Business and Personal.

The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in the following week's issue

For Sale--One 15 H. P. double cylinder, double drum, friction horizontal hoisting engine, with boiler and fixtures. New. Address W. P. Davis, Rochester, N. Y.

"U. S." metal polish. Indianapolis. Samples free. Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J 6Spindle Turret Drill Presses. A.D. Quint, Hartford, Ct.

Mixing machinery. J. H. Day & Co., Cincinnati, Ohio. For mud dredging engines. J. S. Mundy, Newark, N. J.

Universal and Centrifugal Grinding Machines. Pedrick & Ayer, Philadelphia, Pa.

For Sale—Patent 460,883, portable centering machine. Address P. O. box 118, Harrisburg, Pa.

The Improved Hydraulic Jacks, Punches, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York. Screwmachines, milling machines, and drill presse

The Garvin Mach. Co., Laight and Canal Sts., New York. Centrifugal Pumps. Capacity, 100 to 40,000 gals. per minute. All sizes in stock. Irvin Van Wie, Syracuse, N.Y. Crandall's patent packing for steam, water, and ammonia. See adv. next week. Crandall Packing Co.,

Guild & Garrison, Brooklyn, N. Y., manufacture steam pumps, vacuum pumps, vacuum apparatus, air pumps acid blowers, filter press pumps, etc.

Palmyra, N. Y.

Split Pulleys at Low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

The hest book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins By mail, \$4; Munn & Co., publishers, 361 Broadway, N. Y.

What do you want to buy? We will send without cost to you, catalogues, price lists, and information concerning anything you wish. Paret, Willey & Co., 265 Broad

Competent persons who desire agencies for a new popular book, of ready sale, with handsome profit, may apply to Munn & Co., Scientific American office, 361 Broadway, New York.

Wanted-A master mechanic and designer to take charge of the machinery of a large iron foundry and finishing works. Address, stating experience and terms H. J., Box 773, New York.

Send for new and complete catalogue of Scientific and other Books for sale by Munn & Co., 361 Broadway. New York. Free on application.



HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our

or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should References to former articles or answers should give date of paper and page or number of question. In quirles not answeréd in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn. Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

INDEX OF NOTES AND QUERIES.	No.
Battery fluid	
Cherry tree, infection of	4257
Incandescent filament soldering	
Ink, to remove	4246
Liquid, high specific gravity	4255
Pitch and loudness	4264

(4246) F. C. L. asks: 1. Why does it grow colder as you go higher? A. At higher elevations we are further removed from the heat-radiating surface of the earth, and less protected by the atmospheric envelope of the earth, 2. Does copper wire contract and expand the same as steel wire? A. Copper when heated from 32° Fah, to 212° expands 1-582 of its length; steel expands 1-846 its length. 3. Is there anything that will remove ink from paper so it cannot be seen and not harm the paper? If so, what is it, and how applied? A. Mix equal parts of oxalic and tartaric acid and dissolve as needed in a little water. Apply, and take up the ink and eraser with a blotter. Alcohol will remove the stains of aniline. Red ink can sometimes be removed with alcohol. 4. If a dynamo and motor were belted together and started, would the result be perpetual motion? If not, why not, and how long would they run? A. The power required to run a dynamo is always greater than that developed by a motor driven by the current, consequently such an arrangement as you propose would not run at all. 5. Which is the cheapest-cable or electric railroad? A. Taking the cost of construction and maintenance together, we think there is little difference.

(4247) A. M. asks: 1. Will you kindly inform me, through your paper, regarding the follow ing? What is the best compound to use with three Fuller compound batteries, and will they be sufficient to light a three candle power incandescent light (or must I have four) with thirty feet feet No. 18 copper wire? A. The formula for the solution is as follows: Bichromate of sodium is dissolved in water to saturation:to this solution slowly add one-fifth of its weight of commercial sulphuric acid. Three cells of Fuller battery will hardly be sufficient; use four or five. 2. How can I light a gas jet entirely by electricity, and what amount of E. M. F. will be needed? A. For information on electric gas lighters we refer you to SUPPLEMENT, Nos. 213 and 446.

(4248) F. E. F. writes: How much H₂SO₄=sulphuric acid theoretically can be produced

from the atomic weights to figure the same? A. The atomic weight of sulphur is 32, the molecular weight of sulphuric acid is 98. Hence we have the proportion 32: 98: : 1: x; giving 118 x=3.0625 pounds sulphuric acid from one pound of sulphur.

(4249) J. R. M. asks whether the magnesium light is yet available for burning for two or three hours, and its intensity as compared with the lime light, and its comparative cost? A. The magnesium light is used to some extent for continuous illumination in a lamp which feeds the ribbon or wire forward as rapidly as it is burned, but its action is uncertain, and it does not compare with the lime light or the electric light. As to cost, we think the expense of running such a light is considerably more than that of

(4250) J. G. asks: 1. On how long a line will the Bell telephone receiver, described in Sur-PLEMENT. No. 142, transmit and receive articulate speech? A. Two or three miles, if the line is hung adjacent to telegraph or electric line wires. 2. Would it articulate more clearly if the magnet, bobbin, and diaphragm were increased one-half? A. We think not. 3. Has the patent expired on the above receiver? A No. 4. What size and kind of wire is best for a telephone line four miles in length? A. No. 12 galvanized iron or steel wire, 5. Through how many ohms resistance will a Leclanche cell ring an ordinary wood box bell? A. Fifty or more.

(4251) W. H. J. writes: Please explain the trolley system of electric street railway. The wiring is what confuses me. Why is it that the car nearest the generator does not short circuit the others? Also the method of lighting them? A. The resistance of a motor is such as to permit it to take only the amount of current required for running it. The rest of the current goes on for distribution among the other motors. The current for lighting is taken from the circuit in the same manner.

(4252) J. H. O. says: A discussion arose ecently as to the value of a contrivance in common use as a ventilator. The same consists of a sheet of tin, usually occupying the place of a pane of glass, out of which is cut a circular hole, within which is a wheel of tin, with flanges set at an angle. The wheel revolves when a current of air passes through it. Does the wheel in any way favor ventilation? Would a hole of the same size without a wheel serve as well? A. The wheel adds nothing to the force of the draught; rather essens it. Its only value is as a diffuser. By its action the air is spread out, so that it does not become dangerous to health as a direct draught upon a person.

(4253) J. I. C.—Tin plates wholly made of American metals are at present manufactured to a limited extent in this country.

(4254) H. S. R. asks: What solution should zinc be treated with to render its surface snitable for pasting labels on? A. Clean the zinc with with caustic potash (lye) or ammonia.

(4255) G. H. H. asks: 1. Is there a solution or liquid whose specific gravity is 2.25? A. A solution of mercury iodide in potassium iodide or a solution of cadmium boro-tungstate are the best, 2. Would soluble glass be poisonous to butter if the butter were put in a package lined with the soluble glass or would it give it any bad taste? A. It would not be poisonous, but might slightly affect its flavor where in contact with it.

(4256) W. A. H. asks: Is clay considered an ore since the discovery of aluminum? A. No.

(4257) W. S. writes: I inclose a piece of the twig of a fruit tree (cherry I believe) infected with scale. Will you have the kindness to describe in answer to correspondents, the best means of eradicating the affection? A. Reply by Professor C. V. Riley: In reply to the letter of Mr. William Shackelford of The Dalles, Oregon, I will state that the insect which he sends is the San Jose scale (Aspidiotus perniciosus). This is one of the worst pests of deciduous fruit trees or the Pacific coast. Many experiments have been tried against this insect by my agents in California, with the result that the most satisfactory has been found to be a wash made as follows:

Resin...... 30 lb. Caustic soda (70 per cent)..... 9

At twice the dilution it will be safe to apply it to foliage, but it will not then be so effective. This preparation should only be applied during winter or during the dormant period; applied in the growing season, it will cause the loss of foliage and fruit.

(4258) W. B. asks: 1. The name of the river whose bed is not land, but water, and the name of a large river north of China, which river must be some relation of Shakespeare's Othello. A. The Gulf Stream and the Amoor we suppose are therivers meant, Othello being the Moor of Venice. 2. What language is spoken in the Argentine Republic and in Brazil? A. In Brazil, Portuguese. In the Argentine Republic, Spanish is the official language, but owing to a large influx of Italians a great deal of Italian is spoken. 3. Where can I get a good book, not too expensive, on North American en tomology? A. We recommend and can supply you with the following books relating especially to the subject you refer to: " Entomology for Beginners," by Packard, price \$2. Packard's "Guide to the Study of Insects," price \$5.

(4259) W. N. asks: Can common stove pipe be used instead of Russian iron in making a mo tor? A. Yes.

(4260) R. H. P. asks: 1. Can you tell me of any process by which India ink marks may be removed from the person without injury or a scar? India ink being composed of finely divided particles of carbon cannot be removed by any chemical means. Try a piece of pumice stone. 2. I wish to construct a plunge battery of nine cells, connecting five cells together and have the other four so I can turn them on one at a time. A. You will find description of plunge from one pound of sulphur? Can you give me a formula batteries in SUPPLEMENT, Nos. 157 and 792. 3. Would come to the ground in the same time.

nine cells 4×5 with zincs and carbons 234×5 be suitable to use in electrolysis? A. They will answer if connected in parallel. Larger cells would be better.

