TO INVENTORS.

An experience of more than thirty years, and the preparation of not less 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 unequaled facilities for procuring patents everywhere. In addition to our facilities for preparing drawings and specifications quickly, the applicant can rest assured that his case will be filed in the Patent Office without delay. Every application, in which the fees have been paid, is sent complete—including the model—to the Patent Office the same day the papers are signed at our office, or received by mail, so there is no delay in filing the case, a complaint we often hear from other sources. Another advantage to the inventor in securing his patent through the Scientific American Patent Agency, it insures a special notice of the invention in the SCIENTIFIC AMERICAN, which publication often opens negotiations for the sale of the patent or manufacture of the article. A synopsis of the patent laws in foreign countries may be found on another page, and persons contemplating the securing of patents abroad are invited to write to this office for prices, which have been reduced in accordance with the times, and our perfected facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN.

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.

Vertical Engines, 10 to 15 H. P., thoroughly well made. John Hartrick & Co., 47 Gold street, New York.

Magic Lanterns and Stereopticons of all prices. Views illustrating every subject for public exhibitions. Profitable business for a man with a small capital. Also lanterns for college and home amusement. 74 page catalogue free. McAllister, Mf. Optician, 49 Nassau St. N.Y.

Alcott's Turbine received the Centennial Medal.

Northrop's Sheet Iron Roofing makes most durable fireproof roof. Used on all kinds of buildings. Send for circular and prices. Northrop & Co., Pittsburgh, Pa.

Engines, ½ to 5 H. P. Geo. F. Shedd, Waltham, Mass.

New Hand, Foot, or Steam Band Saws that will cut 7½ in. thick; price $35. G. W. Baker, Wilmington, Del.

Giant Car Pusher. Tackle Block Works, Lockport, N.Y.

H. Prentiss & Co., 14 Dey St., N. Y., Manufs. Taps, Dies, Screw Plates, Reamers, etc. Send for list.

Magneto Call Bells for Telephone Lines. The Best. No battery required. Bunnell, 112 Liberty St., N. Y.

Eagle Anvils 9 cents per pound. Fully warranted.

Band Saws, $100; Scroll Saws, $75; Planers, $150; Universal Wood Workers and Hand Planers, $150, and upwards. Bentel, Margedant & Co., Hamilton, Ohio.

Diamond Planers. J. Dickinson, 64 Nassau St., N. Y.

Howard Patent Safety Elevators. Howard Iron Works, Buffalo, N. Y.

Pulverizing Mills for all hard substances and grinding purposes. Walker Bros. & Co., 23d and Wood St., Phila.

The Lawrence Engine is the best. See ad. page 302.

For the most substantial Wood-Working Tools, address E. & F. Gleason, 52 Canal St., Philadelphia, Pa.

Sheet Metal Presses, Ferracute Co., Bridgeton, N. J.

Nickel Plating.—A white deposit guaranteed by using our material. Condit, Hanson & Van Winkle, Newark, N.J. English Agency, 18 Caroline St., Birmingham.

Punching Presses, Drop Hammers, and Dies for working Metals, etc. The Stiles & Parker Press Co., Middletown, Conn.

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing Metals. E. Lyon & Co., 470 Grand St., N. Y.

For Power & Economy, Alcott's Turbine, Mt. Holly, N.J.

Mr. W. B. Adams, one of the most extensive contractors and decorators in this city, says he has used nearly fifty thousand gallons of H. W. Johns' Liquid Paints, and, after an experience of twenty years with white lead and other paints, he considers H. W. Johns' Asbestos Paints not only superior in richness of color and durability, but owing to their wonderful covering properties they are fully twenty per cent more economical than any others.

Wanted.—Articles to manuf. D. J. Miller, Mohawk, N.Y.

Kreider, Campbell & Co., 1030 Germantown Ave., Phila., Pa., contractors for mills for all kinds of grinding.

The only Engine in the market attached to boiler having cold bearings. F.F. & A.B. Landis, Lancaster, Pa.

Improved Steel Castings; stiff and durable; as soft and easily worked as wrought iron; tensile strength not less than 65,000 lbs. to sq. in. Circulars free. Pittsburg Steel Casting Company, Pittsburg, Pa.

Fine Gray Iron Castings a specialty, also Wire Workers' Pickets and Rosetts in stock. A. Winterburn's Foundry, 16 De Witt St., Albany, N. Y.

Jarvis Patent Boiler Setting burns wet peat, screenings without blast. A. F. Upton, Agent, 48 Congress St., Boston, Mass.

Solid Emery Vulcanite Wheels—The Solid Original Emery Wheel—other kinds imitations and inferior. Caution.—Our name is stamped in full on all our best Standard Belting, Packing, and Hose. Buy that only. The best is the cheapest. New York Belting and Packing Company, 37 and 38 Park Row, N. Y.

For Solid Wrought Iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Doctor Egbert Guernsey says, within the past year they have saved nearly two hundred tons of coal at the Homeopathic Asylum for the Insane at Middletown, N. Y., by use of H. W. Johns' Asbestos Pipe Coverings.

The SCIENTIFIC AMERICAN Export Edition is published monthly, about the 15th of each month. Every number comprises most of the plates of the four preceding weekly numbers of the SCIENTIFIC AMERICAN, with other appropriate contents, business announcements, etc. It forms a large and splendid periodical of nearly one hundred quarto pages, each number illustrated with about one hundred engravings. It is a complete record of American progress in the arts.

Presses, Dies, and Tools for working Sheet Metals, etc. Fruit and other Can Tools. Bliss & Williams, Brooklyn, N. Y., and Paris Exposition, 1878.

