A. Price..... 173,238
Cultivator, hand, Pierpont *et al*..... 173,179
Curry comb, C. W. Saladee (r)..... 6,911
Curry comb, C. W. Saladee..... 173,182
Cutter head, rotary, S. C. Houghton..... 173,122
Damper, W. L. McDowell..... 173,321
Dental bracket stand, O. C. White..... 173,148
Desk and seat, school, Puterbaugh and Teal..... 173,340
Desk, school, S. Crumrine..... 173,272
Drawer pull, W. N. Weeden..... 173,218
Drill, ratchet, H. R. Way..... 173,145
Dumb waiter, A. Gordon..... 173,279
Ebullioscope, P. M. E. Malligand..... 173,128
Electric tripper and recorder, R. Bragg..... 173,261
Elevating grain, etc., A. C. Rand..... 173,342
Elevator, H. Wojan..... 173,150
Elevator belt, tightener, Zacharias and Swift... 173,252
Elevator, hay, J. K. Mount..... 173,233
Engine, portable, G. L. McCahan..... 173,330
Engine, traction, R. Creuzbaur..... 173,164
Evaporation of sirups, J. Clegg..... 173,270
Faucet, L. W. Serrell..... 173,242
Faucet, vent, W. F. Class..... 173,160
Faucets, etc., driving, A. and T. McKenna..... 173,328
Feather renovator, C. D. Smiley..... 173,359
Fence, iron, J. H. and D. Van Dorn..... 173,144
Fence, portable, W. W. Potts..... 173,337
Fence, wire, M. Kelly (r)..... 6,902
Fence wire, barbed, W. G. Collins..... 173,271
Fence wires, barbed, J. F. Glidden (r).....6,913, 6,914
Fire escape, L. Falk..... 173,276
Fireplace front, E. D. Merrick..... 173,322
Fish, hatching, E. A. Brackett..... 173,262
Flail, T. F. Drake..... 173,216
Flat iron heater, C. G. Besse..... 173,107
Fodder cutter, G. Dentz..... 173,274
Food, cereals for, L. S. Chichester..... 173,211
Fork blank bar, Pedder and Abel..... 173,226
Fruit box, W. W. Neighbour..... 173,175
Furnace, air heating, G. R. Moore..... 173,230
Furnace, hydrocarbon, H. Napier..... 173,327
Furnaces, air duct for hot air, N. M. Mann..... 173,129
Furnaces, stirrer for ore, J. Brodie..... 173,263
Gage, sheet metal, J. Atkins..... 173,104
Gas fittings, tapping, L. W. Stockwell..... 173,191
Gas pipes, etc., threading, L. W. Stockwell..... 173,190
Gate, J. G. Sherman..... 173,348
Gearing, endless belt, J. Parr..... 173,332
Generator and heater, steam, G. W. Brown..... 173,157
Glove fastening, F. G. Farnham..... 173,218
Grain binder, R. H. McCormick..... 173,130
Grain drill, Wight and Ewings..... 173,380
Gridiron, McKaig *et al*..... 173,131
Guns, projectile for air, H. M. Quackenbush..... 173,341
Harness, N. Teas..... 173,372
Harness check rein, W. U. Selover..... 173,188
Harness machine, W. Barry..... 173,155
Harrow, Phillips and Griffith..... 173,334
Harvester, J. F. Place..... 173,336
Harvester, H. D. Willard..... 173,382
Harvester cutter bar, G. F. Underhill..... 173,193
Harvester pitman connection, O. Cooley..... 173,161
Heater, A. T. Lanphere..... 173,173
Hides, apparatus for treating, C. Royer..... 173,346
Hoisting apparatus, A, B. Lipsey..... 173,309
Hoisting cage, safety, M. Mihlig..... 173,325
Hoops, etc., cutting, G. C. Skidmore..... 173,354
Horseshoe, T. W. Murphy..... 173,326
Horseshoe calks, sharpening, J. Allen..... 173,151
Hubs to axles, attaching, A. B. Brown..... 173,206
Ice machines, S. B. Martin 173,313, 173 314, 173,315, 173,316
Ice machine congealer, D. Smith..... 173,357
Inkstand, G. A. Wilbur..... 173,197
Jack, lifting, A. N. Price..... 173,338
Jars, etc., screw-threaded, J. L. Mason (r)..... 6,904
Kiln, brick, J. Blum..... 173,108
Knife blank bar, Pedder and Abel..... 173,237
Label holder, W. L. Hepineuze..... 173,286