(4261) H. H. B. asks: 1. How many 25 volt 16 candie power lamps could I run at one time with dynamo in Supplement, No. 600? A. 16. 2. Can the motor described in Supplement. No. 641, be run as a dynamo? If so, how much power would it have? A. The motor was not made for use as a dynamo. It would, however, yield a small current if used that way, probably enough for one or two 3 candle lamps. 3. Would it work better with a Gramme or Siemens armature? A. The Gramme armature is preferable, 4. Could 8 light dynamo be run as a plating machine? A. Yes. with the changes described in Supplement, No. 793.

(4262) H. D. W. asks whether a block of charcoal made from pulverized charcoal would have the same or nearly the same capacity for absorbing and condensing gases as a similar block made from the natural wood? A. It would depend on how the dust was agglomerated. Any paste or sirup used for the purpose would interfere unless the mass was subsequently carbonized.

(4263) H. W. L. asks: What is the composition of the substance known as "Frankfort black' in England, and also where it is procurable in America? A. Frankfort black is a high grade of bone black. You may order it from a wholesaledealer in artists' materials.

(4264) J. G. R. asks: 1. What will take red stains from red woolen underclothing out of fine white muslin? A. By a mixture of equal parts of chloroform and ether; if this does not remove the stain, it will probably resist all other applications, though javelle water might be tried. 2. Will a ball keep its weight in a space where the air is pumped out, the same as in a space filled with air? A. Yes. 3. In pumping the air out of a space, will the pump need more force, when the air is nearly pumped out, than in the beginning? A. Yes.

(4265) C. L. R. asks: Would it be practical to run induction coil described in "Experimental Science" (Hopkins) with dry batteries? If so, how many? A. It can be done by allowing 4 cells of dry battery connected in parallel for each cell of bichro-

(4266) G. A. B. asks: 1. What is the difference between the pitch and loudness of tone? A. The pitch is determined by the number of vibrations per second, while the loudness or intensity depends on the extent of the vibrations. 2. What causes a gun barrel to become hotter shooting a blank cartridge than a loaded one? A. If the increased temperature is a fact, it must be due to difference in the rate of combustion under different pressures.

(4267) F. A. S. asks (1) how to make the solder used for connecting the filaments and leading-in wires in incandescent lamps? A. The filaments of incandescent lamps are secured to the wires by means of electric soldering, by copper as the material for forming the connection, or by means of carbon. 2. Also some phonograph company that sell their machines? A. We understand that the phonographs are not sold, but leased.

E. A. B. asks for the table for the removal of spots and stains.-R. L. M. asks for the dimensions of drawings intended for the patent office.-C. C. W. asks for the composition used by toy manufacturers in moulding dolls' heads .- N. P. H. asks for the solvent power of glycerine.-B. B. S. asks how hams are cured .- T. R. L. asks for remedy for headaches .- C. R. O'B. wants the composition for hektograph sheets.-C. W. H. wants information about indicator diagrams suitable for a beginner.-H. P. J. wants information on catechol and paramidophenol developers.-N. H. S. wants a table for doses of medicine, called a posological table.-G. M.B. says: What is the composition of common painter's putty?-P. W. S. says: Can you give me formulas for the following inks-vanadium, invisible yellow, silver and autographic ?-- J. McA. asks how to bend glass tubes.-J. J. W. asks : What is the composition of fuller's earth ?-J. T. asks: Of what is glaire composed ?-E. D. W. asks: Can you give me reliable receipts for etching glass?-T. J. asks: What process is used in staining pool balls, and how are they striped?

Answers to all of the above queries will be found in the "Scientific American Cyclopedia of Receipts, Notes and Queries," to which our correspondents are referred. The advertisement of this book is printed in another column. A new circular is now ready.

Replies to Enquiries.

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

(4205) H. D. H. writes: Your reply to question No. 4205, in your paper of March 26, seems a little behind the times, being based upon the law of Newton, which law only holds true of bodies falling in vacuum. On page 303 of the Smithsonian report for 1889 you will find given, from F. H. Wenham, June, 1866, the fall of bodies in air to be "limited by the weight of air set in motion in a given time." Professor Langley, in his researches in aerodynamics, Scientific AMERICAN, February 13, 1892, proves that a body in motion displaces a body of air equal to its greatest diameter transverse to the line of motion, multiplied by the distance traveled in a given time. Accordingly take a cannon ball weighing one pound, and three inches in diameter, falling say fifteen feet in one second in a perpendicular line, and the same ball when projected 1,000 feet per second. In its vertical fall it overcomes a weight of air equal to the area of its greatest circle, about seven inches, by the distance it falls, fifteen feet, equal to 1,260 cubic inches, but when projected horizontally must overcome the weight of three inches. multiplied by one thousand feet, multiplied by fifteen feet, equal to 6,480,000 cubic inches of air, to come to the ground in the same time and as the impulse projecting it acts only horizontally, it is impossible for it to

TO INVENTORS.

An experience of forty years, and the preparation of nore than one hundred thousand applications for p ents at home and abroad, enable us to understand laws and practice on both continents, and to possess unequaled 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 ex-tensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broad-

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

April 12, 1892.

AND EACH BEARING THAT DATE. [See note at end of list about copies of these patents.]

Blind, Window, H. B. Swartz. 472,532
Block. See Interlocking block.
Blotter for use in bankbooks, etc., attachable, C.
Davis.
Board. See Game board. Piano sounding board.
Telephone exchange switchboard.
Boats. See Torpedo boat.
Boats, cabin roof and deck for, G. Hurson. 472,884
Boller. See Steam boiler. Tubular boiler. Water tube boiler.
Boats, cabin roof and deck for, G. Hurson. 472,887
Bomb lance, D. Kelleher. 472,887
Bomb lance, D. Kelleher. 472,889
Book, check, E. North. 472,761
Book leaf hodier, J. R. & J. Ferguson. 472,571
Book leaf hodier, J. R. & J. Ferguson. 472,571
Book mark, C. L. Watson. 472,561
Bottle stopper, W. J. Kolts.
Bottle stopper, W. J. Kolts.
Box. See Journal box. Knockdown hox. Letter hox. Powder box.
Box or basket, E. Behne. 472,761
Brace. See Carving brace. Fence post brace.
Bracket. See Electric heater bracket. Shingling bracket.
Brake. See Car brake. Vehicle brake.
Breweries, cooling room for, C. D. Stanford. 472,396
Brick kiln, continuous, W. Johnson. 472,398
Bricks, device for conveying, W. Griffith. 472,992
Bromine, extracting, H. H. Dow (r). 11,232
Bromine, extracting, H. H. Dow (r). 11,232
Bromine, extracting, H. H. Dow (r). 11,232
Bromine, extracting, H. H. Dow (r). 12,345
Brick kiln grane. 472,591
Canister, G. E. Kinght. 472,591
Canister, G. E. Kinght. 472,591
Car coupling, J. R. Cappenter. 472,591
Car coupling, R. L. Garlick. 472 Car coupling, W. D. Williams.
Car couplings, lifting device for twin jaw, T. L.
McKeen.
Car door, Carson & Gurganus.
Car door, street, F. Mansfield.
Car dumping device, C. F. Wilson.
Car heater, street, J. Allingham.
Car heater, street, J. Allingham.
Car platform gate, H. Cochran.
Car wheel, anti-friction, J. D. Farquher.
Cars, air and steam coupling for railway, J. F.
Hill.
Cars, motor for propelling, W. L. Davis.
Cars, under-trussing for railway, F. E. Cands.
Carding engine, J. F. Bradbury.
Carding machines, condenser for wool, J. E.
McWilliam.
McWilliam. Carding machines, condenser for wool, J. E. McWilliam. Carriage, baby, D. Rees. 472,740
Carriage, baby, D. Rees. 472,714
Carriage, baby, D. Rees. 472,714
Carrier, See Cash Carrier. Trolley carrier.
Carving brace, A. C. Peck. 472,742
Cash carrier, C. R. Herrington. 472,893
Cash till recorder, W. W. Darbee. 472,893
Cash till recorder, W. W. Darbee. 472,893
Chair, G. W. L. Sykes. 472,893
Chair, See Folding chair. Window chair.
Chails line holder, A. Tache. 472,593
Chamber vessel support, G. R. Rudrof. 472,893
Chair, W. T. Doremus. 472,893
Chamber vessel support, G. R. Rudrof. 472,893
Cook cylinder drain, R. P. Capwell. 472,893
Cook cylinder drain, R. P. Capwell. 472,893
Cook cylinder drain, R. P. Capwell. 472,893
Coop. J. B. Cooper. 472,893
Coop. J. B. Cooper. 472,893
Coop. J. B. Cooper. 472,893
Corset, M. M. Bliss. 472,613
Corset, S. Meier. 472,673
Counter protector, C. A. Schults. 472,671
Counter protector, C. A. Schults. 472,673
Counter protector, C. A. Schults. 472,673
Counter protector, C. A.

