iron wire wrapped around it, and resembles a solid rope of wire.

Is there any known thing that travels faster than light, and what is its rate? A. Lighttravels through space at the rate of 192,000 miles in a second of time. According to Wheatstone static electricity travels along a copper conductor at the rate of about 288,000 miles in a second; but Fizeau's experiments make it 112,680 miles per second, and Walker's only 18,000; while subsequent investigation points to still lower figures—perhaps even only 3,000 miles per second. The matter is still in dispute.

(18) P. S. S. asks: How can I bronze gun barrels? A. See SCIENTIFIC AMERICAN, vol. 36, p. 203, (36).

How can a name be copied from type so as to make a hand stamp? A. By driving the type into wet blotting paper; when the paper is dry, it is removed from the type, and may be then used as a mould, from which a casting may be taken by pouring melted type metal over that surface of the blotting paper which was against the type.

(19) R. B. R. writes: I have a varnish cask, copal or shellac, which I wish to use to make a filter for drinking water, but I cannot remove the smell and taste of varnish. How can the difficulty be overcome? A. Fire the inside, and choke the flame by inverting or covering it after a few minutes, or as soon as the wood begins to char.

(20) J. W. D. asks for a recipe for a cheap jet black for leather. A. The iron-logwood preparation is cheapest, and for ordinary work gives the best satisfaction. You may try the following: Go over the work with hot argol water, then apply a strong hot solution of bichromate of potash in slight excess, and immediately afterward hot logwood solution. A trace of indigo extract may be added to the logwood to correct any reddish cast.

(21) T. A. J. asks how to copperplate steel knives. A. Dissolve about 1 oz. of sulphate of copper in 1 quart of rain water, and to this add a solution of 3 ozs. of cyanide of potassium in 1 quart of rain water; stir the two solutions, and add 2 ozs. of ammonia water. This is called the "bath," and the articles to be plated are first thoroughly cleaned, then connected by a wire with the negative or zinc pole of the battery, and a sheet of copper is similarly connected with the positive pole of the battery, and both placed in the bath, facing but not touching each other.

(22) S. W. T. asks: What paste is best for pasteboard? A. An excellent paste for this and similar purposes is made as follows: 4 parts, by weight, of glue softened in 15 parts of water, then heat with the water until a clear solution is obtained, and add 65 parts of water with stirring. Mix 30 parts of starch with water to a thin milk, and stir this into the glue solution, and keep the mixture at the boiling point for a time. Stir in a few drops of carbolic acid, and store in covered vessels to prevent loss of water. It will not sour.

(23) J. R. E. asks: How can I find the north pole of a permanent bar magnet, without using another magnet having its poles marked? A. By noticing the direction in which it settles when suspended by a silk thread about one yard long; one end of the thread being tied around the middle of the length of the magnet, and the other end held in the hand. The end of the magnet which points to the north pole of the earth is in this country called the north pole of the magnet; but in France it is called the south pole, reasoning from the fact that unlike poles attract.

(24) C. R. asks: 1. What liquid is used in connection with silver solder for brazing band saws? A. A saturated solution of bi-borate of soda in rain water. It is used simply as a flux to dissolve the oxide of the heated metal. 2. Can copper be used in place of silver solder with as much success? A. It is liable to make the joint brittle. The best of materials should be used in making this joint.

(25) D. C. W. writes: 1. I made a telephone having a bar magnet wound with ¼ lb. cotton-covered wire, and a tintype plate for the diaphragm. The plate is $\frac{1}{100}$ inch thick, and has some kind of varnish on it. The apparatus will not work. Is the trouble in the wire, magnet, or plate? A. The principal difficulty is probably in the difference between the resistance of the wire on the magnet of your instrument and that on the magnet of the instrument at the other end of the line. The resistance of the wire on the magnet of each instrument—that is, in one circuit—should be equal. 2. The magnet will hold ½ oz. Is that strong enough? A. Hardly.

(26) R. F. S. writes: A friend of mine says that Damascus gun barrels are not made out of Damascus, and I claim that they are. Who is right? A. What are known as Damascus gun barrels are made in England, Belgium, and other countries. The Damascus system is that of twisting square bars, forging them square again, re-twisting and re-forging, and so on; continuing the process as often as required to produce a given quality. This process refines the metal all through, the steel that has at any part of the process formed the corners of the bar being refined by forging.