Lamp, H. Seidler..... 173,187
Lamp filler, J. A. Griswold..... 173,167
Lamp shade holder, W. Scarlett..... 173,186
Latch, knob, Elwell and Taylor..... 173,217
Leather-dressing machine, W. A. Perkins..... 173,178
Lock, time, E. Stockwell..... 173,366
Lock time attachment, H. Gross..... 173,121
Lock, safe door, etc., E. Stockwell..... 173,367
Locomotive rocker shaft, J. T. & W. J. Crowther 173,213
Loom let-off strap, Rose *et al*..... 173,137
Lubricators, C. H. Parshall (r)..... 6,908, 6,909
Match safe, J. G. Warren..... 173,195
Mattresses, stretching, wire for, J. W. C. Peters 173,333
Meat cutter, J. Adt..... 173,201
Meat tenderer, J. W. Smith..... 173,142
Mechanical movement, G. Jucngst..... 173,301
Medicaments, capsuling, S. A. A. Limousin..... 173,226
Metal bands, doubling ends of, S. H. Gilman..... 173,117
Metal, punching and beveling, S. Morgan..... 173,132
Milk, preserving, W. S. Barney..... 173,105
Ordnance, vent stopper for, R. L. Pruyn..... 173,339
Ore crusher, W. L. Waters..... 173,246
Organ case, reed, Wing and Ishell..... 173,149
Organ, reed, W. A. Loveland..... 173,127
Overalls, S. Laskey..... 173,306
Packing, piston, J. P. McLean (r)..... 6,905
Pan, frying, E. Laufer..... 173,305
Paper box, T. Devine, Jr..... 173,214
Pendulum ball, H. F. Henderson..... 173,285
Photo-chemical printing, W. Willis, Jr..... 173,381
Piano action, upright, W. F. Waite..... 173,377
Pianos, hand guide for, W. Bohrer..... 173,305
Pipe and hose coupling, E. A. Leland..... 173,307
Pipe coupling, T. J. Rice..... 173,239
Pipe, tobacco, J. J. Lang..... 173,304
Pipes and hose, T coupling for, E. A. Leland..... 173,308
Pipe elbow, metal, C. F. Henis..... 173,169
Plane, bench, J. Nicht..... 173,177
Planter and cultivator, corn, H. H. Balding..... 173,202
Planter, corn, W. F. Osgood (r)..... 6,906
Planter, corn, G. A. Siders..... 173,352
Plow, gang, S. Bryan..... 173,264
Plow wheel, M. Sattley..... 173,138
Power, double belt, J. Bowen..... 173,260
Printing press, Hoe and Tucker..... 173,295
Printing press, J. W. Kellberg (r)..... 6,901
Printing press fly, D. Weckerlin..... 173,147
Projectiles, sabot for, R. P. Parrott..... 173,331
Pulley blocks, case for, M. H. Tarbox..... 173,370
Pulley blocks, sheave for, M. H. Tarbox..... 173,143
Pump, G. W. Johnson..... 173,223
Pump, J. Woodville..... 173,250
Pump, air, D. E. Bangs..... 173,154
Pump, portable, F. S. Shirley..... 173,349
Pump, rotary, W. T. Doremus..... 173,215
Pumps, drop box for, A McCarty..... 173,318
Railroad, elevated, W. W. Riley..... 173,240
Railroad rail chair, E. Ruane..... 173,180
Railroad rail joint, H, D. Leishman..... 173,225
Railroad rail joint, J. Shinn..... 173,350
Railroad signal, detonating, F. Hickman..... 173,291
Refrigerator, F. Hackett..... 173,280
Refrigerator, D. Smiley..... 173,243
Registering board, O'Neill and Murphy..... 173,135
Retorts, apparatus for charging, J. F. Rice..... 173,344
Rolling metal tubes, mandrel for, S. P. M. Tasker. 173,192
Rowlock, F. A. Gower..... 173,220
Running gear, W. Baird..... 173,256
Running gear, J. F. Coppock..... 173,111
Running gear, D. Gibbens..... 173,116
Sad iron heater, Hitt, Logan and Egginton..... 173,292
Saddle clip spring, W. S. Ward..... 173,245
Sash fastener, M. Judd (r)..... 6,907
Sash fastener, C. W. Saladee..... 173,185
Sash holder, E. H. & C. W. Hanna..... 173,281
Saw gage, gang, J. M. Farrell..... 173,277
Sawmill dog, H. Williamson..... 173,249