268		Scientific	6
Digger. See Potato digger. Distilling carbonaceous material, B. Brazelle	472,614 472,562	Phosphate washing machine, G. W. Roberts 472,832 Photographic plate changing apparatus, F. A. Fichtner. 472,705	N
Dock, dry, O. Von Nerta Door check, J. J. Holwell Door indicator, C. S. Gerlach Door track, sliding, L. T. Wilcox Dough press for form making, continuous, J. H. Mitchell Dredging enperatus F. A Lockwood	472,880 472,787 472,662	Fichtner 472,706 Fichtner Shutter, F. R. Hoyt 472,806 Planoforte, W. Rollfing, Jr. 472,806 Plano Sounding board, C. Minze 472,407 Ficture or surface exhibitor, **sin-controlled, M. 472,706 O. Grigwood 472,707	V
Dough press for form mak ng, continuous, J. H. Mitchell. Dredging apparatus, F. A. Lockwood.	472,765 472,735	Picture or surface exhibitor, eein-controlled, M. O. Griswold. 472,702 Plow handle clamp, J. L. O. King. 472,65	V V V
Dredging apparatus, F. A. Lockwood. Drilling apparatus, Portable, H. S. & C. E. Glenn. Drilling machine, radial, W. D. McNaull. Egg beater, H. M. Brittain.	472,619 472,546 472,803	O. Griswold. O. Briswold. O.	V
Electric conductor, W. R. Patterson. Electric conductor joint, T. F. O'Connor. Electric elevator, C. R. Fratt Electric heater bracket, G. D. Burton. Electric lighting system, J. M. Lockwood. Electric machine, dynamo, G. E. Dorman. Electric machine, dynamo, F. Pan & Barnett	412,543 472,533 472,909	Mata. 472,81: Position of distant objects, method of and apparatus for finding the, B. A. Fiske. 472,61'	, V
Electric heater bracket, G. D. Burton Electric ligh ting system, J. M. Lockwood Ejectric machine, dynamo, G. E. Dorman	472,634 472,623 472,943	Tatus for finding the, B. A. Fiske. 472,61 Post. See Ferce post. 472,61 Post. See Ferce post. 472,61 Post. See Ferce post. 472,61 Post. See Selling press 472,61 Powder box W. P. Farrington 472,51 Powder box W. P. Farrington 472,51 Press. See Baling press Household press. Printing machine, W. Scott. 472,55 Printing machine, W. Scott. 472,62 Propeller, boat, E. G. Deloe 472,63 Protector. 48, Eshelman 472,65 Protector. 48, Eshelman 472,65 Pulley, J. W. Parsin 472,16 Pulley, J. W. Scott, J. W. Kuen 472,17 Rack. See Cable rack. 472,16 Rails, box brase for girder, A. J. Moxam 472,16 472,16	, 5
Ejectric machine, dynamo, G. E. Dorman. Electric machine, dynamo, Pyke & Barnett. Electric motor or generator, R. M. Hunter. Electric search light, B. B. Ward. El ec tiswitch, L. T. Stanley. Electric wires, safety attachment for overhead, C. D. Brown. Elevator. See Electric elevator. Water ele-	472,709 472,721	Powder box, W. P. Farrington	3 A
Electric wires, afety attachment for overhead, C. D. Brown	472,784	rrintin ginachine inking apparatus, C. B. Cotterlin. 472,656 Propeller, boat, E. G. Deloe. 472,536	5 E
vator. Elevator, A. McEachran.	472,768 ·	Protractor, H. R. Eshelman. 472,53 Pudeling furnace, H. B. Hall. 472,75	1 0
Elevator, A. McEachran. Elevator controller, E. S. Matthews. Rmulsion, S. De Jager. Find gato, C. H. Chain. Stagine. See Carding engine. Dentalengine. Hy-	472,925 472,523	Pump, Mer, H. Nordtmeyer 472,54 Pump, vacuum, J. P. Boettiger 472,64	2 1
draulic engine. See Carding engine. Dentatengine. Hydraulic engine. Engines, reversible eccentric for. D. W. Kellogg.	472,542	Rack. See Cable rack. Rails, box brace for girder, A. J. Moxam	H
draunc engine. draunc engine. Engines, reversible eccentric for, D. W. Kellogg. Extension table. Homer & Pickett. Fancet, portable measuring. & verburg. Feed bag support, J. W. Pfeifler. Feed water licater, C. Jacobs. Felt roller, J. W. Millet. Fence, W. S. Kline. Fence w. S. Kline. Fence post, brace, C. E. Wintrode. Fence post, brace, C. E. Wintrode. Fence wire, T. J. Lieruban. Fence wire, T. J. Lieruban. Fence wire, T. J. Lieruban. Fence wire, T. McChitton. Fifth wheel, P. Lugenbell. Fifth wheel, P. Lugenbell. Fifth wheel, W. S. Folsett. File, document. Des Rivieres & Prud'homme. File, paper, C. B. Stone. File rames, wiing, F. Manlicher. Fire escape, D. Knowles. Fire kindlers, absorbent for, B. B. Jenkins.	472,756 472,168 479,671	Railway, elevated, S. V. Day. 472,88 Railway signal mechaniam, "I. E. Hill. 472,88 Railway signal mechaniam, "I. E. Gardner 472,678 Railway vie, Moffat & Wolf. 472,00 Railway wie suspension, electric, Philipsborn & 472,00 Reicher	i 0
Felt voller, J. W. Millet Fence, W. S. Kline. Fence melana machine A Royrouar	172,819 473,578 477,633	Railway wire suspension, electric, Philipsborn & Reichel 472,316 Recorder. See Cash till recorder. Time re-	l I
Fence, picket, W. S. Fichett. Fence post, Helland & Bronson Fence post brace C. E. Wintrode	472,6%6 1 472,705 472,841 1	corder.	3 0
Fence wire, T. J. Lugraham Fence, wire, J. McClintonk Fifth wheel, P. Lugenbell	472,639 472,555 472,694	Refrigerator, W. Simms	
Fiftb wheel, vehicle, J. W. Taylor. File, document, Des Rivières & Prud'homme File, paper, C. E. Stone.	472,834 472,920 472,661	Safe door, M. Mosler. 472,58 Sash balance, A. Johnson 472,88 Sash cord fastener, T. Vollten 472,56	1 8
Filer frames, whirl for, H. Allcroft. Firearm, repeating, F. Mannlicher Fire excape, D. Knowles	472,844 472,79.5 472,950	Safe door, M. Mosler 472,58 Safe door, M. Mosler 472,58 Sash balance, A. Johnson 472,88 Sash cord fastener, T. Vollten 472,68 Sash fastener, A. Johnson 472,88 Sash holder, J. M. Brobard 472,89 Saw handle, W. H. Kidd 472,59 Sawmill, band, D. C. Prescott 472,59 Sawmill carriages canting block for Roche &	1 1 1 1 0
Fire earm, repeating, F. Manniener. Fire escape, D. Knowles. Fire kindlers, absorbent for, B. B. Jenkins. Fishing rod, Il. P. Morgan. Folding chair, J. W. Hamilton. Food product, C. Saville. Frame. See Clover huller frame. Mosquito bar frame. Window frame. Fulling mill, J. W. Millet. Furnace. See Brick kiln furnace. Ore roasting furnace. Puddling furnace.	472,540 472,756 472,60 6	Sawmill, band, D. C. Prescott. 472,82 Sawmill carriages, canting block for, Roche & Colclough. 472,82 Saw sbarpening machine, F. J. Drake. 472,83 Scale, automatic grain, T. F. Gray. 472,83 Scales, recording device for, G. E. Miller. 472,84 Screwdriver, J. F. Steward. 472,84 Scythe attachment, W. C. Blount. 472,65 Seeding machine, G. W. Kirk patrick. 472,83 Separation of materials of different specific weight and different size, means for dry. Pape	i V 1
Frame. See Clover huller frame. Mosquito bar frame. Window frame.	472,644	Saw Soarpening machine, F. J. Drake 472,87 Scale, automatic grain, T. F. Gray 472,87 Scales, recording device for, G. E. Miller. 472,44	2 0
Fulling mill, J. W. Millet. Furnace. See Brick kiln furnace. Ore roasting furnace. Puddling furnace. Furnace, S. Bunn.	472,900	Screwariver, J. Steward 472,55 Scythe statechment, W. C. Blount 472,65 Scythe snath, C. C. Myers 472,65	
Furnace, Bekerik Bell Furnace grate support, H. D. Babcock.	472,728 472,780	Separation of materials of different specific weight and different size, means for dry, Pape	J
Furnace, Deckerk Bell Furnace grate support, H. D. Babcock. Gauge. See Shingling gauge. Game board, D. W. Randall Game counter, E. S. Thiornton. Cas making apparatus, C. R. Collins. Gato. See Car pletform acto. Endeato.	472,816 472,744 472,785	Sewers, door for catch basins of street, G. W. White. 472.55 Sewing mechine motor, B. Reichelt 472.41	9 9 9
ing gate. Swing-	479.522	weight and different size, means for dry, Pape & Hentueberg. Sewers door for catch basins of street, G. W. White. Sewing machine motor, B. Reichelt. Sewing machines, suspending clamp for use with carpet, F. Ames. Shell, T. G. Bennett. Shell, T. G. Bennett. Shell or other projectile, Bott & Cammell. Shingling bracket, E. K. Beckwith. Shingling bracket, E. K. Beckwith. Shingling gauge, C. Avery. Shee, F. G. Miles. Shutter fastener, Russell & Walt. Shidwalk hole guard, E. H. Roberts. Sight, acjustable, H. P. Griswold.	9 7
Gate, M. McDonough. Gear cutting machine, A. H. Brainard. Gear wheel, E. W. Bliss. Glass articles, manufacture of hollow, C. Ulfig Governor, R. Baumann. Grading machine, W. D. Arnett Cridiron, M. & M. Griswold, Jr. Guard. See Cattle guard. Railway surface	472,905 472,519 472,664	Shell, T. G. Bennett. 472,78 Shell or other projectile, Bott & Cammell. 472,78 Shingling bracket, E. K. Beckwith. 472,63	2 -
Glass articles, manufacture of hollow, C. Ulfig Overnor, R. Baumann. Grading machine, W. D. Arnett	472,631 472,890 472,569	Shingling gauge, C. Avery 472,84 Shoe, E. G. Miles 472,71 Shutter fastener, Russell & Walt. 472,55	1 1 2
Gridiron, M. & M. Griswold, Jr	472,537	Sidewalk hole guard, E. H. Roberts. 472,655 Sight, adjustable, H. P. Griswold. 472,655 Smoke conveyer, G. E. Bell. 472,655	i i
Guns, apparatus for pointing, C. Martin		Snow and ice melting machine, R. Steel	8 1 1 1
Hanger. See Arc light hanger. Tobacco	472,556		
Harness hook, Q. V. P. Day Harrow, disk, R. P. Howard Harrow, disk, T. Maxon	472,863 472,656 472,710	son & Naylor) : = 5 !
marrow teeth, machine for bending, H. M. Brink-	479 060	Stamping mac ine, postal date and time, O. E. Lundstedt	
Harvester, corn, A. B.Clippinger. Harvesters, sheaf carrier for self-binding, A. Jewell. Heater. See Car heater. Feed water heater. Tank heater.	472,885	Staple making and driving machine, wire, W. E. Arnold	6 1
