

## 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 unequalled 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 Hartwick & 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, 1/2 to 5 H. P. Geo. F. Shedd, Waltham, Mass.

New Hand, Foot, or Steam Band Saws that will cut 7/8 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, \$100, 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, Ferracuta Co., Bridgeton, N. J. Nickel Plating.—A white deposit guaranteed by using our material. Condit, Hanson & Van Winkle, Newark, N. J. English Agency, 19 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, Pittsburg, 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.

Pre-press, 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 Traynam & Gelse, 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, 1/2 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 unskilful 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, *Oreortyx pictus*, Baird; and the widgeon, *Mareca Americana*, Stephens. Our high opinion of the work has already been expressed.



(1) S. B. M. asks how the "béton concreté," 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 (methyl 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 1/2 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 x 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 =  $\frac{\text{mean pressure (in lbs. per sq. inch)} \times (\text{piston speed in feet per minute}) \times (\text{piston area in sq. inches})}{33,000}$

(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 4 1/2 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:

$$\text{Breaking load in lbs. per sq. inch of area} = \frac{5,000}{1 + \left( \frac{\text{square of length in inches} \times 0.004}{\text{square of side in inches}} \right)}$$

(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 1 1/2 diameter by 2 1/2 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 1/2 inch thick. The connecting rod should be from 2 1/2 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 1/2 of an inch in thickness, the ribs are of oak 3/4 of an inch thick and 1 1/4 inch wide, steamed and bent in, and placed 6 inches between centers. The boiler is made of steel 1/2 inch thick in the shell, and the firebox and tube sheets are of iron 1/4 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 3 1/2 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 3/4 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 225 revolutions per minute, and drives the boat 8 miles per hour in still water. The pump is 3/8 of an inch in diameter and 1 1/4 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 radii,

$$r = R - S \times \left\{ 1 - 5708 - \left( \sqrt{0.4674 + \frac{L - 6.2882 \times R}{S}} \right) \right\}, \text{ and}$$

$$\text{if } R \text{ is the smaller of the two radii, the other radius,}$$

$$r = R + S \times \left\{ \left( \sqrt{0.4674 + \frac{L - 6.2882 \times R}{S}} \right) - 1 - 5708 \right\}$$

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 1/2, copper 1/4, and zinc 1/4, 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 1 1/2 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. neroll, 1/2 oz. rosmarinol, 1/4 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 8 1/4 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 3 1/2 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