North's Lathe Dog. 347 N. 4th St., Philadelphia, Pa.

Vertical & Yacht Engines. N. W. Twiss, New Haven, Ct.

Best Turbine Water Wheel, Alcott's, Mt. Holly, N. J.

Millions of dollars now annually lost by fires could be saved by use of H. W. Johns' Asbestos Concrete Coating, which forms an absolutely fireproof surface like stone on wooden beams, posts, floors, and partitions in basements, lofts, and boiler rooms of warehouses, factories, etc. It is prepared ready for use, and can be easily applied by any one.

The Cameron Steam Pump mounted in Phosphor Bronze is an indestructible machine. See advertisement.

Baxter Wrenches, Blake's Belt Studs, Soap Stone Packing, Empire Packing. Greene, Tweed & Co., 18 Park Place, N. Y.

Wheel Press, Cotton Press, Pipe Line, and Test Mercury Gauges. T. Shaw, 915 Ridge Ave., Philadelphia, Pa.

Makers of Improved Door and Sash Machinery will please send circulars and prices to Traynham & Geise, Atlanta, Ga.

For Telephones, Amateur Photo, Apparatus, etc., address E. Sackmann & Co., 278 Pearl St., N. Y.

For Sale Cheap.—One 50 lb. Hotchkiss Air Spring Hammer, nearly new. D. Frisbie & Co., New Haven, Ct.

A Valuable Patent for an Improved Coupling for round and flat leather belts for sale. A. Strois, Patentee, 89 Fulton St., New York.

Rubber Hose, Steam Hose, Suction Hose, Linen Hose, Cotton Hose. Greene, Tweed & Co., 18 Park Place, N.Y.

Hydraulic Press, Screw Presses, Engines, and Boilers, ½ to 200 H. P. Send for circulars. Machinery Exchange, 3d and Vine Sts., Philadelphia, Pa.

Wanted.—A 2d-hand Transit, with level on Telescope. Address, stating price, F. J. Knight, Monroe, N. Y.

The Interstate and International Mechanical Exchange. Send for explanatory circular. A. S. Gear, 20 E. 13th St., N. Y.

Wanted.—One Steam Riveter and one Machine for planing bevel edges of sheets; both suitable for boiler work. Address Boiler Maker, 111 Liberty St., N. Y.

NEW BOOKS AND PUBLICATIONS.

METHODICAL TEXT BOOK OF ROUND WRITING. By F. Soennecken. New York: Keuffel & Esser.

The style of writing which Mr. Soennecken calls round is something very different from the "round-hand" of former days. It is instead a system of ornamental writing, done with a broad pointed or double pointed pen, by means of which a bold and peculiar shading is effected without pressure. For distinctness, beauty, and ease of execution it is by all odds the most desirable ornamental hand that we know. And by Mr. Soennecken's method of instruction it would seem that any one, however unskillful as a penman, can, with the use of his pens, easily become expert. The pens numbered from 3 to 6 we find excellent for ordinary business writing.

UPLAND GAME BIRDS AND WATER FOWL OF THE UNITED STATES. By A. Pope, Jr. New York: Charles Scribner's Sons.

Part Ninth of Mr. Pope's admirable series of upland game birds and water fowl figures the mountain quail of the Sierras, *Oreortyxpictus*, Baird; and the widgeon, *Mareca Americana*, Stephens. Our high opinion of the work has already been expressed.

Notes & Queries

(1) S. B. M. asks how the "béton concrete," used in the buildings, etc., illustrated in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 118, is made? A. Consult Gillmore's "Coignet Béton, and other Artificial Stones."

(2) P. W. J.—Send full name and address.

(3) G. B. G. asks: What is the composition of the steel bronze dip used by brass finishers? A. Dip the articles bright in dilute nitric acid, pass them immediately through clear water, and place in the following mixture until they turn black: Hydrochloric acid, 1 gallon; ferrous sulphate (copperas), 1 lb.; arsenious acid (pure white arsenic), 1 lb. Then remove, rinse in cold water, and dry in sawdust. It may be polished with black lead and coated with a lacquer made as follows: Spirits of wine or wood naphtha (methylic spirits), 1 gallon; shellac, 5 ozs.; sandarac, 4 ozs.; elimi, 1 oz.; turmeric, 6 ozs.; gamboge, 1 oz. Digest together in a covered vessel in a warm place, decant the varnish, digest the residue again with ½ gallon of spirit, and add this to the rest of the lacquer.

How do printers measure type when set up at so much per thousand ems? A. The unit of measurement in printing is the square of the depth of the type, called an em, because the letter *m* was at one time a square letter. The number of these squares contained in a line of type in width, being multiplied by the number of lines, or ems, in the depth of the page or column, gives the number of ems. The large type on the reading pages of this journal is brevier, 29 ems wide, 132 lines or ems in a column, equal to 3,828 ems. This result multiplied by the price gives the wages of the compositor; as, say 50 cents a thousand ems, 3,828×50 = $1.91. See Webster's Dictionary, under "Type," for comparison of sizes of types.

(4) Quandary writes: I have a telephone with which I want to connect my store and house. I also have two sounders (common telegraph style). The telephones have many more ohms resistance than the sounders, which have only two ohms. How shall I connect, so that I can attract attention with the sounders? I have used 2 cells of the usual style battery, and cannot get it to work. A. Do not place the telephones in the telegraph circuit. Connect one binding post of each telephone with the line wire, and ground the other.

(5) A. Z. M. asks where to get carbon points and their probable cost. Also wants an outline of the Bell telephone, as he is trying to make one. A. You can get carbon points from any dealer in electric batteries, or you can make them by following directions given on p. 171 (1) of current volume. Full directions for making a working telephone may be found in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 142.