Hank neater. Heating apparatus, R. Calder. Heel breasting machine, M. C. Lockwood. Hides, tawing, H. Endemann. Hinge, R. Linkletter. Hinge, windmill, S. A. Rouse. Hitching device, J. E. Parkison. Hog nose cutter, W. Needbam. Hol der. See Bill holder. Book leafholder. Chalk line holder. Sash holder. Whetstone holder.	472,940 472,736	Stocking, H. J. Griswold 472,87 Stocking, L. M. Preston 472,81 Stonner Sea Rottle storner Leak stonner	3 \ 5 \ 6
Hinge, R. Linkletter. Hinge, windmill, S. A. Rouse. Hitching device, J. E. Parkison.	472,622 472,825 472,934	Stove, Freelove & Welch 472,75 Stove, cooking, E. C. Frost 472,75 Stove lamp C. S. Unton 472,75	$\begin{bmatrix} 5 & 1 \\ 3 & 1 \end{bmatrix}$
Hog nose cutter, W. Needham. Holder. See Bill holder. Book leafholder. Chalk line holder. Sash holder. Whetstone hold-	472,932	Stove or range, gas burning cooking, C.F. Adams 472,84 Stove steam cooking, W.S. James 472,73 Stoves, ash box for. Kahn & Christ 472,57	2 -
er. Hook. See Harness hook. Snap hook. Veterinary parturition hook. Hook, R. Gorton		Staple making and driving machine, wire, W. E. Arnold	3 1 8 1
Horses, mouth speculum for, G. Z. Barnes	472,961	Swinging gate, A. Ross	. 4
Horses while being shod, apparatus for holding, M. A. Crossman Horses hoe, J. E. Bull	472,917 472,520	Clair Tank band fastening, F. Bergquist 472,91 Tank heat er, J. T. McGrath 472,77 Telephone exchange switchboard, canopy, C. E. Scribner 472,78	3
Horseshoe and care of H. J. Griswold Household press, J. S toudle Hudsenble press, J. S toudle	472,576 472,559	Telephone exchanges, circuit for multiple switch-	_ ;
M. A. Crossman. Horses hoe, J. E. Bull. Horseshoe and calk, J. B. Stoner. Hoslery, manufacture of, H. J. Griswold. Household press, J. Steudle. Hydraulic engine, Crawford & Lambert. Index, H. A. Stephenson. Indicator. See Door indicator. Injector, F. Kelch. Ink well, E. G. Young. Inkstamt, Countain, A. Gaskill. Insole, E. H. Noble. Insulator support, D. Doren. Interlocking block for building, paying, etc., C.	472,63	Doard systems of, seely & Scholler 472,65 Tienis racket, C. Malings. 472,65 Tie, See Railway tie. Tile, Illuminating, L. E. Davenport. 472,65 Tile, roofing, L. H. Montross. 472,65 Time recorder, watchman's, H. May. 472,65 Tim plates, making, G. H. Benjamin. 472,65 Tire, bicycle, E. G. Dorchester 472,75 Toba coo hanger, D. V. Davis. 472,85 Tools, press for attaching abrasive material to, S. Ross, Jr. 472,85	စိ t
Ink well, H. G. Young Inkstami, fountain, Å. Gaskill Insole, E. H. Noble	472,649 472,703 472,713	Tile, roofing, L. H. Montross. 472.68 Time recorder, watchman's, H. May. 472.68 Tim plates making G. H. Benjamin 472.68	0 8 10 1
Insulator support, D. Doren. Interlocking block for building, paving, etc., C. E. Simpson. Iodine derivates of acetyl paramido-phenetole, I. Sabelvino.	472,529 472,590	Tire, bicycle, E. G. Dorchester	8 6
Iodine derivates of acetyl paramido-phenetole, L. Scholvien	472,828 472,746	Torpedo boat, submergible, J. P. Holland 472,67 Torpedo launching apparatus A. Scheibel 472,55	0
Ironing machine, C. E. Quarnstrom. Jeweler's spring snap, W. C. Edge Joint. See Electric conductor joint.	472,954	Toy, A. Wiggins 472.77 Toy marble shooter, W. W. Rand. 472.07 Toy pistol, R. Frisble 472.57	$\frac{2}{8}$
Joint. See Electric conductor joint. Journal bearing, dust proof, T. A. Edison. Journal box, W. B. Hosford Journal box lifter, E. E. Taylor Viln. Soo Bricklin, Lumbor during kiln	472,752 472,729 472,835	Toy marble shooter, W. W. Rand. 472.67 Toy pistol, R. Frisble. 472.57 Trace connection, elastic, J. N. & I. N. Burke. 472.67 Trammel, S. E. Selleck. 472.87 Trap. See Animal trap. Sporting trap. 472.87	3 9
Kinit See Brick Kini. Lumber drying Kini. Knitted fabrics, device for transferring, H. J. Griswold	472.874		24
Knitted goods and manufacturing the same, H. J. Griswold Knitting machine, straight. W. Coult. Knob. E. J. Forrest.	472 698	Trolley carrier, overhead, W. F. Glenn	5 8
Knob, E. J. Forrest. Knob attachment, C. M. Burgess. Knockdown box, J. J. McDonald. Lamp, electric arc. R. E. Ball.	472,725 472,797 472,747	Tube bending apparatus, J. Donaldson 472,9 Tubular boiler, J. Pierpont 72,66 Typewriting machine. G. C. Blickensderfer.	0
Knock down box, J. J. McDonaud. Lamp, electric arc, R. E. Ball. Lamp, incandescent electric, G. C. Baillard, 472,800 Lamp shade support, T. Hipwell. Lamps, flexible supporting arm for electric, L. T. Stanley Lasting machine, J. T. Avery Latch and lock combined, G. H. Hyde. Lathe, automatic metal boring and turning, L. C. Swisher	, 472,801 . 472,790	Typewriting machine, E. A. Ford 472, 2 to 472,694, 472,62 Typewriting machine, H. H. Unz. 472,634	ii i
Lamps, flexible supporting arm for electric, L. T. Stanley Lasting machine, J. T. Avery	472,611 472,599	Typewriting machine, S. C. Vasaly 572,61 Typewriting machine attachment, G. C. Blickens- derfer 472,636, 472,85	
Latch and lock combined, G. H. Hyde. Lath e, automatic metal boring and turning, I. C. Swisher	. 472,620 . 472,833	derfer 774.88, 472.84 Typewriting machine ribbon, L. Bailey 472.84 Typewriting machines, type cleaner for Holmes & Ralston 472.76	7 (0 (
Leak stopp er or breach plate, F. F. Jones Leather b eading machine, A. J. Schmiedl Letter to x, J. B. Stoner	472,888 472,609 472,560	T. H. Stackhouse	10 10 10 10 10 10 10 10 10 10 10 10 10 1
Swisher Leak stop er or breach plate, F. F. Jones. Leatherb eading machine, A. J. Schmiedl. Letter brow, J. B. Stoner Let te pouch, H. H. Jehnigm m. Lifter. See Journal box lifter. Light. See Electric search light. Lock. See Nut lock. Permutation lock. Lubricator, J. Sandall Lumber drylug kiln, A. T. Bemis. Mail pouch, Edgar & Rohrbach Matrices, means for justifying M. Georgii Measuring and drawing of liguids, app aratus for	. •14,781	Typewriting machines, type cleaning device for, T. H. Stackhouse.	4
Lubricator, J. Sandall Lumber drying kiln, A. T. Bemis	472,827 472,600 472,000	Valve Controller, electro-magnetic, O. E. Linds- Stedt. Valve for hot blast stoves, H. Kennedy 372,6 Valve grar, cut-off T. Lees et al. 373,6 Valve, rotary, M. Rothfuss 372,7 Vaporizer, W. H. Spencer 372,6 Vehicle attachment, J. H. Akin 372,8 Vehicle brake, W. H. Grant 372,6 Vehicle, spring, C. G. Bradley 372,6 Vehicle, spring, C. G. Bradley 372,6 Vehicle spring, C.	100
		Vaporizer, W. H. Spencer. 472.6 Vehicle attachment, J. H. Akin. 472.8 Vehicle brake, W. H. Grant. 472.6	3
34 - a) i - 1 T TT TT!!!	AWO'FOO	Vehicle brake, W. H. Grant. 472,5 Vehicle, spring, C. C. Bradley 472,5 Vehicle spring combing, W. Boughton 472,7 Vehicle wheel, H. Carmont 472,8 Vehicle wheel, H. Carmont 472,8 Vencer machine, W. H. Williams 472,8 Ventilation, etc., device for producing blasts of air for, J. T. Lowe. 472,8 Vetsels, construction of, O. Congelton 472,8 Veterinary parturition hook, E. H. Graves. 472,8 Veterinary parturition book, E. H. Graves. 472,8 Voting booth, J. M. Patton. 472,8 Wash stand and close stool, combination, L. R. Lewing. 472,6	18 14 16
Metal planer, J. S. Detrich. Metal planer, J. S. Detrich. Metal working machines, bed for, J. McKenna Microphone, adjustable, H. O. Henneberg Mill. See Fulling mill. Sawmill. Moulding cutter, R. E. Linham	. 472,806 o 472,679	Velocipede saddle, E. G. Latta. 472,77 Veneer machine, W. H. Williams. 472,87 Ventilation, etc., device for producing blasts of	12
Money changer, W. H. Staats	. 472,719 . 472,879	air for, J. T. Lowe. 472.5. Vessels, construction of, O. Congelton 472.6. Veterinary parturition hook, E. H. Graves. 472.6.	14 18 18
motor, Motor, C. J. Neef	. 472,906 472,754	Vise, bench, M. G. Lewis. 472.5 Voting booth, J. M. Patton. 472.9 Wash stand and close stool, combination, L. R.	7
Mowing machine, O. Cooley	. 472,654 . 472,572 5, 472,852	Lewing 472.6 Washing machine, F.C. Weinman 472.3 Washing machines, waste water gate for, Dwight	37
Nail or spike, W. Taylor Nut fastening device, J. W. Grantland Nut lock, B. Floersheim	. 472,513 . 472,788 . 472,637	& Jepson 472.5 Watch bow fastener, F. Mink 472.7 Water strenlator, P. & H. Bloomsburg 472.9	30 64 15
Oils, safety vessel for, C. J. Ryder. Ore roasting furnace, Bartlett & O'Neill.	472,716 472,910 472,848	Washing mannies, waste water gate 10t, Dwight & Jepson. 472,5 Watch bow fastener, F. Mink. 472,7 Watch sirculator, P. & H. Bloomsburg. 472,9 Water elevator, W. Claypoel. 472,6 Water purifying apparatus, L. S. Lewis. 472,5 Water tube beil er, A. F. Yarrow. 472,7 Weeder, T. L. Davis. 472,7	77 41 77
Motor. See Electric motor. Sewing machine motor. Motor. C. J. Neef. Motor. C. J. Neef. Mower, G. A., Farrall Mowling machine, O. Cooley. Muscle roller, W. E. Forest Nail machine, C. E. Houghton. 472,604, 472,607 Nail or spike, W. Taylor. Nut fastening device, J. W. Grantland. Nut lock, E. M. Hill. Oils, safety vessel for, C. J. Ryder. Ore rosating furnace, Bartlett & O'Neill. Ore screening apparatus, T. A. Edison. Organ, reed, J. B. Hamilton. Pan. See Baking past. Pegging machine, J. ityslore, Jr. Pendulum, compensation, E. R. Malmborg. Penmanship guide, J. Estillin.	472,789	Weeder, T. L. Davis. 172,7 Weig hing liquors, apparatus for, E. Y. Gordon 172,5 Wheel. See Barrow wheel. Car wheel. Fifth wheel. Gear wheel. Vehicle wheel. Wind	35
Pendulum, compensation, E. R. Malmborg Penmanship guide, J. Earle. Permutation lock. E. Feret.	472,624 472,751 472,858	wheel. wheels wheel wheel wheel wheel wheel wheels, manufacture of metal, J. R. Lattle. 472,8 Wheels on boing, L. C. Strong. 472,6 Whiffletree, S. E. Burke. 472,6	
Phonograph, J. L. Skillin	. 472,684	Whiffletree, S. E. Burke	53 i