(27) D. H. asks for a recipe for a cement, to be used cold, for leather; with the requisites of strength, elasticity, and resistance to moisture. 1. Dissolve good glue, previously softened in cold water, in strong acetic acid, over a hot water bath to a thin paste. Strong, but requires several hours to harden. 2. Melt together equal parts of good coal-tar pitch (not tar) and gutta percha; mix well and use hot. Very strong, elastic, quick setting and waterproof. It may be softened with naphtha and used cold.

(28) I. H. B. asks: What is the philosophy of the air chamber on the suction pipe of a steam pump? A. It acts very much on the same principle as the chamber on the delivery pipe, diminishing shocks that would otherwise be produced by suddenly stopping the column of water, and tending to cause a uniform flow.

(29) A. F. asks: Can a ½ inch pipe (80 lbs. pressure) furnish steam enough for a cylinder 3½ x 4½, 225 revolutions, to make 3 horse power? A. It is rather small. It would be better to use a ¾ inch pipe.

(30) D. E. J. writes: I have an engine with cylinder 3 inches diameter and 6 inches stroke, which I intend putting in a boat 15 feet long and 5 feet beam. I shall use paddle wheels, and gear the engine 3 to 1. I intend making a tubular boiler 14 inches diameter and 3 feet long, with 40 tubes 1 inch in diameter, having the draught running the whole length of the boiler, and returning to the smokestack at the forward end of the boiler. With this arrangement, will the boiler be large enough to keep up steam to run the boat 4 miles an hour? A. By using a forced draught, such as can be produced by exhaust steam, probably the boiler will answer.

(31) G. M. H. asks: 1. What sort of steel should I use to make dies for cutting stencil plates? A. Weld Jessup's steel to a wrought iron backing. 2. How should the dies be tempered? A. To a deep yellow.

(32) Z. F. asks how to face grindstones after they are hung. A. Run them dry at a slow speed, and turn them with a piece of 1½ inch gas pipe.

(33) W. F. C. S. writes: I have a fan, the speed of which I wish to double. Will it require twice or four times as much power to run it at the double speed? A. It will take about eight times as much power.

(34) G. A. E. asks: 1. How can the tone of a tuning fork be altered? A. By changing the length, thickness, or width of the prongs. 2. Will the tone of a tuning fork remain the same after years of use? A. When used with care a tuning fork does not change materially.

(35) F. M. suggests that A. H. J. (p. 75, current volume), whose stove pipe acts as a pyroligneous distilling apparatus, should fit the joints upside down, so that the drops will fall within the pipe instead of outside, and that the standing part should slant a little.

(36) W. F. L. writes: I wish to cement an iron to the under side of the bed-plate of a sewing machine to strengthen it. How can it be done? A. One of the best cements for this purpose is composed of melted rosin and plaster of Paris, thinned with boiled oil, and applied warm. The surfaces should be cleaned before application. A few screws or rivets would, however, be preferable to any cement.

(37) A. H. L. asks: What is the method of calculating the chronological cycles, as given in the almanacs? A. The rule for finding what position any given year occupies in the solar cycle is as follows: Add 9 to the date, and divide the sum by 28; the remainder is the year of the cycle, and the quotient is the number of cycles that have elapsed. If there is no remainder the given year is the 28th of the cycle.

(38) H. W. asks whether a square foot of surface near the axle of a windmill exerts more or less power than a square foot at the rim? A. The portion near the periphery is most effective, in windmills, water-wheels and fans.

(39) C. J. M. writes: I have a Bell wire passing over my house, in which the current is reversed at each stroke of the bell. How can I complete a local circuit, without cutting the Bell wire at each stroke of the bell? A. By tapping the main line as follows: Make a metallic connection between one end of a wire and the main line of the Bell circuit, and connect the other end of the wire with one of the two main line binding posts of a relay, and connect the other main line binding post with the earth. If the Bell circuit belongs to other persons, it is unlawful for you to do this.

(40) I. H. asks: 1. Can ice be made thick by pumping water upon it after the pond has frozen over? A. Yes, in some cases; but ice obtained in this way is not very homogeneous. 2. What will be the best method of flooding, so that the ice will not be cut through where it falls from the spout? A. The water may be supplied by a number of pipes, wide planking being laid on the ice in the immediate vicinity to avoid rotting it.

(41) F. A. P. writes: I am casting plates of bent form, which are required to be hard. I have been unsuccessful in chilling them; have greased the mould and heated it before pouring in the metal; imperfect castings always result, the plates being thinner at some places than in others, and cracking in cooling. What is the trouble A. Probably you do not use a proper mixture of iron. Try pouring the metal through several gates, placing them where the castings are apt to crack or cast too thin.