(6) L. O. R. asks: 1. Can Spanish well be learned without a teacher? A. Not to speak it. 2. What particular textbooks, grammar, dictionary, readers, and the like, are best for an unassisted scholar? A. Consult publishers' catalogues.

(7) D. H. S. asks: Can a 4 horse power engine be made to exert 8 horse power by increasing speed to double its former rate? In other words, by doubling speed of an engine will its power be increased at same ratio? A. Yes, providing the same mean cylinder pressure be maintained. The horse power of an engine =

$$\frac{\left(\begin{smallmatrix}\text{mean pressure}\\ \text{in lbs.}\\ \text{per sq. inch.}\end{smallmatrix}\right)\times\left(\begin{smallmatrix}\text{piston speed}\\ \text{in feet}\\ \text{per minute}\end{smallmatrix}\right)\times\left(\begin{smallmatrix}\text{piston area}\\ \text{in sq.}\\ \text{inches}\end{smallmatrix}\right)}{33{,}000}$$

(8) G. H. H. writes: I have a steam engine: the cylinder is 3 inches in diameter and 4 inches stroke. What is the power, how large a boiler will it require, and what kind is the best for me to get? A. Such an engine would rate about 2 horse power. A vertical boiler, 22 inches in diameter and 4½ feet high, would be suitable for it.

(9) L. S. I. asks how to weld and temper a broken carriage spring. A. To weld, heat in a clean fire to a yellow heat, and use borax as a flux. To temper, heat it evenly to a low red, quench it in oil, and blaze it off two or three times.

(10) C. F. D. asks how to construct a cheap telephone from his room to another, distant about 150 feet. A. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 142, which contains full directions for making a telephone.

(11) A. O. writes: Please state in the SCIENTIFIC AMERICAN, for the benefit of many readers, the breaking load of a white pine pillar, 12 inches square and 40 feet long. A. Mr. C. Shuler Smith's rule is as follows:

$$\text{Breaking load in lbs. per sq. inch of area} = \frac{5{,}000}{1+\left(\frac{\text{square of length in inches}}{\text{square of side in inches}}\times 0{\cdot}0004\right)}$$

(12) Foreman.—Your data are insufficient.

(13) F. S. W. asks: 1. Which of two water wheels of equal size is best, one discharging at the center, the other at the periphery, and why? A. A question of this kind cannot be generalized, as there are other things besides point of discharge that influence the efficiency of a wheel. 2. Which of two pulleys of equal size, one with straight arms, the other with curved, is the strongest, and why? A. For equal cross sections, the straight arms are usually the strongest, for the same reason that a straight beam is ordinarily stronger than a curved one.

(14) O. V. F. asks: Does increasing the size of the arm or axle of a wagon increase or decrease the draught? A. After passing the requisite proportions, the draught is increased.

Would falling through the air from one mile in height cause death before reaching the ground? A. We think so.

(15) C. R. M. writes: I am building an ice house, 16 x 20, and 20 feet deep in the ground, with logs in the form of a square pen. Ought I to leave an open space between the logs and the earth, or had I better fill in with tan bark, sawdust, leaves, or something of that sort, as is usually done? My opinion is an air chamber or space between the earth and logs would be the best non-conductor I could have. Am I right? I find ice commences to melt around the sides next to the logs, making an open space of 10 or 12 inches. People mostly fill up the space with ice (which takes a good quantity) and others fill up with leaves, tan bark or sawdust. My opinion is to leave the space open. Am I right? A. Dry air is one of the poorest conductors of heat, but at the same time it offers no impediment to thermal radiation or convection. Walls of loose non-conducting substances, as sawdust, intercept the one and impede the other. See pp. 871, 939, 1570, and 1851 of the SCIENTIFIC AMERICAN SUPPLEMENT.

(16) W. C. S. asks: What size boiler must I have for a 1½ diameter by 2½ inch stroke cylinder? Please give thickness of the plates to be made of, and how high the water must stand in such a boiler when in working order. How long should I make the connecting rod? A. You can make a boiler 12 inches in diameter and 24 inches high. Carry the water level at about two thirds of the height. Use iron plate about $\frac{3}{16}$ thick. The connecting rod should be from 2½ to 3 times the length of stroke.

(17) X. Y. Z.—You will find in the last edition of Ganot's "Physics" a full description of Helmholtz's apparatus for the analysis and synthesis of sound. We are unable to give you the cost of the apparatus.

(18) G. G. L. writes: Some time ago you mentioned in your paper that you would be pleased to receive any communications on the practical results of small steam yachts. I send you the following description and performance of one that I have built this summer, hoping that it may be of service to others who want to build one. The boat is a lap streak, 26 feet long over all, and 5 feet beam; the planking is of pine ⅝ of an inch in thickness, the ribs are of oak ¾ of an inch thick and 1¼ inch wide, steamed and bent in, and placed 6 inches between centers. The boiler is made of steel $\frac{3}{16}$ inch thick in the shell, and the firebox and tube sheets are of iron ¼ inch thick, and is 34 inches high, 20 inches diameter, with a firebox 17 inches in diameter and 15 inches high; there are 56 inch tubes 19 inches long, the engine is vertical, with cylinder 3¼ inches diameter and 4 inches stroke, and weighs 100 lbs. The wheel is 20 inches diameter with 3 blades, and has a pitch of 34 inches, and is placed 3½ feet from stern post, thus giving room for the rudder forward of the wheel above the shaft; the shaft is supported by the stern pipe, which is 8 feet long and is made of 2 inch gas pipe, and extends from the stuffing box to the wheel, and has a bearing in each end. With 100 lbs. of steam the engine makes 325 revolutions per minute, and drives the boat 8 miles per hour in still water. The pump is ⅞ of an inch in diameter and 1¼ inch stroke, and gives plenty of water. The above results are taken from actual tests, and are correct in every particular. The results are excellent. We hope to hear from others who are experimenting in this direction.—ED.]