<u> </u>		
Whip, H. S. Cushman	472,869 472,543 472,946 472,760 472,564 472,564 472,569 472,818 472,818 472,757 472,758 472,758	
TRADE MARKS.		
Antiseptics, J. M. Stevens	f ·	
host and shoos Dies & Untobing	00 000	

Boots and shoes and leather for the uppers of boot and shoes, Rice & Hutchins	20,962	
Confectio s and candies, Pan Confection Com-	20,966	
Creamers, centrifugal, Aktiebolaget Separator,	20,957	i
Edge tools a d cutlery of all kinds, McKnight &	•	
Extracts for foods, flavoring, M. J. Chryst	20,976	
Food for horses and cattle, prepared, Charles Mar- vin Stock Food Company	20,973	
liats, Cook, Lyman & Seixas Kidney and liver cure, blood purifier, pills, and	20,972	
Leather for the uppers of boots and shoes and for	20,977	
boots and shoes, Allen, Field & Lawrence Oil used as a remedy for rheumatism or pains in	·	
Paper for printing and writing purposes, J. B. Watkins	i	
Plows, Deere & Company	20,969 20,974 20,954	
Shellac, substitute for, Burbank & Ryder	20,960	ı
Taristan, lace net, and all other cotton dress	20,96	
goods, M. Landesmann. Tin and other metal plates, Phelps, Dodge & Co	20,975 20,956	
Whisky, A. Dryfoos & Co	20,961	

DESIGNS

4(2,0(2	DEDIGINA.
472,642	Comb case, T. J. Whitney
472,591	Dress, dancing, M. L. Fuller
472,652	Glassware, ornamentation of, W. A. Wood 21,466
472,626	Inquilaton handrot C Wint
472,891	Jar F. K. Ward
specific	Jar, F. K. Ward 21,493 Jar stopper, F. K. Ward 21,485
lry, Pape	Spoon, L. R. Horton 21,461
472,682	: SDOOD S R M Vers. 91 469
et, G. W.	Spoon, D. Southworth. 21,463
472,567	Spoon, etc., C. C. Adams 21,460
472,918	TODDITE CAD. M. J. JOHNSON 91 450
use with	
472,779	Vehicle body, W. B. Griffin 21 453
472,928	
472,782	
11 472,748	
472,633	SDV natent in the foregoing list depart potent in solve i
472,846	issued since 1863, will be furnished from this office for
472,711	25 cents. In ordering please state the name and number
472,551	of the patent desired, and remit to Munn & Co., 361
472,661	Rroadway New York
472,660	1
472,666	Canadian patents may now be obtained by the in-
474,982	ventors for any of the inventions named in the fore-
A79 710	rections like a manufacture has a second to the second to

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72.573

#72

inside Page, each insertion - - 75 cents a line

472.616
472.751
The above are charges per agate line—about eight words per line. This notice shows the width of the line.
472.813
472.755
472.755
472.753
472.753
472.753
472.753
472.753
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472.754
472

ADAMANT WALL PLASTER

BEST PLASTERING MATERIAL KNOWN. No experiment. Its success has been plenomenal. Thirty factories in this and other countries. ADAMANT MFG. CO., SYRACUSE, N. Y.

Patent Foot Power Machinery

Complete Outfits.

Wood or Metal workers without steam power. can successfully compete with the large shops. by using our New LABIJK SAYING Machinery, latest and most improved for practical shop use, also for Industrial Schools, Home Training, etc. Catalogue free.

Seneca Falls Mig. Co.
685 Water Street, Seneca Falls, N. Y.



FOR SALE or TO RENT

The premises formerly occupied by The Stiles & Parker PressCo., Middletown. Conn., comprising Machine Shop. Blacksmith Shop and Foundry, supplied with new 10th horse power boiler, engines, traveling crane, blower and main lines of shafting. Everything in first-class order. Photographs a d plans furnished o application.

E. W. BLISS CO., LIMITED, 17 Adam Street, Brooklyn, N. Y.

vice for, 472,720
472,655
472,675
472,676
472,676
472,676
472,676
472,676
472,677
472,074
472,074
472,074
472,074
472,074
472,074
472,074
472,074
472,074
472,074
472,074
472,074
472,074
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,075
472,



E. Konigslow, manufacturer of Fine Machinery and Modela, offers Special Facilities to Inventors. Guarantees to work out ideas in strictest secrecy, and any improvement that he can suggest goes with the work. Thousands of men have crude though really valuable ideas, which they lack mechanical training to develop. Novelties and patented articles manufactured by contract, 181 Seneca St., Cleveland. Ohio.

The Sebastian-May Co. Improved Screw Cutting

Foot & LATHES

Drill Presses, Chucks, Drills, Dogs, and Machinists' and Amateurs' Outfits. Lathes on triat. Catalogues mailed on application. 165 to 167 Highland Ave. SIDNEY, OHIO.



T. A. C. MARCH 1st to OCTOBER 1st. Sales of a patented specialty over two millions. Manufactured on royalty. Inventors, write us.

THE TUSCARORA ADVERTISING CO., COSHOCTON, O.

COSHOCTON, O.

