

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 next issue.

The demand for the Sturtevant mill for grinding ores, phosphate rock, cement, etc., is steadily increasing and the merits of this wonderful machine universally acknowledged wherever used. Among those recently adopting same may be mentioned the Richmond Chemical Co. phosphate rock, Croton Magnetic Iron Mines, magnetic iron ore, S. P. Wetberrill & Co. barytes, and Southern Pavement Co. lime stone. Address for full particulars and testimonials Sturtevant Mill Co., 88 Mason Building, Boston, Mass.

Flour emery a specialty. New process. No dust. All grit. The Tanite Co., Stroudsburg, Pa.

Billings' Drop Forged Lathe Dogs, 12 sizes— $\frac{3}{8}$ to 4 inches. Billings & Spencer Co., Hartford, Conn.

Best Ice and Refrigerating Machines made by David Boyle, Chicago, Ill. 155 machines in satisfactory use.

The Improved Hydraulic Jacks, Pumps, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Wanted—A small power vacuum pump. Must be in good condition. A. Werner & Co., 52 Warren St., N. Y.

Power presses and dies. Also contractors for special machinery. T. R. & W. J. Baxendale, Rochester, N. Y.

Screw machines, milling machines, and drill presses. The Garvin Mach. Co., Laight and Canal Sts., New York.

Tight and Slack Barrel Machinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus. adv., p. 301.

Manufacturers of appliances to ventilate rooms in which there are no flues will please send description to Wm. Jennings, Harrisburg, Pa.

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

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

Sheet Rubber Packing, 1-16, 3-32, $\frac{1}{8}$, $\frac{3}{16}$, and $\frac{1}{4}$ inch thick, 7½ cent. per pound. All kinds of rubber goods at low prices. John W. Buckley, 156 South St., New York.

English tanned walrus, hippopotamus, giraffe, elephant and buffalo leather for polishing machines. All kinds mfrs. supplies. Greene, Tweed & Co., 83 Chambers St., N. Y.

For the original Bogardus Universal Eccentric Mill, Foot and Power Presses, Drills, Shears, etc., address J. S. & G. F. Simpson, 26 to 36 Rodney St., Brooklyn, N. Y.

Magic Lanterns and Stereopticons of all prices. Views illustrating every subject for public exhibitions, etc. A profitable business for a man with small capital. Also lanterns for home amusement. 205 page catalogue free. McAllister, Optician, 43 Na-sau St., N. Y.

An experienced business man and engineer, experienced in steam and electrical matters and an expert in general mechanics, is open for an engagement as manager of the New York business of some manufacturing concern. My age is forty-two. Salary expected fair. Address Mr. Wood, care Scientific American office.

For Sale—New and second hand iron-working machinery. Prompt delivery. W. P. Davis, Rochester, N. Y. Acme engine, 1 to 5 H. P. See adv. next issue.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J. Send for new and complete catalogue of Scientific and other Books for sale by Munn & Co., 361 Broadway, New York. Free on application.

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

References to former articles or answers should give date of paper and page or number of question. Inquiries not answered 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.

(2570) F. J. McV. asks: Will you please inform me what kind of a paste or cement I can use to fasten a strip of wood to glass and brass? A. Melt together equal parts of common pitch or Burgundy pitch and gutta serena.

(2571) J. H. H. asks: What is the ratio of the increase in rapidity of vibration of the strings of a piano forte in the ascending scale for one octave? That is, a piano string, in sounding a particular note, vibrates so many times per second, the string that sounds the tone above vibrates a certain degree faster, and so on. Can you say what the ratio of the increase is for each note of the eight components of an octave? A. The vibrations of musical notes are arranged under two systems, the harmonic scale as fixed by the congress of Stuttgart and the tempered geometric scale. In the Stuttgart scale C below the treble clef has 264 vibrations; E, 330, with intervals for each half tone of 16½ vibrations; A has 440 vibrations, with intervals of 22 for each half tone from E. C in the clef has 528 vibrations, with intervals of 27½ between A, A sharp and A B; while from B to C is 33 vibrations difference. The geometrical system has the same octave vibrations of C as in the harmonic, but with a geometrical ratio of increase for each semitone, which ratio has a variable. It is too complex for full explanation here. You will find the whole tabulated in full for 8 octaves in Nystrom's Mechanics, \$3.50 mailed.