(19) F. B. writes: I am building a lathe. My balance wheel is a 3 part one, namely, 24 inch, 21 inch, and 18 inch diameter. I wish the pulley on the spindle to match the 24 inch part 3 inches in diameter. What shall be the diameter of the other two pulleys to match the 21 inch and 18 inch parts, so that the belt may be tight on either pulley? A. Having found the length of belt, call R the rad'us that is known, S the distance between centers of pulleys, and L the length of the belt (all dimensions in feet). Then if R is the larger of the two radii, the other radius,

$$r = R - S\times\left\{1{\cdot}5708-\left(\sqrt{0{\cdot}4674+\frac{L-6{\cdot}2832\times R}{S}}\right)\right\}, \text{ and}$$

if R is the smaller of the two radii, the other radius,

$$r = R + S\times\left\{\left(\sqrt{0{\cdot}4674+\frac{L-6{\cdot}2832\times R}{S}}\right)-1{\cdot}5708\right\}$$

1. Can I, with a furnace like the one described on p. 404, vol. 38, SCIENTIFIC AMERICAN, and the blower described on p. 75, vol. 39, SCIENTIFIC AMERICAN, obtain heat enough to melt copper in a common sand crucible? If not, what heat can I get? A. Except in very small quantities, no. 2. At what temperature will a mixture by weight of iron ½, copper ¼, and zinc ¼, melt? A. If the zinc were not all volatilized in the operation the alloy would probably melt at about 1960° Fah.

(20) W. W. MacC. asks: Which is the better engine for a flouring mill, a long stroke and slow motion, or a short stroke and quick motion? A. We think the latter is preferable.

(21) E. H. C. asks: Will an engine having a cylinder 1½ inch in diameter and 3 inches stroke, run a boat 15 feet long? A. The engine is rather small.

(22) A. J. F. asks: How can I do enameling on gold and silver? A. The enamels used consist of a very fusible glass variously colored by metallic oxides, reduced to powder and made into a paste with water for use. These are applied to the finished surface of the metal, on which they are fused by means of a blowpipe flame or by the heat of a small furnace.

How can I make hair cosmetic? A. Fuse together 2 parts of lard and 1 part of beef suet, and incorporate by trituration any of the bouquets given on p. 1030, SCIENTIFIC AMERICAN SUPPLEMENT.

Please give me a good recipe for making cologne. A. Eau de Cologne—6 quarts 82 per cent alcohol, 2 ozs. essence of orange, 2 ozs. essence of citron, 2 ozs. oil des petits grains, 1 oz. de cedro, 1 oz. de cedron, 1 oz. de Portugallo, 1 oz. neroli, ½ oz. rosmarinol, ¼ oz. thymol.

(23) T. H.—In your first inquiry the data are insufficient. Rosin is sometimes applied to belts to prevent slipping, but there never should be occasion for its use.

(24) A. I. asks: What size propeller wheel is required for an 8¼ by 8 inch engine, and what pitch wanted for towing and running partly, and which is the best make to buy? A. A propeller suitable for such an engine may have a diameter of from 3½ to 4 feet, and a pitch of from 5 to 6. We do not recommend special manufactures in these columns.

(25) C. C. B. writes: I wish to raise water for domestic use to a perpendicular height of two hundred feet, and deliver six hundred feet from supply point. Is the hydraulic ram practicable for this height? A. You can use a ram for the purpose, but it may be necessary to fit pipe of extra strength. A manufacturer will give you full instructions as to fall, etc.

(26) W. M. E. writes: Which is best for seasoning white oak, open air, kiln or steam? A. Air seasoned timber is generally considered the best, but the difference is not great.

Does a 40 inch circular saw, 26 teeth, gauge 7, sawing a plank 16 inches wide, take more or less power than a 50 inch, 26 teeth, gauge 7, on 16 inch plank, both run on same speed of mandrel? A. Less, as we understand the conditions.

(27) R. H. B. asks: 1. What is sumac used for in chemistry? A. Sumac is used principally in dyeing and tanning. 2. Where is the best quality procured in the United States, and how does it rate in the market with that brought from Italy? A. Virginia. Fine Sicilian powder, $120; Virginia, $65 per ton. Poorer qualities sell at from $50 to $60 per ton. 3. How is it prepared for market? A. The leafy tops are broken off and dried in the shade. When dry they may be beaten with sticks or flails. The gathering of the leaves may commence in July and continue till frost. It may be packed in bags preparatory for shipment to market. The amount of tannin contained is from fifteen to twenty per cent.

(28) F.—In your thread telephone use a single silk or linen thread.

(29) S. E. W. asks (1) for some good durable cement or glue not affected by moisture, that will secure rubber to tin. A. Fuse together equal parts of gutta percha and pitch. Have the metal dry and use the cement moderately hot. 2. How can I make some cheap blue, black or green ink, such as is used by large rubber roller printing machines for marking wood; it is to be applied to a roller covered with felt, which revolves in contact with another roller on which is secured the rubber type? A. See p. 204 (33), current volume.

(30) W. T. M. asks: What oil or oils will make a photograph, or other pictures, transparent on glass and not spot in a short time after? A. Cover the face of the moistened print with good starch paste containing a drop or two of clove oil, press the picture face downward on the clean glass, press out the excess of paste, and dry. Then saturate the paper with castor oil, wipe off excess, cover with a thin glass plate for protection, and bind the edges with cloth or paper and paste.

