

Business and Personal.

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Agricultural Implements and Industrial Machinery for Export and Domestic Use. R. H. Allen & Co., N. Y.
For Bolt Forging Machines and Power Hammers, address S. C. Forsaith & Co., Manchester, N. H.

Owners of Steam Engines—We guarantee 25 per cent extra power or an equal saving in fuel, by applying the Ransom Syphon Condenser. T. Sault, Consulting Engineer, General Agent, New Haven, Conn.

For Sale or Royalty—Cotton Stalk Puller, patented April 11. Address T. P. O'Connell, San Antonio, Tex.

Rubber Hydrant Hose, Hose Pipes and Couplings, best quality. Send for Prices to Bailey, Farrell & Co., Pittsburgh, Pa.

Wanted—Situation as Supt. or Foreman of Machine Works or Shop, by Machinist of 22 years' experience. Address Machinist, P. O. Box 393, Chicopee, Mass.

"Dead Stroke" Power Hammers—recently greatly improved, increasing cost over 10 per cent. Prices reduced over 20 per cent. Hull & Belden Co., Danbury, Ct.

Driving Belts made to order, to accomplish work required. Send full particulars for prices to C. W. Army, 148 North Third St., Philadelphia, Pa.

Power & Foot Presses & all Fruit-can Tools. Ferracute Wks., Bridgeton, N. J. & C. 27, Mch. Hall, Cent'l.

Johnson's Universal Lathe Chuck—Awarded the highest Premium by the Franklin Institute of Phila., for "Durability, Firmness, and adaptation to variety of work." Lambertville Iron Works, Lambertville, N. J.

Metallic Letters and Figures to put on Patterns of Castings, all sizes. H. W. Knight, Seneca Falls, N. Y.

Wanted—A means of Waterproofing Manila Paper at a cost not exceeding 2 or 4 cents a lb. Address Chas. R. Chute, Minneapolis, Minn.

We beg to call the attention of our readers to the advertisement of Geo. W. Read & Co., No. 200 Lewis St., where the largest assortment of Rare and Fancy Woods for amateur workers is constantly to be found.

Safety and Economy—Eclipse Sectional Steam Boiler. First Class references. Lambertville Iron Works, Lambertville, N. J.

Woman's Shoes—Patent for Sale, either whole or State Rights. Address C. Steckel, 199 Allen St., N. Y.

To Umbrella & Parasol Makers—Improvement in Handles for Sale. Address N. P. Fassett, Elmira, N. Y.

Water Wells—Wanted descriptive circulars, best apparatus for boring or driving, and best terms to agent. W. P., 1407 Ripley St., Davenport, Iowa.

Engine Builders and Mill Furnishers, send Circulars or Card to Benson Brothers, Centralia, Ill.

For Sale—35 in. 16 1/2 ft. Lathe, \$400; 18 in. 10 ft. do., \$125; 15 in. 8 ft., \$100; 19 1/2 in. 7 ft. Stover do., \$215; 9 ft. Planer, \$400; 6 ft. Planer, \$25; 12 in. Slotter, \$390; Profiling Machine, \$250. Shearman, 45 Cortlandt St., N. Y.

Lawn Mowers for Hand, Pony, or Horse—Prices reduced. Largest stock in the city. A. B. Cohn, 197 Water St., New York.

Wanted—25,000 lbs. 2nd hand light T rail. E. B. Seeley, Bowling Green, Ky.

For Sale—Complete outfit of machinery for the manufacture of cotton waste, cost \$2,300. Price \$700. Forsaith & Co., Manchester, N. H.

For Sale—24 in. x 24 ft. Lathe, with Chuck; two 13 in. Lathes; one 7 ft. x 24 in. Planer; two 8 in. Shapers. E. P. Bullard, 48 Beekman St., New York.

The Photo-Engraving Co. have been obliged to remove from 62 Cortlandt St. to a larger building at 67 Park Place. Their Relief Plates for Newspaper, Book, and Catalogue Illustrations are rapidly taking the place of Wood Cuts and are unsurpassed. See advertisement in another column of this paper.

For the best Patent Self-Opening Gates for Carriages, in any Style of Wood or Iron, address Cottom & Co., Dayton, Ohio.

400 Machines, new and 2d hand, at low prices, fully described in our printed list No. 6. Send stamp, stating just what you want. Forsaith & Co., Manchester, N. H.

Split-Pulleys and Split-Collars of same price, strength, and appearance as Whole-Pulleys and Whole-Collars. Yocom & Son, Drinker St., below 147 North Second St., Philadelphia, Pa.