(2572) W. H. B. asks: What is the precise nature of the work of a mechanical engineer? Is it work that could be performed by a man who has had only shop experience and a general education, but no technical education? Does mechanical engineering or civil engineering offer the better chance for position and

advancement? A. Designing is the principal forte of the mechanical engineer. This requires a technical education in the principles of mechanics, ability as a draughtsman and experience as a guide. With all these he has a fair start for success in a business way. Shop experience is one of the necessities. The other essentials are matters of study and aptitude within the power of the aspirant for mechanical fame. The civil engineer requires a higher education and a more extended experience in the mathematical and mechanical relations of the forces of nature. Both pay in their way.

(2573) J. F. S. says: I wish to construct an aquarium, size 2½ by 1½ by 1½ feet, bottom of wood and corner posts of wood, fastened by iron rods running through center of post, and bottom. I wish to know what is best wood, to use. How should wood be prepared to prevent leakage or dampness warping and cracking glass. Cement for corners and bottom edge. A. Make the frame of your aquarium sides and bottom of oak, with glass in bottom. Boil the frame before putting together in linseed oil for a few minutes. Make a cement of equal parts of litharge, fine white sand and plaster of Paris. Mix with boiled linseed oil, with a little drying oil, to a stiff putty. Let it stand a few hours before using. A frame bottom with glass is better than a solid wood bottom.

(2574) W. P. asks: 1. What is meant by a volt? I have seen it mentioned in several papers, but no two explain it the same. A. The volt is the unit of electromotive force or pressure of the current. The current from one cell of gravity battery has an E. M. F. of slightly more than 1 volt (1.07). 2. What is meant by shunt wound dynamo? A. A shunt wound dynamo is one in which the terminals of the armature are connected with the terminals of the field magnet and also with the external circuit, so that the current divides at the brushes, a part passing through the field magnet, the remainder through the external circuit. 3. How is the voltage measured in dynamos and batteries? A. Voltage or E. M. F. is measured by means of a voltmeter, or galvanometer. Consult any work on physics or electricity.

(2575) D. B. A. says: Some years ago a dam was built across a river here, and a short time since began leaking badly. Upon examination it was found cheaper to build a new dam than to repair the old one, consequently a new one was built, but a little further down the stream, and the water filling in soon became level on both sides of the old dam. Now a discussion has arisen as to which dam supports the pressure of weight of water in the lake above. One party contends that the old dam has still the same pressure upon it as formerly, while the other party claim that the new dam has now the whole pressure of the lake against it. A. The new dam supports the whole pressure of the lake as long as the water covers the old dam, which has the pressure on both sides, and is, in consequence of this balanced pressure, a neutral point. If there was a difference of level in the water above and below the old dam, the pressure would be divided by the hydrostatic difference of level.

(2576) H. G. C. asks: What kind of material shall I use for tanning alligator hides? A. Bark is mainly used for the tanning, but a special technical knowledge, possessed by but few in the trade is required for the preparation of the skins for the tan liquors, in order to make good leather.

(2577) A. E. B. says: Some people say that the B. B. caps No. 22 are injurious to the rifling of a gun. Is this so, and why? A. The B. B. are no more injurious than other caps of less strength, if the gun is properly cleaned after use. It is allowing the products of combustion to remain in the gun, even for a day, that does the mischief, by starting oxidation in the rifle grooves. In cleaning the wiping wad should go tight and follow the rifle grooves, otherwise the dirt will lodge in the grooves and roughen them by oxidation.

(2578) E. R. D. D. says: I have two wells, 38 feet and 35 feet deep respectively. In the first well is placed a steam pump, 10 feet from the top of well. Can I run a suction pipe from this pump, over the ground and down into the second well, and draw all the water out of it? The wells are 30 feet apart. A. You cannot draw all the water out of the second well, but by digging a trench for your suction pipe 5 feet deep, you may be able to draw the water down to within 3 feet of the bottom, possibly a little nearer.

(2579) N. O. L. asks: When a gun is discharged, what is the cause of the noise or report? Is it concussion of the air, or has it anything to do with the vacuum produced in the barrel? A. The noise of a gun is caused by the concussion or vibration of the air at the instant of the charge leaving the gun. There is no vacuum formed, but on the contrary a momentary pressure made by the expansion of the gases or powder smoke.

(2580) J. H. G.—The plant sent for identification is a small form of *Helenium tenuifolium*, Nutt.

Replies to Enquiries.

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

(2475) If P. C. N., of query No. 2475, will thoroughly smoke his buckskin articles with any ordinary wood fire, the same as bacon is smoked, say hang them up in some closed building and build a good smudge under them three or four times each day for about a week, being careful not to get them too hot, he can then wash them the same as any woolen cloth is washed, and I guarantee they will not get hard if the buckskins are thoroughly tanned.