(42) R. L. E. asks how to temper gun springs. A. Heat them evenly to a low red heat in a charcoal fire, and quench them in water with the cold chill off, keeping them immersed until reduced to the temperature of the water. Place an iron pan containing lard oil and tallow, in about equal quantities, over a fire, and place the springs therein, and heat the pan until its contents take fire; then hold the springs in the flames, turning them over and over and dipping them occasionally in the oil to keep them blazing; when the oil adhering to them blazes freely when they are removed from the flames, place them aside to cool off.

(43) J. M. K. asks: 1. Is there a cheap gum which would mix with castor oil to put on belts to prevent slipping? A. The best remedy for a slipping belt is to increase its width, run it over larger pulleys, or cover the pulleys with leather or rubber. There is no preparation to prevent slipping which is cheap in the end. 2. Would it be advisable to run a circular saw, 36 inches in diameter and scant ⅛ inch thick, with flanges 14 or 16 inches diameter, ¾ inch thick at center, and tapering to ¼ inch at rim; would the friction between the lumber and flanges be too great? A. The idea does not appear practicable.

(44) S. W. M. writes: I send herewith a root used as a catarrh remedy. What is it? A. The root is galangal. It comes from the East Indies. It contains a volatile oil, an acrid resin, gum bassorin, lignin, and extractive starch and fixed oil, and a crystallizable body called kampferid. The active principles are the volatile oil and resin. It acts as a stimulant aromatic. It is of small value and seldom employed. It can be bought in the market for 15 or 20 cents a pound.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

H. D. C.—It contains, besides calcium sulphate (plaster of Paris), glue or size, alum, lime, and whiting or chalk.—S. B.—Chlorite—hydrous silicate of magnesia and alumina, colored with oxides of chromium and iron. Not metalliferous.—E. G.—Rich lead sulphide ore (galena).—W. P.—The rock contains traces of lead, zinc, and iron sulphide.—A. H.—Argillaceous red sandstone.—P. S.—It is zircon-syenite. The red crystals are zircon, a silicate of zirconium.—L. W. J.—The gravel does not contain appreciable quantities of precious metals. The red pieces are jasper.

HINTS TO CORRESPONDENTS.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

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.

Inquiries 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.

OFFICIAL.

INDEX OF INVENTIONS

FOR WHICH

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

January 15, 1878,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings, will be furnished from this office for one dollar. In ordering, please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city.