Saw teeth, grinding, W. H. Gallvie..... 173,234
Saws to spindles, securing, S. W. Little..... 173,126
Sawing machine scroll, R. McChesney..... 173,319
Sawing machine, stone, Heermans & Reed..... 173,283
Scales, weigh, J. T. Guthrie..... 173,168
Screw driver, T. J. Sloan..... 173,356
Screw, wood, H. A. Doty..... 173,115
Screws, making nicked wood, T. J. Sloan..... 173,355
Separator, grain, J. Bowen..... 173,259
Sewing machine, J. S. Fletcher..... 173,278
Sewing machine starter, J. K. P. Pine..... 173,335
Sewing silk, putting up, C. C. Knowlton..... 173,125
Sheet metal gage, J. Atkins..... 173,104
Shirt, G. D. Elzhmie..... 173,275
Shirt bosom supporter, D. J. Shults..... 173,351
Shoe, W. H. Land..... 173,303
Shoe heel supporter, rubber, M. Bock..... 173,204
Shoulder brace and suspenders, J. W. Broderick 173,156
Shovel, snow, E. Campbell..... 173,209
Shutter worker and fastener, J. W. Cooper..... 173,162
Skylight lifter, W. P. Hagadorn..... 173,221
Slate and desk combined, G. H. Chinnock..... 173,269
Soap, sawdust, Porter & Robinson..... 173,136
Sole edge burnishing machine, C. H. Helms..... 173,284
Spark arrester, W. Jackson..... 173,298
Speed recorder, W. Wythe..... 173,251
Stamp hand, J. Sigwalt..... 173,353
Stamp, perforating, J. Houston..... 173,296
Steamer and soup strainer, Cox & McCarthy..... 173,112
Stone gleaner, L. D. Lucas..... 173,311
Stool, milking, E. Webber..... 173,247
Stove pipes, safety attachment for, J. H. Wilber. 173,196
Stoves, device for lifting, H. M. Hockman..... 173,293
Stove, fire pot, etc., H. L. McAvoy..... 173,317
Stoves, ventilating cook, H. M. Hockman..... 172,294
Stud and sleeve button, G. D. Stevens..... 173,363
Table and writing desk, G. Hess..... 173,288
Tacks, machine for making, C. P. Weaver..... 173,378
Telegraph line, underground, J. Horner, Jr..... 173,170
Thrashing machine, W. P. Penn (r)..... 6,910
Tire tightener, J. W. Thayer..... 173,374
Tobacco box clamp, W. W. Wood..... 173,199
Tobacco pipe, J. J. Lang..... 173,304
Tobacco stem roll, leaf, J. L. Weatherhead..... 173,146
Tooth pick case or holder, Stephenson & Bennett 173,364
Toy cap exploder, C. Coester, Jr..... 173,212
Toy target and battery, W. W. Campbell..... 173,267
Traps, animal, C. W. Saladee.....173,183, 173,184, 173,347
Trap, fly, J. A Blauvelt..... 173,258
Tubes, packing condenser, F. B. Stevens..... 173,189
Tube mandrel, S. P. M. Tasker..... 173,192
Type case stand, A. T. De Puy..... 173,113
Type case stand, folding, A. T. De Puy..... 173,114
Type writing machine, C. T. Moore..... 173,232
Varnish, manufacture of, M. Zingler..... 173,200
Vehicle spring, E. Huntzinger..... 173,297
Veneering, imitating, Kuhn & Pew..... 173,302
Vessels, head light for, W. Sherman..... 173,140
Vinegar maker, household, J. Smythe..... 173,358
Water closets, operating, E. A. Calahan..... 173,266
Water filter, cistern, Carter and Humphreys..... 173,268
Water meter, P. Wells..... 173,379
Water, obtaining, A. Byram..... 173,208
Weather strip, C. W. Mace..... 173,312
Wheel hubs, banding, W. Corris..... 173,163
Wind motor, G. S. Strong..... 173,368
Window blind, inside, D. Y. Kilgore..... 173,224
Wool-washing machine, B. Hall..... 173,222
Wrench, axle nut, A. Bagley..... 173,255

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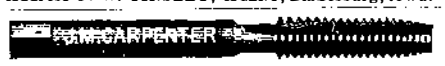

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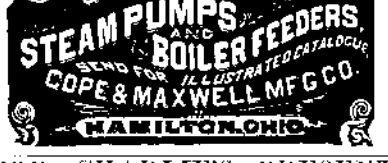

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