(31) H. A. P. asks: What will remove the smoky discoloration of 10 years' standing on an Italian marble mantel, occasioned by being over a heater in parlor? A. Moisten quicklime with a strong cold aqueous solution of sal soda, and rub this paste over the marble to remain for several hours. Then clean off and wash

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well with clean hot water and a stiff brush. A thick solution of silicate of soda (water glass) is said to answer better than lime and sal soda—it may be mixed with a little slaked lime, kaolin or whiting.

What causes the noise from a heavy cart wheel in motion on stone pavement? And why is the noise greater when the cart is heavily loaded? A. It is caused by the dropping of the wheels from the tops of the paving stones into the depressions between them. The force of the blow increases with the weight of the wagon.

(32) S. T. L. asks for a recipe for making rubber cement. A. Digestcaoutchouc cut in fine shreds with about 4 volumes of naphtha, in a well covered vessel for several days. Naphtha should not be used indoors.

(33) H. E. H. asks (1) how to make a good cheap bottle wax. A. Resin, 6½ parts; beeswax, ½ part; Venetian red or red lead, 1½ lb. 2. Shellac, 3 parts; Venice turpentine, 1¼ part; vermilion, 2¼ parts, or Venetian red or red lead, q. s. 3. Resin, 6 parts; shellac and Venice turpentine, each 2 parts; coloring matters to suit. The bubbling is due to overheating the wax, moisture in the stopper, or both. It is often advantageous to slightly oil the stopper.

(34) G. H. A. asks: What will prevent the accumulation of dandruff? A. See p. 27 (1), and 188 (43), SCIENTIFIC AMERICAN, vol. 38.

(35) A. O. K. asks for a recipe for making a good white ink, such as is used on the sample card inclosed. A. Mix pure, freshly precipitated barium sulphate with water containing enough gum arabic to prevent immediate settling of the substance. Starch or magnesium carbonate may be used in a similar manner—they must be reduced to impalpable powders.

1. Is there any danger attending the use of petroleum for removing scale in boilers? A. If the quantity introduced is small no danger need be apprehended. 2. Which gives the best results, the crude or the refined article? A. The latter is generally used.

(36) G. B. F. asks: By what process is the blackletteringdone upon saw blades? For instance, Disston's card on the Centennial saw; it is evidently printed and etched, as they are all alike, which would not be the case if drawn by hand through a waxed surface. A. Stencils are employed, we believe. Use in etching pyrogallic or dilute nitric acid or aqueous iodine solution.

(37) L. B. & Co. write: In making autoplates it is necessary for us to use a battery, and we would like you to inform us which of the many that are for sale is the best for our purpose, and how many cells we will have to use to deposit an ⅛ of an inch of copper over say 10 to 15 square feet of surface, in a tank measuring 2 x 2 x 3 feet, in the shortest possible time. A. The Smee cell with carbon negative plates is, we believe, generally preferred; but for work of this kind a magneto-electric machine is better than batteries. The power (number of cells) required is estimated in battery zinc surface about equal to the surface of the work exposed in the plating bath. It would require many hours to deposit a shell of the thickness you mention.

(38) J. A. S. asks: 1. Can nitrous oxide gas be made by heating nitrate of ammonia in a flask, and is there any danger of an explosion? A. If no carbonaceous or combustible matters are present, there is no danger. 2. Is oxygen explosive alone or mixed with air? A. No.

(39) D. R. writes: No. 20, vol. 38, contains an article on "How to make a strong Electro-Magnet." Desiring such to ring an 8 inch bell, I followed the instructions given, wrapping the iron pipe with three layers of insulated wire (inclosed sample), and attached the ends to a battery of 7 cells (disk) Leclanche in good working order. The results were not satisfactory, the magnet showing very little power, not sufficient to move the clapper rapidly. Can you explain the difficulty? Is the wire too large and the layers insufficient? A. The wire is too heavily covered with cotton. For the purpose named we think a magnet of the ordinary form would be better than the one you describe.

(40) A. W. C. asks: What substances can I dissolve in alcohol, that the flame will be blue when burned in a spirit lamp, and also the ingredients for producing a red flame in the same manner? A. We know of nothing soluble capable of producing very satisfactory flame colorations of these orders. For red you may try a little strontium nitrate, and for blue bismuth nitrate or indium chloride.

(41) W. H. E. W. writes: I am using water from a driven well, iron pipe and pump; the water is strongly impregnated with iron; is it injurious to my health? A. If the quantity of iron is excessive, yes.

(42) F. D. W. asks for a recipe for bleaching white holly which has turned yellow by age. A. You may try a strong aqueous solution of sodium sulphate, also solution of calcium hypochlorite (bleaching powder).

(43) E. A. F. asks: 1. What is the composition of the explosive called "white gunpowder?" A. Potassium ferrocyanide (yellow prussiate), 28 parts; loaf sugar, 23; potassium chlorate, 49. 2. I understand that it is easily manufactured, and that its projectile force is much greater than gunpowder. Why is it not more used? A. The principal reasons are that the manufacture of this powder is very expensive, and that, as the powder acts very strongly upon iron and steel during ignition, it can only safely be used in bronze ordnance and in the filling of shells.

(44) J. H. M. asks how to mix a gold solution for battery gilding for copper alloys, one that will work well in cold weather. A. Dissolve 12 ozs. of potassium cyanide in a gallon of water, and in this dissolve ½ oz. of oxide of gold.