FOR LEASE—THE MIDDLEBROOK GRANITE quarries, at Middlebrook, Mo., operated for the past 10 years by the Syenite Granite Co., of this State, will be leased for ten years from June 10th, 182. They are the largest and linest quarries in the West, containing the well-known red granite so extensively used in many of the finest buildings, monuments, bridges, etc., in the country, Scaled proposals will be received and opened at noon, on June 1st next, for a ten year lease of the property. This Company reserves the right to reject any and all bids. You are cordially invited to inspect the property.

IRON MOUNTAIN CO., Gay Building, St. Louis, Mo.

Improved Screw Cutting Foot and Power.

Drill Presses, Shapers, Band, Circular, and Scroll Saws.
Machinists' Tools and Supplies. Lathes on trial.

Catalogue mailed on application. SEBASTIAN LATHE COMPANY, 44-46 Central Ave., Cincinnati, O.



SCIENTIFIC AMERICAN SUPPLE-MENT. Any desired back number of the SCIENTIFIC AMERICAN SUPPLEMENT can be bad at this office for 10 cents. Also to be had of newsdealers in all parts of the country.





THE GIBBS PATENT DUST PROTECTOR. DUST PROTECTOR.
For protecting the nose and mouth from inhalations of dust of every c aracter. Invaluable in mills and factories. Perfect protection with perfect ventilation. Dust inhaled into the nose and lungs results in Catarrh and Consumption. Nickel plated protectorsent postpaid on receipt of \$1.

Gibbs Respirator Co...

Gibbs Respirator Co., 36 S. La Salle St., Chicago.

Best small power is the world.
One and Two Horse Power, specially adapted for ramning Printing Presses, Sewing Machines, Lathes, Ventilating Pass, ice Gream Machines, etc., and P. F. OLDS & SON, 218 filver St., Lausing, Mich.

Pneumatic Tire Bicycles.

Every One Guaranteed.
Sendfor Catalogue. Wanted.
KIRKWOOD, Miller & Co.
16 South St., Peorla, III.



The 1892 Model



of the

Remington **Typewriter** is now on the market.

SEND FOR CATALOGUE.

Wyckoff, Seamans & Benedict, 327 Broadway, New York.

BEATTY Pianos, \$175, Organa, \$48. Want Agents. Cat's free. Da T.F. Beatty, Wash'ton, N.J.

ELLULOID ZAPON CO CELLULOID LACQUERS

41 BARCLAY ST. NEW YORK. AND VARNISHES FOR METALAND WOOD

41 BUR LACOUERS - BRILLIANT AND DEAD BLACKS - SHELLACS &C.

NEW AND VALUABLE BOOKS

METAL WORKERS.

not to be found in any other way.

BRANNT.—The Metallic Alloys. A Practical Guide for the Manufacture of all kinds of Alloys, Amalgams, and Solders used by Metal Workers, together with their Chemical and Physical Properties, and their Application in the Arts and Industries; with an Appendix on the Coloring of Alloys. Translated and edited, chiefly from the German of A. Krupp and Andreas Wildberger, with extensive additions, by William T. Brannt, one of the editors of "Techno-Chemical Receipt Book," etc.

Illustrated by 16 engravings. 12mo, 423 pages. Proceedings of the editors of the

The above or any of our Books sent by mail, free of ostage, at the publication price, to any address in the world. CF Circulars, giving the full Tables of Contents of all of the above books, will be sent free of postage to any one in any part of the world who will furnish his address.

Der New and EnlargedCatalogue of Practical and Scientific Books, 88 pages, 800, and our other Catalogues, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish us with his address.

HENRY CAREY BAIRD & CO., INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS

810 Walnut St., Philadelphia, Pa., U. S. A.

Roper's Engineers' Handy-Book.

EDWARD MEEKS, Publisher, No. 1012 Walnut St., - · Philadelphia, Pa.

PROPOSALS.

U. S. ENGINEER OFFICE, ARMY BUILDING, NEW York, March 18, 1892.—Sealed proposals, in triplicate, will be received at this office until 12 o'c lock noon, on April 20, 1892, for supplying all necessary materials and erecting a frame dwelling house upon the U. S. Reservation at Sandy Hook, N. J., at a cost not exceeding \$4,500. The attention of bidders is invited to Acts of Congress, approved February 26, 1885, and February 23, 1887, vol. 23, page 332, and vol. 24, page 414, Statutes at Large. For specifications, blank forms, and all information, apply to the undersigned. G. L. GILLESPIE, Lieut.-Col. of Engineers.





Van Duzen's Pat. Loose Pulley Oller Highest Indorsements, Envisible Reputation, Scientific Pedigree. A two years' test by conservative manufacturers of national reputation has shown it to be the only perfect Lubricator for Loose Pulleys in use. Prices very reasonable. Send for our "Catalogue Number 55."

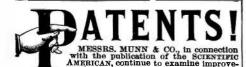
VAN DUZEN & TIFT, Cincinnati, O

Machinists' Tools of every description, drop forged from bar steel, correct in design and unequaled in finish. THE BILLINGS & SPENCER COMPANY, HARTFORD, CONN.

TRIAL A voided by using "Goldman's Advanced System" for Locating Errors without Bechecking or Copying Entries.

RALANCE Nochangeof Bookkeeping! Senton Trial.

TRIAL Stronger Internations! Request Instructive Circular. Henry Goldman, Author and Inventor, Major Block, Ch. cago.



MESSRS. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN, continue to examine improvements, and to act as Solicitors of Patents for Inventors.

In this line of business they have had forty-five years' experience, and now have unequaled facilities for the preparation of Patent Drawings, Specifications, and the prosecution of Applications for Patents in the United States, Canada, and Foreign Countries. Messrs. Munn & Co. also attend to the preparation of Caweats, Copyrights for Books, Labels, Reissues, Assignments, and Reports on Infringements of Patents. All business intrusted to them is done with special care and promptness, on very reasonable terms.

A pamphlet sent free of charge, on application, containing full information about Patents and how to procure them; directions concerning Labels, Copyrights, Designs, Patents, Appeals, Reissues, Infringements, Assignments, Rejected Cases. Hints on the sale of Patents, etc.

We also send, free of charge, a Synopsis of Foreign Pasent Laws, showing the cost and method foreign Pasent

nts, etc.

also send, free of charge, a Synopsis of Foreign Pa,
Laws, showing the cost and method of securing
nts in all the principal countries of the world:

MUNN & CO., Solicitors of Patents, 361 Broadway, New York BRANCH OFFICES.—No. 622 and 624 F Street, Pa-ine Building, mear 7th Street, Washington, D. C.



T. H. CHUBB ROD CO., Post Mills, Vt. "Scientific American."

RELEGIES OF YOU NOTHING.
Send us your address on a postal and you will receive the finest catalogue of PIANOS and ORGANS show you how to SAVE \$100.

Satisfaction guaranteed before you pay. Cut This Our and mail it to us. You will be surprised at the result. But you must do it NOW. Write to Send us your address on a postal and you will receive the finest catalogue of PIANOS and ORGANS in the world. It will PIANOS and ORGANS show you how to SAVE \$100. It to us. You will be surprised at the result. But you must do it NOW. Write to CORNISH & CO. (Established) WASHINGTON, New Jersey.



33,000 SOLD.

GAS AND GASOLINE ENGINES,

1-3to100 horsepower Can be used in cities or in country inde-pendent of gas works or gas machines. No Boiler. No Danger. No Engineer.

OTTO GAS ENGINE WORKS, PHILADELPHIA.



OIL WELL SUPPLY CO. 91 & 92 WATER STREET,

Pittshurgh, Pa., Manufacturers of everything needed for ARTESIAN WELLS for either Gas, Oil, Water, or Mineral Tests, Boilers, Engines, Pipe, Cordage, Drilling Tools, etc. Illustrated catalogue, price lists and discount sheets on request.

PHE PENNA. DIAMOND DRILL & MFG. CO. BIRDSBORO. PA., Builders of High Class Steam Engines, Diamond Drills, Power and Hand Cranes, and General Machinery.

STEEL TYPE FOR TYPEWRITERS



Stencils, Steel Stamps, Rubber and Metal Type Wheels, Dies, etc.

Model and Experimental Work Small Machinery, Novelties, etc., manufactured by special contract.

New York Stencil Wks. 100 Nassau St., N.Y.

"OTTO" | GATES ROCK & ORE BREAKER

Capacity up to 200 tons per hour. Has produced more ballast, road metal, and broken more ore than all other Breake s combined.
Builders of High Grade Mining Mach inery. Send for Catalogues.
CATES IRON WORKS,
50 C So. Clinton St., Chicago
128 C, Liberty Street, New York,
237 C, Franklin St., Boston, Mass

CHUCKS. Catalogue No. 12, just issued with over 40 new illustrations sentfree. Address, The Cushman Chuck Co., Hartford, Conn.

HOME MADE INCUBATOR.—BY Susie P. Summey. Description and illustrations of an easily constructed incubator that can be operated successfully the first time, the proper care being given. With 6 figures. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NO. 835. Price licents. To be had at this office and from all newsdealers.



Our new General Circular "S. A.," showing specimens of all our work, is now ready. Send stamp and particulars for estimates.

PURE TEMPERED COPPER THE SAFEST, MOST DURABLE & ECONOMICAL METAL EVER OFFERED FOR VA-



After being on the Market Six Years

Sizes One, Two, Three, and Four Horse Power. Arranged for either NATURAL GAS or Kerosene Oil fire, as ordered. No extra insurance required on account of the oil fire. Send for catalogue giving full particulars and prices.