Splitting Wood.—Please tell your inquirer of query No. 2459 to use 3 C blasting powder for splitting wood. If he cannot get this grade at the hardware store, to get either single F, double F, or E F blasting powder. Three C is the slowest powder made. It is the best for quarrying large fine stone or splitting straight-grained wood. When it explodes it merely gives a grunt, but it is shel for smoke. Single F is the next quickest, double F the next, and 3 F the next.

Judging by his query, he does not live in a mining district, and it is quite probable that he cannot get blasting powder. He should not use gunpowder by itself for splitting wood, unless it is very hard to split, as it would be liable to put a splinter in his eye. If he has to use gunpowder let him mix it with fine sand, one-third sand, two-thirds powder. This sand reduces the strength of the powder, but not its quickness. Gunpowder itself is too quick for wood, stone, or coal. Coal miners can use their drill dust instead of sand.—H. B.

TO INVENTORS.

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

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

November 4, 1890,

AND EACH BEARING THAT DATE.

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

Advertising device, L. M. Devore.....	439,866
Air compressor, E. Hill.....	439,876
Alarm, See Burglar alarm.	
Anchor, J. T. Williams.....	439,821
Atomizer, J. Buckley.....	440,002
Automatic sprinkler, J. Clapp.....	439,884
Axles, anti-friction bearing for car, L. W. Hardy.....	439,654
Baby's diaper and swinging receptacle, convertible, I. N. Franklin.....	439,618
Bag, See Paper bag.	
Bag holder, I. B. Tryon.....	440,073
Bags, acid proof, making, J. A. Lighthall.....	439,840
Bale tie, J. Hentz.....	439,957
Balls, machine for making, W. H. Wright.....	439,715
Band, See Band band.	
Banjo, C. M. Chapman.....	440,012
Barrel head wedge, J. A. Campbell.....	439,928
Barrel stand, H. H. Fleck.....	439,815
Baseball game, W. Schnitzges.....	439,683
Basin top and catch, H. Smith.....	439,790
Bassett, discharge attachment for wash, J. W. Reid.....	440,067
Bath, See Spray bath.	
Battery plate, secondary, A. E. Woolf.....	439,850
Beating, ball, H. Howard.....	439,877
Bed and other similar articles, folding, P. A. Mull.....	439,573
Bed, folding, D. J. Powers.....	439,873
Beer cooler, G. E. Runyan.....	439,764
Belt cord coupling, H. G. Kennedy.....	440,094
Belt shifter, J. M. Sailer.....	439,693
Belt tightener, A. Pollock.....	439,790
Biba, C. W. For driving combined stappers and bicycle support, W. H. King.....	439,879
Binder, temporary, Murphy, Jr. & Davidson.....	440,110
Binding clips, opening instrument for, H. H. Ballard.....	439,834
Blacking, W. B. & G. L. Bogart.....	439,831
Blanket holder, J. B. Whitbeck.....	439,888
Block, See Building block.	
Board, See Wash board.	
Boiler, Steam boiler, Wash boiler.	
Boiler bottom, J. McGinnis.....	439,761
Boiler feeder and feed water heater, F. M. La Bonte.....	440,109
Boiler feeder for making, R. H. Kersey.....	439,749
Boiler furnace, S. Runser.....	439,753
Boilers, apparatus for supplying pure water to steam, F. L. McGahan.....	439,788
Boilers, scraper for cleaning steam, Glover & Armstrong.....	440,028
Boilers, steam regulator for hot water, P. Rondquist.....	439,877
Bonnet, sun, N. L. Butler.....	440,015
Book and slate, combined, W. T. Jamison.....	440,037