(45) B. M. A. and C. P. K.—The simple electric light apparatus is not in the market. See SCIENTIFIC AMERICAN SUPPLEMENT of November 9 for a description of the apparatus which will enable you to make it.

(46) E. A. D. asks: What chemicals will remove ink blots from paper, when dry? A. Try a strong solution of bleaching powder in cold water or acetic acid, also strong aqueous solution of oxalic acid.

Will the use of goggles injure the eyes in any way? A. We do not think that goggles having smoke colored glasses would injure the eyes.

(47) W. L. I. writes: Will you please tell me the different parts of speech of the different "thats" in the following verse?

"For it is known that we may safely write,
Or say, that that that that that man writ was right;
Nay, e'en, that that that that that that followed
1 2 3 1 2 3
Thro' six repeats the grammar rule has hallow'd;
And that that that that that that that began
1 2 3 4
Repeated seven times is right. Deny it who can."

A. 1. Relative pronoun. 2. Definitive adjective. 3. Noun. 4. Not justifiable.

(48) P. W. J. should repeat his questions, giving full name and address.

(49) J. F. F. asks: Has compressed air ever taken the place of steam, and if so, to what extent? Can it ever be used for motive power on railroads? A. It is largely used in tunneling operations, and has been used on railroads as you suggest.

If the perpetual motion could be made, would it be of any use? A. Yes.

I have an oxycalcium stereopticon; can I use an electric light as a substitute. If so, please give me information for obtaining an electric apparatus. A. Yes. Insert a notice in the "Business and Personal" column if you do not find what you want among the advertisements.

(50) C. B. P. writes: I have two cylinders 2½ x 5 in., which I should like to make use of to run a small yacht. What would be the most advantageous size, as regards largest possible dimensions and quickness of speed for my boat? Provided my boiler be of copper, how and of what shape should it be made, and of what thickness, to insure minimum space and weight? What lap and lead ought the valve to have, and what diameter and pitch the screw? A. With a boat 28 feet long, screw 30 inches diameter, 3 feet pitch, vertical boiler with 100 square feet of heating surface, engine ⅛ inch lead, cut-off ¾ stroke, you might expect a speed of 7 to 8 miles an hour in smooth water.

Are any magazines or papers published in Australia or New Zealand devoted to the interests of mechanical engineering? Would you give me the names and addresses of the best? A. Perhaps some of our friends in these localities will send the information desired.

(51) R. D. B. writes: I have all the parts of a Grove galvanic battery except the porous cups. How can I make them, or is there anything I can use as a substitute for them? A. Porous cups cannot be easily made except by potters. Use an unglazed flower pot.

(52) A. K. S. writes: I wish to ascertain the exact horse power of an engine 30 inches bore, 36 inches stroke, running 75 revolutions per minute under a boiler pressure of 80 lbs. steam; the engine stands about 40 feet from steam dome, or, in other words, there is 40 feet of steam pipe. I want the exact horse power of that engine, there are so many different opinions. A. It cannot be calculated unless the mean pressure acting on the piston during each stroke is known, and this can only be determined by experiment.

(53) F. W. M. asks how much carbonic acid gas can be made from 1 pound or 1 quart marble chips; also what proportion of sulphuric acid to use. A. If the marble is reasonably pure, about 30 cubic feet.

Marble + sulphuric acid (specific gravity 1·8) =
100 98
calcium sulphate + water + carbonic acid.
136 18 44.

Under normal conditions of atmospheric pressure and temperature a cubic foot of carbonic acid weighs about 1·8 oz. The amount of oil of vitriol to be used in practice is somewhat greater than that above indicated. It should of course be diluted with water.

(54) D. I. C. writes: I am between the age of forty-nine and fifty, somewhat past the time when men generally begin to lose their sight, and mine is beginning to fail. I am naturally nearsighted, my ordinary distance for reading being about eight inches; but now if I hold small print, say Webster's pocket dictionary, that close, the letters become blurred and run together, and the closer to the eye the worse blurred; but if when blurred the worst and most indistinct I close the eyelids one half or more, I find the letters to appear sharp and clear. Can this be explained? A. Closing the lids of the eyes tends to flatten the crystalline lens, and by this means to focus the eyes on the object. It may also help to make the image sharper by shutting out side lights.

(55) G. E. H. asks: How can I cut out circular pieces of looking glass about ¼ of an inch in diameter; I am not particular about the thickness, but the surface of the glass must be perfectly plane, as the least convexity or concavity would mar its application, and the reflecting substance—whatever it might be—should not be defaced. A. Very thin glass, like microscope slide covers, may be cut with a diamond. Thick pieces of the diameter given could not well be cut in this way. You might do it with an iron or copper tube having ¼ inch internal diameter rotated rapidly and supplied with emery and water. It would probably be best to silver the disks after they are cut.

(56) J. G. asks: Am I right in saying that the first elevated railroad car was driven by a stationary engine with wire rope attached? A. Yes.

(57) R. W. S. asks: 1. Will you please inform me whether frost has any effect upon spiral springs which are in use in cold weather out of doors? A. They sometimes become more brittle. 2. What is the best material for spiral springs for hard usage? A. Spring steel.

(58) H. T. W. writes: In an article published recently, headed "New Industrial Enterprises," the question is asked: "Is it not practicable to teach our farmers that they may produce all the flax fiber as fast as required?" I am much interested in the question, and wish to know how to obtain statistics as to the trade as far as this country is concerned. That is, the quantity manufactured, imported, and grown, and the parts of the country in which the larger quantity is raised, prices, etc. Also in relation to the seed for oil purposes, whether it is mostly imported, from where, and in fact everything in connection with the industry, with a view to getting at the desirability of engaging in it. A. See article on the subject, p. 400, vol. 38, SCIENTIFIC AMERICAN. There are several books on the cultivation and treatment of flax in print. Address booksellers who advertise in these columns. For statistics consult the reports of the Bureau of Statistics and of the Department of Agriculture.