Advertising case, R. C. Millings 199,306
Aerial vessel, F. A. L. Von Ehren. 199,334
Aging whisky and spirits, Peiffer & Richards (r) 8,042
Antiseptic composition, F. Jourdes 199,209
Awning, E. De Courcy 199,193
Ax, C. L. Young 199,342
Axle, car, N. Jones 199,207, 199,208
Bed bottoms, N. Dutton 199,147
Bedsteads, folding, W. Seng 199,320
Beehive, R. Strawser 199,328
Billiard cue, C. Seymer 199,321
Binder, temporary, J. H. Van Pelt 199,241
Blind stop, H. Fellows 199,278
Boiler, steam, J. Baird 199,139
Boilers, preventing incrustation, J. North 199,309
Bolt holder and clamp, Norris & Sweet 199,220
Book binding, I. Reynolds (r) 8,039
Boot and shoe jack, G. McKay 199,304
Bottle stopper fastener, F. W. Perry 199,165
Bottle stopper fastener, E. D. Weyburn 199,337
Box fastener, B. S. Atwood 199,138
Box manufacture, H. C. Stone 199,327
Bracket, F. H. Robinson 199,167
Brake, car, Gue & Field 199,286
Brake for ship's windlass, L. Garison 199,283
Brake shoe, car, W. McConway 199,161
Brake, wagon, F. A. Barlow 199,176
Brush, painter's, J. W. Howard 199,205
Buckle for shoes, A. Makiolczyk 199,216
Buttertray, W. M. Ferris, Jr 199,279
Calcimining, size for, W. S. Welch 199,242
Calculator, W. Hart 199,289
Can jacket, oil, L. Peter 199,222
Can, oil, Baron & Tallman 199,251, 199,252
Car coupling, J. J. Anthony 199,173
Car, refrigerator, A. W. Zimmerman 199,343
Car starter, W. Jasper 199,158
Car wheels, making moulds for, B. Burgess 199,259
Carbureting air, Wolle & Munyon 199,246
Carriage seat, J. D. Olds 199,310
Caster, furniture, J. B. Ritchey 199,313
Casting, collapsible core for, G. Bisset, Jr 199,179
Chair bottom, H. S. Hale (r) 8,041
Chair, oscillating, G. W. Cummings, Jr 199,189
Chair, rocking, J. Krapp 199,212
Chandelier, extension, J. W. Carter 199,183
Chandelier for oil burners, M. Schmickl 199,169
Churn motor, T. J. Crump 199,187
Clinometer, L. C. Schnell 199,319
Clock, A. I. Goodrich 199,198
Clock, tell-tale, R. Boeklen 199,181
Colter, S. T. Ferguson (r) 8,038
Commode covers, H. Geroud 199,284
Corset clasp, D. H. Fanning 199,277
Cuspadore, S. J. Van Stavoren 199,333
Derrick for hay stackers, A. J. Marks 199,301
Desk, J. D. Tatum 199,236
Die for plastic materials, Winn & Bliss 199,340
Dish, butter, A. C. Lippitt 199,214
Draft equalizer, B. C. Bradley 199,142
Dredging machine, J. Menge 199,305
Dress train supporter, A. W. Thomas 199,170
Drill and planter, G. W. Grimes 199,200
Egg carrier, R. R. Wilkinson 199,339
Eyeglass for watchmakers, J. H. Mather 199,218
Feather machine, C. Ballinger 199,178
Felt fabrics, P. A. Dailey 199,270
Fence, portable, A. G. Kirk 199,211
Fence wire, barb for, S. H. St. John 199,330
Fences, metal barb for, J. McNeill 199,162
Fire escape, W. A. Greene 199,199
Fire extinguisher, Abbott & Birdsell 199,171
Fire kindler, H. H. Case 199,184
Fire kindling, Williamson & Vogts 199,245
Fruit dryer, J. C. Slaughter 199,232
Fruit gatherer, G. W. Baker 199,250
Furnace door, T. R. Butman 199,182
Furnace for iron and steel, C. H. Morgan 199,164
Garters, Vinton & Fitzpatrick 199,240
Gas burners, C. G. Spengler 199,323
Gas retort charger, A. Q. Ross 199,316
Gate, S. Rogers 199,227
Gate, R. Yale 199,341
Gate, farm, S. S. & J. G. Sherman 199,322
Gearing, J. T. Hawkins 199,203
Glass vessels, metallic neck for, J. T. Cody 199,264
Governor, H. T. Farnsworth 199,149
Grain binder, F. E. McNall 199,219
Grain measure, J. D. Knight 199,159
Grain separator, B. A. Grant 199,151
Grain separator, T. C. Histed 199,204
Grain separator, J. L. Lowe 199,300
Grain separator, H. B. Stevens 199,233
Hair curling device, Burnham & Chase 199,260
Harness, girth for, C. M. Sanford 199,318
Harness pad, H. R. Ridgley 199,225
Harness straps, F. Conway 199,266
Harrow, L. F. Haas 199,287
Harvester, cotton, S. & M. Ruthenburg 199,168
Hat holder, O. Jenness 199,294
Hats, sweat leather for, J. C. Budd 199,258
Hay rack, N. B. Cooper 199,186
Heels, cutting wooden, W. W. Abbott 199,247
Horse blanket, I. H. Hodgdon 199,292
Horse collar fastening, J. H. Emerson 199,276
Horse detacher, F. J. Leidorf 199,298
Horseshoe, H. C. McCeney 199,302
Horseshoes, J. Russell 199,228
Hub, vehicle wheel, C. K. Wilcox 199,244
Inhaler, O. P. Barber 199,140
Insoles, manufacturing, C. Riewe 199,226
Lamp, E. J. Blackham 199,254