Asme Automatic Safety On ROCHESTER MACHINE TOOL WORKS. Brown's Race, ROCHESTER, N. Y.

DON'T COMPLAIN

Of hard times when you can make \$5.00 to \$10.00 per day. Send 2 cent stamp for particulars. Nowotny Electric Co., Mfrs. of Electrical Novelties, CINCINNATI, OHIO.

DEAF NESS & HEAD NOISES CURED by Peck's Invisible Tubular Ear Cushions. Whispers heard, Successful when all remedies fall, SoldFREE only by F. Hisson, 848 B'way, N.T. Write for book of proofs FREE

VOLNEY W. MASON & CO., FRICTION PULLEYS CLUTCHES and ELEVATORS PROVIDENCE. R. I.

WANTED for Gray Iron and Malleable Foundries, rience in making Agricultural Castings. WALTER A. WOOD HARVESTER Co., St. Paul, Minn.

BARNES New Friction Disk Drill.

FOR LIGHT WORK.

Has these Great Advantages:
The speed can be instantly changed from to 1600 without stopping or shifting belts. Power applied can be graduated to drive, with equal safety, the smallest or largest of 1 s w thin its range—a wonderful economy in time and great saving in drill breakage. Send for cata ogue.

W. F. & INO. BARNES CO.,
1999 Ruby St., — Rockford, III,

H. CHANNON COMPANY, **Contractors' Supplies**

WIRE ROPE, MANILLA ROPE-Iron and Wooden Tackle Blocks, Etc., Hoisting Engines and Hand Powers.

24-26 Market St., CHICAGO, ILL

CLARK'S

WOOL WASHERS,
WARP DYEING AND SIZING MACHINES,
PATENT RUBBER COVERED SQUEEZE
ROLLS, POWER WRINGERS FOR HOSIERY AND YARN DYEING,

DRYING AND VENTILATING FANS, WOOL AND COTTON DRYERS, Etc. GEO. P. CLARK

Windsor Locks, Conn

THE BEST LIME KILN known, or no pay. C. D. PAGE, Rochester, N. Y.





\$10.00 to \$50.00 per night. A light and proness. Magic Lanterns and Views of popular subjects. Catalogues on application. Part 1 Optical, 2 Mathematical, 3 Marte, prological, 4 Maric Lanterns, etc. L. MANASSE, SS Madison Street, Chicago, Ill.



Figures any and all hinds of examples. Operated by keys. Saves 60 per cent of time. Insures accuracy, and relieves all et one? Send for circular.

FELT & TARRANT MFG. CO. 52-56 Illinois St. Chicago



- HARRISON CONVEYOR!

Handling Grain, Coal, Sand, Clay, Tan Birk, Cinders, Ores, Seeds, &c. Send for BORDEN, SELLECK & CO., Sole Sole Circulars, Chicago, Ill.

ELECTRIC POWER APPARATUS,

FOR EVERY VARIETY OF MECHANICAL WORK.

SAFE, ESTIMATES FURNISHED.

SURE,

RELIABLE. SEND FOR CATALOGUES.

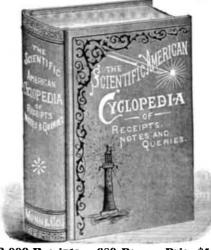
THOMSON-HOUSTON MOTOR CO., 620 ATLANTIC AVENUE BOSTON, MASS

WINANS ANTI INGRUSTATION POWDER OR BOLLER COMPOUND FOR REMOVING SCALE IN BOLLERS. SAVE ITS SOUTH FULL AND REPARING PEERLESS VALVE ROB PACKING. MAGNO LAND TRICTION AND PACKING. MAGNO LAND TRICTION TALL. STMARYS ELECTRIC DAMPER REGULATOR. J.C.WINANS 220 FREMONT ST. SAN FRANCISCO, CAL..

Water will run from it pure and clean. It covers double the surface of any other paint, and ill last four or five time elonger. Equally useful for any iron work. Send for circulars. Jos. Dixon Crucible Co., Jersey City, N.J.

WOOD WORKING MACHINERY For Veneer, Fruit Package and Barrel Works. Handle, Spoke and Tunning Factories. L. E. Merritt Machinery ('o., Lockport, N. Y.

NOW READY! A NEW AND VALUABLE BOOK.



12.000 Receipts. 680 Pages. Price \$5.

This splendid work contains a careful compilation of the most useful Receipts and Heplies given in the Notes and Queries of correspondents as published in the Scientific American during the past fifty years; together with many valuable and important additions.

Over Twelve Thousand selected receipts are here collected; nearly every branch of the useful arts being represented. It is by far the most comprehensive volume of the kind ever placed before the public.

The work may be regarded as the product of the studies and practical experience of the ablest chemists and workers in all parts of the world; the information given being of the highest value, arranged and condensed in concise form convenient for ready use.

ists and workers in all parts of the world; the information given being of the highest value, arranged and condensed in concise form convenient for ready use.

Almost every inquiry that can be thought of, relating to formulæ used in the various manufacturing industries, will here be found answered.

Instructions for working many different processes in the arts are given.

It is impossible within the limits of a prospectus to give more than an outline of a few features of so extensive a work.

Under the head of Paper we have nearly 250 receipts, embracing how to make papier maché; how to make paper water proof and fire proof; how to make sandpaper, emery paper, tracing paper, transfer paper, carbon paper, parchment paper, colored papers, razor strop paper, paper for doing up cutlery, silverware; how to make luminous paper, photograph papers, etc.

Under the head of Inks we have nearly 450 receipts, including the finest and best writing inks of all colors, drawing inks, luminous inks, invisible inks, gold, silver and bronze inks, white inks; directions for removal of inks; restoration of faded inks, etc.

Under the head of Alloys over 700 receipts are given, covering a vast amount of valuable information.

Of Cements we have some 600 receipts, which include almost every known adhesive preparation, and the modes of use.

How to make Rubber Stamps forms the subject of a most valuable practical article, in which the complete process is described in such clear and explicit terms that any intelligent person may readily learn the art.

For Lacquers there are 120 receipts; Electro-Metallurgy, 125 receipts; Pronzing, 127 receipts; Photography and Microscopy are represented by 600 receipts.

Under the head of Cleansing over 500 recipes are given, the scope being very broad, embracing the removal of spots and stains from all sorts of objects and materials, bleaching of fabrics, cleaning furniture, clothing, glass, leather, metals, and the restoration and preservation of all kinds of objects and materials.

Those who are en

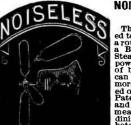
are given.

Soaps have nearly 300 receipts.

Those who are engaged in any branch of industry probably will find in this book much that is of practical value in their respective callings.

Those who are in search of independent business or employment, relating to the home manufacture of sample articles, will find in it hundreds of most excellent suggestions.

MUNN & CO., Publishers, SCIENTIFIC AMERICAN OFFICE, 361 Broadway, New York,



NOISELESS ROTARY FANS.

These fans can be fastened to ceiling, and driven by a round belt directly from a Backus Water Motor, Steam Engine, or other power. By changing angle of blades amount of air can be regulated. Two or more fans can be connected on ceiling. The Backus Patent Fans are noiseless, and found invaluable in meatmarkets, restaurants, dining rooms, bakeries, ROTARY FANS
dining rooms, bakeries, botels, etc. They will keep your place cool and free from files. Write for special circular to

Backus Water Motor Co., Newark, N. J., U.S.A.

Mdvertisements.

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.



A. G. SPALDING & BROS., Special Agents.

THOROUGHY RELEASE AND PHILS STANDARD
END FOR PANISH ETC. BAIN ELECTRIC MANUFACTURING CO.

MAHOGANY

And all Fancy Woods. VENEERS, TEAKWOOD FOR YACHTS, etc. THE E. D. ALBRO CO.,

Enstern 200 Lewis Street, New York, U. S. A. Branch, H. T. BARTLETT, Mg'r. F. W. HONERKAMP, Ass't Mg'r.

Sprague, Duncan & Hutchinson,

FRANK J. SPRAGUE, LOUIS DUNCAN, Ph.D., ALFRED BISHOP MASON, CARY T. HUTCHINSON, Ph.D.

Consulting Electrical Engineers.

15 WALL STREET, **NEW YORK.**

DOUSEEK POWER?



Motor of the 19th Century A to 70 horse power.
Cost about one cent an hour to each indicated horse power.
"In worth, not size, my value lies."
Whatothers think of me is stated in catalogue.

in catalogue.
CHARTER GAS ENGINE CO.
P. O.Box148, Sterling, III.





A PRETTY BOLD ASSERTION, posures; glass plate attachments; daylight

LUNKENHEIMER'S CHECK VALVE loading, etc., etc. Send for catalogue.

Is the only reliable valve in the market.
A trial will prove this.
Supplied by dealers everywhere.

THE LUNKENHEIMER BRASS MFG. CO.,

Cincinnati, O., U. S. A.,

Sole Manufacturers.

We have a catalogue of specialties of interest to stead

Geers. Mention the Scientific American and get one.

95 MILK ST., BOSTON, MASS.

This Company owns the Letters Patent granted to Alexander Graham Bell, March 7th, 1876, No. 174,465, and January 30th, 1877. No. 186,787.