Book case, I. C. Kugans.....	439,782
Book, memory memorandum or sales, R. L. Lam.....	440,044
Book shelf, roller, J. D. Edwards.....	439,869
Books, attaching hangers to, I. Fine.....	439,643
Bottle and bottle stopper, E. M. Sanger.....	439,885
Bottle washing machine, T. Saunders.....	439,838
Bottle tool for driving combined stappers and pouring nozzles into, E. H. Alling.....	439,678
Box, See Core box, Letter box, Paper box, Spool box, Tumbling box.	
Box closure, A. M. Brinard.....	439,632
Bracing machine feeding attachment, D. D. Griffin.....	439,948
Brake, See Car brake, Wagon brake.	
Brake beams, strut for, H. B. Robischung.....	440,117
Brake regulator, automatic, G. Westinghouse, Jr. Breastpin, G. K. Webster.....	440,082
Breastpin, G. K. Webster.....	440,081
Brick kiln, O. Karl.....	440,014
Brick kiln, O. Karl.....	440,014
Bridle, J. H. Carlstedt.....	439,846
Brush, O. Pederson.....	440,114
Brush, Welsh & Gates.....	439,914
Bucket and heater therefor, combined lunch, W. Kirkpatrick.....	440,107
Building block, J. M. Farrar.....	439,841
Burglar alarm, electrical, F. Pierce.....	440,115
Burner, See Lamp burner.	
Burnishing jack, H. F. Reed.....	439,752
Button, L. A. Douillet.....	440,030
Button, A. J. Shipley.....	439,923
Button, L. A. Douillet.....	439,923
Button, separable, M. D. Shipman.....	439,936
Calendar, J. Casseday.....	439,810
Caliper and centering gauge, combined, W. O. Nelson.....	439,975
Camera, See Photographic camera.	
Can spout, J. O'Neil.....	440,052
Can testing machine, E. B. Anzell.....	439,851
Car, F. C. Ingalls.....	439,881
Car, bicycle passenger, E. M. Baynton.....	439,770
Car brake, J. P. Clancy.....	440,014
Car brake, A. R. Drake.....	439,857
Car coupling, W. C. Brizum.....	440,030
Car coupling, Hammerstad & Lyken.....	439,633
Car coupling, Hodges & Isaacs.....	439,800
Car coupling, H. Meorden.....	439,767
Car coupling, W. J. Ponto.....	440,058
Car coupling, F. W. Ioss.....	439,857
Car coupling, S. L. J. Sangster.....	439,834
Car coupling, J. L. Sullivan.....	439,932
Car guard, railway, F. W. Stutt.....	439,935
Car register, automatic, Sprague & Kellogg.....	439,706
Car wheel, W. F. McCready.....	440,050
Car wheel, A. Mayer.....	439,670
Cars, feeding rack for cattle, F. E. Canda.....	440,010
Cars, friction buffer for railway, J. A. Hinsen.....	439,748
Carrier, See Cash carrier.	
Cart, road, F. Berntrager.....	439,858
Case, See Book case, Post office distributing case.	
Cash carrier, W. S. Reed.....	439,836
Cash register, W. Koch.....	440,108
Cash register and indicator, H. B. Kenwick.....	440,116
Caster, G. J. Helmsstaeder.....	439,777
Casting ingots, method of and apparatus for, J. Illingworth.....	439,750
Ceiling moulding, sheet metal, F. G. Caldwell.....	440,017
Ceiling panel, F. G. Caldwell.....	440,008
Chair, See Convertible chair.	
Chair attachment, A. M. Whiteley.....	439,989
Chandeliers, device for operating, keys of gas, R. F. Bridewell.....	439,832
Chimney cap, W. H. Gardiner.....	439,816
Churn, J. P. Sinclair.....	439,937
Cigar bunching machine, F. A. Schleiff et al.....	439,978
Cigar or cigarette holder, A. Fritsch.....	439,649
Cigar pressing apparatus, F. R. De Estenoz.....	439,344
Cigarette machine, F. J. Ludington.....	439,963
Clamp, See Cover clamp.	
Chest clamp, Spring clamp.	
Cleaner, See Cuspidor cleaner, Track cleaner.	
Clevis, P. Brown.....	439,771