(59) S. J. M. asks: 1. At what depth is the minimum of temperature reached? In other words, how far below the surface of the earth does the heat of the sun penetrate? A. It varies in different parts of the globe; at Paris it is about 30 yards. 2. Would an extra thick arch over a cellar diminish the temperature at its bottom more than a simple covering to keep out the sunlight, etc.? A. Yes.

(60) L. H. I.—See "Rights of Investigators," p. 128, current volume. SCIENTIFIC AMERICAN SUPPLEMENT, No. 133, contains full directions for making a phonograph.

(61) E. B. B. asks: Will you please give the process for making rubber stamps for printing, from the making of the mould to the finishing of the stamp? A. You will find an article on this subject on p. 1326, SCIENTIFIC AMERICAN SUPPLEMENT. See also p. 204 (33), current volume, SCIENTIFIC AMERICAN.

(62) L. W. F. asks: What substance can I cast readily in moulds that will possess the flexibility and hardness of India rubber upon cooling? A. The following composition is very flexible, resembles caoutchouc somewhat, and may be readily fused and cast. Glue is melted in water by the aid of a hot water bath into a very thick paste, to which glycerin is added in about the same quantity as that of the dry glue. The mixture is then thoroughly stirred and further heated to evaporate the excess of water. Sawdust, pigments, metallic oxides, earths, etc., may be added to color, toughen or harden the substance.

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

J. P.—If properly burned and ground the substance might be used with oil as a cheap paint, and to a limited extent by paper makers.—H. H. C.—No. 1 (black) is an indurated clay containing much finely divided carbon. If properly ground it might be useful as a substitute for lampblack in some cheap paints, etc. No. 2 (red), is an earth consisting largely of an iron sesquioxide, various grades of which are known in the market under the names of red earth or ocher, burnt ocher, Indian red, Berlin red, English red, Armenian bole, terra di sienna, etc., and much used in paints.—D. L. B.—It is marcasite—sulphide of iron, of little value.—J. S. R.—Quartz.—A. M. K.—It is celestite inclosing sulphur.—D. R.—The smaller fragments are magnesium limestone or dolomite. You should send larger samples.

COMMUNICATIONS RECEIVED.

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

Wooden Buildings. By D. F. H.

Lenses. By C. A. C.

HINTS TO CORRESPONDENTS.

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

Many of our correspondents make inquiries which cannot properly be answered in these columns. Such inquiries, if signed by initials only, are liable to be cast into the waste basket.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