The transmission of Speech by all known forms of Electric Speaking Telephones infringes the right secured to this Company by the above patents, and renders each individual user of telephones not furnished by it or its licensees responsible for such unlawful use, and all the consequences thereof, and liable to suit therefor.

LOVELL DIAMOND CYCLES SERVER ELEVATORS



\$85 Pneumatic, Cushion and Solid Tires. \$85 Diamond Frame. Steel Drop Forgings, Steel Tubing, Adjustable Ball Bearings to all Running Parts, including Pedals, Suspension Saddle, Finest Material money can buy, Finished in Enamel and Nickel. STRICTLY HIGH GRADE IN EYERY PARTICULAR. NO BETTER MACHINE MADE AT ANY PRICE.

Bicycle Catalogue Free. Send six cents in stemps for our 100-page illustrated catalogue of Guns, Rifess, Revolvers, Sporting Goods of all kinds, etc.

JOHN P. LOVELL ARMS CO.



"Improvement the order of the age."

VAN DUZEN'S Steam PUMP PUMPS ANY KIND OF LIQUID.
Does not clog, freeze or get out of order.
Always ready. All brass. Every Pump
Guaranteed. In sizes. Capacity
100 to 10,000 gallons per
hour. Prices \$7 and upwards.
For full information write to The VAN DUZEN &TIFT CO. (PUMP DEPARTMENT) CINCINNATI. O.

PELTON WATER MOTOR.

The Pelton Water Wheel Co.,

ELECTRO VAPOR ENGINE. GAS OR GASOLINE FOR FUEL.

NO BUILER. NO FIRE. NO DANGER. NO ENGINEER.



Engine operated by spark from small battery. You rurn the Switch,
Engine does the rest.
Regan Vapor Stationary
Engines, 1 to 12 H. P.
Regan Vapor Pumping Engines, 350 to 10,000 galions capacity.

-MANUFACTURED BY-THOMAS KANE & CO.,

CHICAGO, ILL. Send stamp for catalogue " V.

THE SMITH PREMIER TYPEWRITER



Important Improvements.

All the Essential Features greatly perfected.

The Most Durable in Alignment.

Easiest Running and Most Silent.

All type cleaned in I0 seconds without soiling the hands.

The Smith Premier Typewriter Co., Syracuse, N. Y., U.S.A.

Send for Catalogue.

FIRE HAZARDS FROM ELECTRICI ty.—A lecture by C. J. Woodbury, delivered in the S ley College Course. Contained in SCIENTIFIC AM-ICAN SUPPLEMENT, NO. S30. Price 10 cents. To had at this office and from all newsdealers.

Boiler Coverings, Millboard, Roofing, Building Felt, Liquid Paints, Etc. PESCRIPTIVE PRICE LIST AND SAMPLES SENT FREE,

H. W. JOHNS MFG. CO., 87 Malden Lane, N.Y.



We Build Everything, from a Canoe to a Steam Yacht.

Complete Stock Oars, Sweeps and B at Trimmings.

We Make all Sizes Pipe Bollers and Engines

Cedar Row Boats from \$25 upward. Vapor and Steam Launches from \$300 upward.

SEND 100. FOR COMPLETE CATALOGUE.

DAVIS BOAT AND OAR CO., DETROIT, MICH., U. S. A.



WELLER MFG. CO., 116 North Avenue, CHICAGO. Our Specialties: Steel Conveyors, Steel Buckets, Elevator Boots, Flexible Spouts, Turn Heads, Hopper Bottoms, Power Shovels, Car Pullers, Belt Conveyors, Friction Citches, Pulleys, Shafting, etc. Send us a list of what you want, get our prices, we do the rest.



ARTESIAN Wells, Oil and Gas Wells, drilled by contract to any depth, from 50 to 300 feet. We also manufacture and furnish everything required to drill and complete same. Portable Horse Power and Mounted Steam Drilling Machines for 100 to 1,000 feet. Write us stating exactly what is required and send for illustrated catalogue. Address ed catalogue. Address & Oil Well Supply Co., 80 Beaver Street, New York.

COMPOUND LOCOMOTIVES.—BY C.

Regular Junior Folding Daylight Ordinary

I4 styles and sizes for the season of 1892, \$6.00 to \$65.00.

Latest improvements, registers for ex-

THE EASTMAN COMPANY,



EPERFECT CRUDE OIL BURNER BEST REGULATION. — HIGHEST ECONOMY FOR ALL PURPOSES MANUFACTURED IN SIX SIZES BY SHIPMAN ENGINE MANEG GO



POPE MFG. CO., 221 Columbus Ave., Boston.



BRISTOLE RECORDING PRESSURE GAUGE

Makes a continuous record, day and night, of Steam, Water, Gas, Air, and Liquid Pressure. Will pay for itself by Insuring Safety and Economy in the opera-Sately and second, it is to operate in the construction, accurate in operation, and low in price. I'm Send for arreader and facsimile chart. The Bristol's Mig. Co., Waterbury, Conn.



EDISON GENERAL **ELECTRIC**

INCANDESCENT AND ARC LIGHT PLANTS. Stationary and Railway Motors.—Lamps.—Cables.—Safety Devices.

DISTRICT OFFICES.

PATENT JACKET KETTLES 🦪

Plain or Porcelain Lined.
Tested to 100 lb. pressure. Send for Lists.
BARROWS-SAVERY CO.,
S. Front & Reed Streets, Philadelphia. Pa.



BALL AUTOMATIC
MADE ONLY CUT OFF ENGINE
THE BALL ENGINE CO

Cushion Tires, Tangent Spokes
With Pneumatic Tires, \$120
Also \$1.55 and \$1.59 patterns.

"Lady's pattern...\$100
Boy's New Mail...\$0
Hand somest and best Diamond
Safety. Send for Ontaleque
and Second-Hand List.

Also Sole New England Agents for LITTLE

GIANT PRICE, \$35.00. Only Boy's Safety with a Spring Fork, preventing injury to young riders from jar and vibration.

WM. READ & SONS, 107 Washington St. BOSTON, MASS.

THE



ESTABLISHED 1846. The Most Popular Scientific Paper in the World

Only \$3.00 a Year, Including Postage. Weekly-52 Numbers a Year.

This widely circulated and splendidly illustrated paper is published weekly. Every number contains six-teen pages of useful information and a large number of original engravings of new inventions and discoveries, representing Engineering Works, Steam Machinery, New Inventions, Novelties in Mechanics, Manufactures, Chemistry, Electricity, Telegraphy, Photography, Architecture, Agriculture, Horticulture, Natural History, etc. Complete list of patents each week.

Terms of Subscription.—One copy of the Sciences.

TIFIC AMERICAN will be sent for one year-52 numberspostage prepaid, to any subscriber in the United States Canada, or Mexico, on receipt of three dollars by the

publishers; six months, \$1.50; three months, \$1.00. Clubs.—Special rates for several names, and to Post Masters. Write for particulars.

The safest way to remit is by Postal Order, Draft, or Express Money Order. Money carefully placed inside of envelopes, securely sealed, and correctly addressed, seldom goes astray, but is at the sender's risk. Address all letters and make all orders, drafts, etc., payable to

MUNN & CO., 361 Broadway, New York.

THE

Scientific American Supplement

This is a separate and distinct publication from THE SCIENTIFIC AMERICAN, but is uniform therewith in size, every number containing sixteen large pages full of engravings, many of which are taken from foreign papers and accompanied with translated descriptions. THE and accompanied with translated descriptions. SCIENTIFIC AMERICAN SUPPLEMENT is published weekly, and includes a very wide range of contents. It presents the most recent papers by eminent writers in all the principal departments of Science and the Useful Arts, embracing Biology, Geology, Mineralogy, Natural History, Geography, Archæology, Astronomy Chemistry, Electricity, Light, Heat, Mechanical Engineering, Steam and Railway Engineering, Mining, Ship Building, Marine Engineering, Photography, Technology, Manufacturing Industries, Sanitary Engineering, Agriculture, Horticulture, Domestic Economy, Biography, Medicine, etc. A vast amount of fresh and valuable information obtainable in no other publication.

The most important Engineering Works, Mechanisms,

and Manufactures at home and abroad are illustrated and described in the SUPPLEMENT.

Price for the SUPPLEMENT for the United States and Canada, \$5.00 a year; or one copy of the SCIENTIFIC AMERICAN and one copy of the SUPPLEMENT, both mailed for one year for \$7.00. Single copies, 10 cents. Address and emit by postal order, express money order, or check,
MUNN & CO., 361 Broadway, New York,

Publishers SCIENTIFIC AMERICAN

Building Edition.

BUILDERS' EDITION is issued monthly. \$2.50 a year. Single copies, 25 cents. Forty large quarto pages, equal to about two hundred ordinary book pages; forming a large and splendid Magazine of Archi ecture, richly adorned with elegant plates in colors, and with other fine engravings: illustrating the most interesting examples of modern architectural construction and allied subjects. A special feature is the presentation in each number

of a variety of the latest and best plans for private residences, city and country, including those of very moderate cost as well as the more expensive. Drawings in perspective and in color are given, together with full Plans, Specifications, Sheets of Details, Estimates, etc.

The elegance and cheanness of this magnificent work have won for it the Largest Circulation of any Architectural publication in the world. Sold by all newsdealers. \$2.50 a year. Remit to

MUNN & CO., Publishers,

361 Broadway, New York.



PRINTING