Lamp burner, S. C. Catlin 199,144
Lamp extinguisher, W. S. Asbury 199,249
Lamp filler, H. & A. T. Hatch 199,290
Lamp shade cover, F. L. Cutter 199,269
Lamps, oil chamber for, H. T. Hanks 199,201
Last, L. Darozier 199,272
Lathe, R. Beal 199,178
Lifting jack, S. D. J. & L. S. Barrow 199,177
Liquids, vessel for holding, W. F. Sherman 199,231
Lock, electric, P. Bowe 199,255
Locomotive, exhaust nozzle, R. N. Allen 199,137
Lubricator, J. W. Reed 199,224
Meat chopping machine, J. Sanler 199,317
Meats, etc., preserving, T. G. Ames 199,248
Mouldings, polishing, C. G. Purdy 199,166
Mortising machine, R. L. & R. S. Greenlee 199,285
Mower knife sharpener, Caden & McCray 199,261
Muzzle, calf, R. S. Hazen, Sr 199,156
Neck wear, holder for, E. D. Dougherty 199,195
Nut lock, F. B. Davis 199,191
Nut lock, E. McConnell 199,303
Ore separators, dust, J. P. Conkling 199,267
Ore washing apparatus, J. M. Allenwood (r) 8,037
Paneling machine, H. J. Cordesman, Jr 199,268
Pantaloons, J. W. Davis 199,273
Paper cutting machine, G. R. Clarke 199,146
Paper shutter for windows, W. Hipkins 199,291
Piano action, upright, A. H. Hastings 199,154
Piano action, upright, C. E. & A. F. Rogers 199,314
Pile, D. B. Oliver 199,311
Pile driver, Libby & Hatch 199,299
Pin, safety, Z. G. Pierce 199,346
Pipe coupling, C. H. Perkins 199,312
Pipes, joining of lead, A. L. Bricknell 199,180
Pitcher, ale, S. Crowell 199,188
Pivot turning attachment, W. N. Manning 199,217
Planter, corn, R. H. Avery 199,344
Plow, J. W. Mahoney 199,215
Plow, sulky, C. A. Hague 199,153
Pole crab for vehicles, R. S. Grummon 199,152
Post office box, W. H. Taylor 199,331
Press, hydraulic, A. B. Lawther 199,297
Press, steam and hydraulic, J. F. Taylor 199,237
Pressure gauge, J. Helwig 199,157
Pump, double acting steam, A. F. Hall 199,288
Radiator, steam, W. H. Brown 199,257
Rails, chair for switch, S. H. Havens 199,155
Railway signal, M. A. Stevens 199,234
Rake, horse hay, M. C. Burr 199,143
Rake, horse hay, A. Tschop 199,239
Rectifying apparatus, A. J. & A. B. Gallagher 199,281
Rectifying apparatus, A. J. & A. B. Gallagher 199,282
Refrigerator shipping box, C. H. & M. C. Turner. 199,332
Refrigerator shipping box, J. Sproat 199,324
Roof and floor, fireproof, F. L. Kane 199,210
Ruler, Barrows & Kennish 199,253
Sad iron, J. B. Stamour 199,325
Sash fastener, I. Cogswell 199,265
Sash fastener, W. T. Doremus 199,194
Satchel, traveling bag, etc., I. Scheuer 199,229
Saw mill dog, C. J. Leach 198,213
Saw set, W. C. Wheeler 199,338
Saws, manufacturing circular, W. E. Nickerson 198,308
Screen, window, Walker & Hunt 199,385
Sewer trap, Forney & Tillotson 199,238
Sewers, check valve for, C. Naeher 199,307
Sewing machine, button hole, T. S. L. Howard 199,206
Sewing machine darning attachment, R. M. Rose 199,315
Shaft support for carriage harness, G. C. Eastman 199,148
Shedding mechanism, O. Piper 199,223
Sheep shears, power, J. C. Wightman 199,243
Shutter fastening, J. H. Clark 199,262
Sink trap, H. W. Clapp 199,145
Skirt, hoop, F. A. Brewster (r) 8,040
Snatch block, M. H. Tarbox 199,235
Spring for vehicles, W. H. Brace 199,256
Spring, platform, M. C. West 199,336
Spring, vehicle, G. Stricker 199,329
Sprinkler, garden, Hodel & Stauber 199,293
Squares, spacing T, J. D. Day 199,192
Stamp, canceling, H. A. Coats 199,185
Stamp, hand, W. H. Keeler 199,295
Stencil plate, D. G. Garretson 199,197
Stone sawing machinery, J. Langstaff 199,160
Stove, coal oil, J. A. Frey 199,280
Stove grate, J. A. Lawson 199,296
Stoves and ranges, Dutot & Thrift 199,275
Suppository, F. D. Owen 199,221
Table leaf support, Flather & Boughtaling 199,150
Telephone, E. Berliner 199,141
Thrashing machines, H. K. Andrews 199,172
Thrashing machines, W. E. Harwell 199,202
Tug holder, elastic, W. S. Mead 199,163
Type writing machine, Clough & Jenne 199,263
Umbrella tip cup, H. S. Frost 199,196
Vessels, centerboard for, P. L. Senat 199,230
Wagons, lap seat for, G. W. Damon 199,271
Water closet, J. H. Stevens 199,326
Water wheels, flume for, J. P. Drouillard 199,274
Windmill, J. & J. B. Cushman 199,190
Windmill, G. Hodges 199,345
Yoke and draft tongue, R. Atkin 199,174

[A copy of any of the above patents may be had by remitting one dollar to MUNN & Co., 37 Park Row, New York city.]