The Bastet Magnetic Engine for running Sewing Machines, Lathes, Pumps, Organs, or any light Machinery, 1-32 to 1/2 horse power. Agents wanted. Address with stamp, 1113 Chestnut st., Philadelphia, Pa.

The French Files of Limet & Co. have the endorsement of many of the leading machine makers of America. Notice samples in Machinery Hall, French Department, Centennial Exposition. Homer Foot & Co., Sole Agents, 22 Platt St., New York.

First class Amoskeag Steam Fire Engine for Sale, 2d hand, \$1,200. Forsaith & Co., Manchester, N. H.

Trade Marks in England—By a recent amendment of the English laws respecting Trade Marks, citizens of the United States may obtain protection in Great Britain as readily as in this country, and at about the same cost. All the necessary papers prepared at this Office. For further information address Munn & Co., 37 Park Row, New York city.

Shingles and Heading Sawing Machine. See advertisement of Trevor & Co., Lockport, N. Y.

For Sale—Sturtevant No. 7 Hot Blast Apparatus, \$400. Forsaith & Co., Manchester, N. H.

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 39 Park Row, New York.

Steel Castings, from one lb. to five thousand lbs. Invaluable for strength and durability. Circulars free. Pittsburgh Steel Casting Co., Pittsburgh, Pa.

For best Presses, Dies, and Fruit Can Tools, Bliss & Williams, cor. of Plymouth and Jay, Brooklyn, N. Y.

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

Hotchkiss & Ball, Meriden, Conn., Foundrymen and workers of sheet metal. Fine Gray Iron Castings to order. Job work solicited.

For Solid Emery Wheels and Machinery, send to the Union Stone Co., Boston, Mass., for circular.

For Sale—2 Hunneman Hand Fire Engines with Hose Carriage, second hand, 5 1/2 in. cylinder, 15 in. stroke. Price, each, \$425. Forsaith & Co., Manchester, N. H.

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing Metals. E. Lyon, 470 Grand Street, New York.

Spinning Rings of a Superior Quality—Whitinsville Spinning Ring Co., Whitinsville, Mass.

For best Bolt Cutter, at greatly reduced prices, address H. B. Brown & Co., New Haven, Conn.

Diamond Tools—J. Dickinson, 64 Nassau St., N. Y.

Temples and Oilcans. Draper, Hopedale, Mass.

Hand Fire Engines, Lift and Force Pumps for fire and all other purposes. Address Rumsey & Co., Seneca Falls, N. Y., U. S. A.

See Boulton's Paneling, Moulding, and Dovetailing Machine at Centennial, B. 8-55. Send for pamphlet and sample of work. B. C. Mach'y Co., Battle Creek, Mich.



R. R. will find directions for tempering rock drills on p. 202, vol 31.—R. N. will find directions for calculating the strength of boilers on pp. 116, 165, vol. 28.—J. C. N. will find a description of the speed indicator for railway trains on p. 271, vol. 33.—R. N. will find a recipe for lemon sugar on p. 378, vol. 30.—B. & S., W. C. J., F. H. S., M. F., H. D., and others, who ask us to recommend books on industrial and scientific subjects, should address the booksellers who advertise in our columns, all of whom are trustworthy firms, for catalogues.

(1) A. C. H. asks: What is the best cement to resist the action of bisulphide of carbon? A. One of the best cements for this purpose is a solution of glue in warm dilute glycerin.

(2) F. B. says: Our schoolhouse is 30 x 50 feet on the ground, with only one floor. The ground is clayey and hard to drain. The frost raises it very badly. Is it practicable to set it on iron posts in such a way that the frost will not move it? A. Under each post of the building, place a timber post of good size, extending into the ground about five feet, and foot it upon the middle of a mudsill, of the same size and eight feet long, laid horizontally. Secure the foot of the post to the sill by an iron clevis bolted through the post, and provide a timber brace upon either side, from the post to the end of the mudsill. In filling in the trench, let the filling around the post be of large stone. If you are willing to take still greater precautions, you can lay another mudsill, at right angles to the one above described, to each post, and brace it in the same manner.

(3) E. P. R. says: I have a roof 16 x 24 feet, with a pitch of 3 feet, covered with shingles. It leaks badly. Is there anything that can be applied so the shingles that will make a perfect roof? A. The roof (about 1 1/2 inches to the foot) is too flat. Elevate it so as to give a pitch of 6 inches to the foot, and then ordinary repairs will make it tight.