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

September 10, 1878,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

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

Air compressor, W. D. Doremus	207,954
Anodes, holding grain nickel, A. C. Wenzel	208,003
Anti-attrition compound, J. Kimball	207,874
Apiary or bee house, W. Erwin	207,958
Atomizer, G. A. Brug	207,849
Bag and sack, J. Arkell	207,933
Bag fastener, Theakston & Fouts	207,996
Baggage check, W. S. Guy	207,962
Bale band tightener and band, J. L. Sheppard	207,902
Barrel combination, T. C. Veale	207,917
Bars, coiling metal, G. F. Evans	207,802
Bed bottom, F. C. Eastman	207,800
Bed bottom, spring, A. S. Felch	207,959
Bed bottom spring, M. Van Sickle	207,833
Bedstead and fire escape, H. B. Scholes	207,899
Bedstead fastening, F. S. Clarkson	207,949
Bedstead, wardrobe, J. M. Montgomery, Jr.	207,975
Belt coupling, A. Sirois	207,903
Bevel, F. L. Cook	207,950
Bit stock, ratchet, H. C. Hart	207,964
Blank forming machines, metal, M. L. Bassett	207,840
Book binding, F. S. Hasbrouck	207,808
Boot and shoe nailing machine, H. Dunham	207,956
Bottle stopper and fastener, H. W. Putnam	207,982
Box, express, H. H. Kingsbury	207,969
Brake, car, D. A. Rees	207,819
Brake, wagon, P. Smith	207,824
Brick kiln, J. Kingsbury	207,875
Broom, J. Arbeiter	207,837
Brush, blacking, R. C. Doane	207,953
Brushes, manufacture of, C. L. W. Baker	207,793
Buckle, bale tie, J. L. Sheppard	207,901
Bullion, refining base, L. Balbach	207,937
Button fastener, G. W. Prentice	207,818
Button polishing machine, W. F. Niles	207,889
Calculating machine, R. Verea	207,918
Can, liquid, F. Willcox	207,926
Car berths, arm for sleeping, J. R. Fish	207,861
Car coupling, J. C. & W. H. Stratton	207,992
Car coupling, Van Hoesen & Brown (r)	8,412
Car coupling, Webb & Tinker	207,921
Car coupling tool, A. Sullings	207,994
Car door fastening, freight, W. Engles	207,859
Carbonizing apparatus, beverage, B. Bates	207,841
Carbureter, T. Miner	207,886
Carbureting apparatus, L. H. Reid	207,983
Carriage top standard, E. Betz	207,941
Cartridge loading mechanism, R. H. Dalzell	207,853
Cattle guard, Hallner & Lindquist	207,963
Chair, dental, H. C. Tripp	208,000
Chair, rocking, J. F. Schulte	207,900
Chill for car wheels, J. A. Barr	207,794
Chuck, M. McAnly	207,882
Churn, W. F. Baird	207,935
Churn dasher, W. B. Mumbrue	207,888
Cigar cap, J. T. Emerick	207,858
Cloth shearing machine, rest for, E. Woolson	207,929
Coffee pot, J. M. Davis	207,952
Combs, rounding the ends of, W. Booth	207,845
Condenser, siphon, G. H. Starbuck	207,827
Cooking apparatus, steam, L. H. Ayer	207,838
Corkcutting machine, J. C. Tennent	207,830
Culinary utensil, A. F. McConnell	207,974
Cultivator, J. C. Boyd (r)	8,406
Cultivator, W. Henigst	207,808
Curtain roller and bracket, E. T. Hingham	207,965
Curtain roller and bracket, P. W. Phillips (r)	8,404
Dental drill, W. M. Reynolds (r)	8,409
Dock, Bell & Costello	207,843
Drilling machine, rock, A. J. Mershon	207,885
Earring cover, A. Hessels	207,869
Elevator, ice, R. G. Brown	207,848
Elevator, water, A. B. Davis	207,799
Engine and pump, steam, J. G. Baker	207,936
Engine, rotary, J. Jardine	207,968
Fabrics, measuring and marking, S. C. Talcott	207,912
Faucet, H. Alexander	207,931
Faucet and cock, R. F. Gillin	207,961
Fence wire, barbed, K. Tysdal	208,001
File, bill and letter, T. Orton	207,817
File holder, R. Hudson	207,967
Fire escape, W. Duryea	207,856
Fish drier, D. H. Tetu	207,913
Flooring, portable parquetry, A. Siemroth	207,990
Fluting machine, C. A. Sterling (r)	8,403
Fork, horse hay, J. Frank	207,863
Fruit picker, G. Shelton	207,988
Furnace, ore roasting, D. J. O'Harra	207,890
Furnace, reverberating, W. Mann	207,972
Gauge and glass tube cutter, steadying, W. Heyn	207,809
Game table, G. L. Witsil	207,835
Gas generating burner, Stead & Bayley	207,828
Gas regulator, C. D. Vail	207,832
Gate hanger, J. S. Smith	207,825
Gate, sluice and flood, B. D. Downs	207,955
Glass, process for annealing, A. Weyer	207,924
Governor for horse powers, J. D. Reiff	207,984
Governor, steam engine, Moore & Scott	207,976
Grain binder, Ross & Parker	207,821
Grain binder, C. Van Houten	208,002
Grain separator, J. F. Becker	207,842
Grain separator, R. B. Robertson	207,985
Hame, J. J. Carpenter	207,944
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Harvester, corn, C. K. Conner	208,005
Hedge trimmer, J. A. Stephenson	207,829
Herrings, packing, G. T. Peters	207,980
Hook, F. Kortick	207,877
Horse detacher, W. G. Cummins	207,951
Horse power, P. Beche	207,795
Horseshoe, A. W. Smith	207,905
Jacket, measuring, H. Lingen	207,880
Jewelry base, design for a, Keller & Frey (r)	8,413
Lamps, etc., lighter and extinguisher, S. C. Swett	207,995
Latch, gate, E. S. Shellhouse	207,823
Lathe, screw cutting, A. F. Cherry	207,852
Leather dressing machine, A. J. Alexander	207,930
Lifting jack, J. Buel	207,850
Lifting jack, W. Kniffin	207,876
Lifting jack, J. B. Smith	207,909
Lubricator, vehicle axle, Wayland & Berry	207,920
Mailing package, H. G. Pearson	207,979
Medical compound, W. M. Green	207,864
Milk, separating cream from, P. Shaw	207,822
Motor, hydraulic, W. B. Cass	207,945
Necktie fastener, A. M. Smith	207,826
Nut cracker, C. F. Ritchel	207,897
Ore separator, E. B. Hastings	207,867
Ore separator, T. S. Lewis	207,878, 207,879
Ore washer and amalgamator, Hobart & Best	207,870
Organ, reed, H. W. Smith	207,906, 207,908
Organ valve, reed, H. W. Smith	207,907
Packing for pistons, etc., Horton & Brady	207,871
Packing, piston rod, E. T. Prindle (r)	8,411
Paper box, H. A. Mann, Jr.	207,813
Paper feeding machine, S. Harlow	207,805
Paper sizer and varnisher, R. McNamee (r)	8,407
Patterns, tool for cutting out, D. F. Hartford	207,866
Peg float, A. Whittemore	207,925
Pencil, draughting, F. W. McGee	207,883
Pianoforte action, upright, C. F. Chew	207,946
Pianoforte frame, upright, C. F. Chew	207,947
Pipes, etc., from rubber, etc., H. J. Merrens	207,884
Pitcher, ice, T. C. Smith	207,910
Pitchers, etc., cover for, L. Selling	207,987
Plaiting machine, M. Bradley	207,796
Plow, H. J. Gentzsch, Sr.	207,960
Plow, F. K. Jennings	207,873
Plow, W. G. Reid	207,895
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Plow, ditching, Stuart & Allen	207,993
Pocket book frame, Read & Prahar (r)	8,408
Press, baling, W. D. Riddick	207,896
Press, broom, D. Bard	207,839
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Printing machine inker, C. H. Bacon	207,934
Pump, W. H. Peterson	207,891
Pump, J. S. Putnam	207,893
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Pumps, walking beams of oil, W. B. Tracy	207,999
Punch, ticket, W. H. Pickford	207,981
Rake, horse hay, Laraway & King	207,811
Rake, horse hay, W. M. Saunders	207,986
Rake, horse hay, G. R. Williams	207,927
Rauge, cooking, D. H. Thomas	207,914

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