Clock chime, W. Matthews.....	439,965
Clock motion, A. Bannatyne.....	439,854
Clocks, electric actuating device for pendulum, J. H. Dyson.....	439,886
Closet, See Water closet.	
Cloth brushing and cleaning machine, A. C. Heath.....	439,849
Clothes drier, E. E. Arnold.....	439,833
Clothes line apparatus, J. E. Kellogg.....	439,957
Clutch, friction, W. F. Lee.....	439,960
Coffee pots, etc., handle and cover for, H. S. Reynolds.....	440,061
Coin receptacle register, N. Stafford.....	439,791
Collar pad, W. T. O'Brien.....	439,678
Collar stiffener, C. Gible.....	440,027
Colors on cotton or other vegetable fiber, producing azo, R. Holliday.....	439,853
Comb, See Curry comb.	
Compassing matter, C. C. Shiber.....	440,066
Convertible chair, N. Bartelle.....	439,857
Convertible chair, J. W. Cuff.....	439,721
Cooking utensil, R. C. Andersen.....	439,768
Cooler, See Beer cooler.	
Copying cloths, moist pan for, H. G. Razall.....	439,896
Cover box, H. G. Razall.....	439,896
Corn cutter, Morden & Hefman.....	439,949
Corn cutting machine, W. S. Morden.....	440,049
Corset, J. K. Ross.....	439,690
Corset clasp and brace, R. W. Partamore.....	439,891
Coupling, See Bell cord coupling, Car coupling, Hose coupling, Shaft coupling, Thill coupling, Whiffletree coupling.	
Cream of tartar, obtaining, A. Martignier.....	439,805
Cuff holder, E. N. Dodge.....	440,019
Cultivator shovel, M. Temple.....	440,090
Curry comb, J. Du Shane.....	440,022
Curry comb and brush, F. L. Lewis.....	439,648
Curtain fastening canopy top, A. R. Tully.....	440,074
Curtain fixture, J. F. Romer.....	439,848
Cuspidor, D. Lange.....	439,667
Cuspidor cleaner, M. Barker.....	439,740
Cutlery scourer, H. F. Warren.....	440,080
Cutter, See Corn cutter, Feed cutter, Pipe cutter.	
Cutter head, universal, M. Morton.....	439,873
Cylindrical surfaces, producing, P. Howieson.....	440,018
Decorative material, manufacturing, T. J. Palmer.....	440,055
Digger, See Potato digger.	
Distillation, treating residues of, E. M. Cook.....	439,639
Distilling column and condenser, combined, E. Bolton.....	440,087
Distilling oils, apparatus for, E. A. Edwards.....	439,745
Ditcher and cultivator, combined, O. T. Davies.....	439,833
Ditching machine, W. C. Witt, Jr.....	439,739
Door attachment, E. W. Greason.....	439,842
Door clamp, sliding, E. Y. Moore.....	439,886
Dredging machines, bearing for rollers of, D. Urie.....	440,076
Drier, See Clothes drier, Pulp drier.	
Drill, See Expansion drill.	
Drill, J. M. Murphy.....	439,772
Dust pans, brush attachment for, Dean & Earle.....	439,944
Dyeing, bleaching and washing yarn, apparatus for, W. Maybury.....	439,966
Dyeing machine, yarn, L. Weldon.....	439,708
Dynamos and motors, automatic regulator for, Clever & Fugate.....	440,016
Dynamos, method of and apparatus for connecting, C. T. Child.....	439,929
Electric circuits, magazine fuse box for, W. F. Bossert.....	439,859
Electric conductors, device for applying, coating, J. T. Child.....	439,916
Electric fan, W. P. Granville.....	439,740
Electric heater, Drew & Francis.....	439,724
Electric heater, C. H. Talmae.....	440,071
Electric indicator, L. O. Chatfield.....	440,013
Electric motor and generator, A. Gartner.....	439,775
Electrical conductors, trolley lineswitch for overhead, W. L. Emmer.....	439,746
Electrical generator, F. L. McGahan.....	439,974
Electrode, secondary battery, Entz & Phillips.....	440,023
Electrodes for secondary batteries, making, Entz & Phillips.....	440,024
Elevator, C. W. Fowler.....	440,077
Elevator, R. C. Smith.....	439,734
Elevator gate operating device, W. H. Golder.....	439,840
Elevator guard, C. J. Latz.....	439,844
Elevator shafts, device for operating shutters for, Ranlett & Provost.....	439,823
Embroidery, S. H. Swain.....	439,798
End gate, wagon, B. H. Hershey.....	440,032
Engine, See Petroleum engine, Rotary engine, Rotary steam engine, Steam engine, Vapor engine.	
Engines, automatic cut-off for steam, J. H. Engle.....	439,709
Engines, condenser for steam, J. B. Hutchison.....	439,664
Engines, cut-off for steam, G. Fussell, Jr.....	440,103
Engines, journal box for steam, G. Fussell, Jr.....	440,102
Expansion drill, C. A. Seely.....	440,065
Eyebolts and hooks, machine for making, J. W. Bowen.....	439,809
Feed cutter, F. F. Drinkhouse.....	440,021
Feed water, extractor for removing air, grease, and sediment from, H. See.....	439,695
Fertilizer distributor, S. Johnston.....	439,955
Fiber from fibrous plants, machine for extracting, J. J. Weche.....	439,913
Fifth wheel, D. Wilcox.....	439,822
Fifth wheel, vehicle, Barney & Rahn.....	439,821
File, cabinet, J. Mullhauser.....	439,771
Filter, water, W. T. Floyd.....	439,645
Firearms, magazine for breech-loading, L. F. Bruce.....	439,833
Fire escape, G. F. Oehl.....	4