(4) B. J. M. says: I want something to elevate as much as 1 1/2 tons freight about 20 feet, that one man can handle. A. A differential pulley block and chain will answer your purpose. They may be obtained from any machinists' supplies store.

(5) A. P. McC. asks: How can we ventilate our schoolhouse? It is heated by steam through coils of pipe around the sides of rooms. The building is of brick; and there are 20 rooms, each about 30x60 feet. A. Without plans of your building we cannot answer you specifically; but we would suggest generally the introduction of fresh air upon the coils of heating pipe, in such a manner as not to create drafts, and its discharge at the ceiling on the opposite side of the room.

(6) G. J. B. says: A roof leaks; it is of galvanized iron, and has been on several years. When I purchased the house, I was advised to cover the iron with two or three coats of a mixture of coal tar, Portland cement, and lime, and did so, at a cost of \$50. I find, however, that the cement and lime get washed away, and that the cure is only partial. The iron is very good except in spots. How can these leaks be stopped? A. The iron is probably in large sheets, without the proper allowance for contraction and expansion; and this has opened the joints. A good roofer should be able to scrape all those places bare and clean and solder them tight, if the iron is not too much rusted away. In this way it might be made to serve a year or two; but the best job would be to put on a new tin roof in small sheets.

(7) H. asks: 1. If the Rumford method cannot be applied to show how much more light is concentrated upon a given surface by a concave reflector placed behind an artificial light than would be received from the same light at the same distance without the reflector, then by what process can the question be determined? A. The best way to find the utilizing power of concave mirrors is first to determine the loss of light by reflection of the material of which the mirror is made, then its size, its curvature, and the surface section of the bundle of parallel rays. 2. Is the following a correct rule to ascertain what proportion of light from a spherical source (a round charcoal set aglow, for instance) will fall upon a page of a given size? "Compute the surface measurement of a sphere whose diameter is twice the distance of the page from the flame, and the proportion which a page of a given size bears to the entire surface of the sphere will be the proportion of the whole amount of light falling upon the page, provided the page is held at right angles to the rays of light." If the rule is as stated, to what extent should it be modified when applied to a flat flame? A. The rule is correct, and need not be modified for flat flames, as such flames give the same amount of light in all directions, either from the edges or from the flat surface: flames being perfectly transparent for the light of other flames, and every part of a flame transparent for every other part of the same.

(8) H. asks: 1. With two lamps, which are proved by the Rumford or any like method to emit equal quantities of light, as a basis for a test, can the Rumford method be applied to test the utilizing power of concave mirrors by placing one

of the lamps before a concave mirror, in its principal focus, and then varying the distance of the two lights from the screen until the shadows are sensibly equal in density? A. The method proposed could not give correct results, as the reflection from a concave mirror introduces complex circumstances, which make the comparison with a simple lamp impracticable. 2. Will the law of inverse squares apply to determining how many lamps, at the same distance, would be required to equal the amount of light thrown upon the screen by the lamp placed before the reflector? A. As soon as you place the lights in the focus of a concave mirror, you make the reflected rays parallel, and the law of inverse squares is no more applicable, being based on the divergence of rays from a point. 3. Will a test with the lights at any distance from the screen indicate with accuracy the relative utilizing power of the reflector, no matter what the distances? A. In order to determine correctly the relative utilizing power of reflecting surfaces, the only correct method is to use plane reflectors. 4. Can the photometric method be applied to make the same tests? A. The ordinary photometric method is the best for the tests in question, provided concave reflectors are excluded.

(9) J. G. C. asks: 1. Is any form of galvanic battery patentable? A. Yes, any new and useful form. 2. Can carbon plates for batteries be made out of plumbago? A. Yes. 3. Which is the best of all wood for insulation? A. The driest wood is the best. 4. Will oiling or polishing impair its insulating properties? A. No.

(10) I. E. T. asks: 1. Does the conducting power of a lightning rod depend on its surface or the area of its cross section? A. The latter. 2. Is there any gain in increasing the conducting power of a rod, without increasing the number of points? A. Yes, up to a certain point. 3. Is copper any cheaper for lightning rods than iron? A. No. 4. Why are iron wires so extensively used for telegraph lines? A. Because they are stronger.

(11) J. F. A. says: Please let me know the best method of case hardening thin steel plates so that they will not crack, twist, or bend in hardening. A. Cool them off between two flat gratings of cast iron, having small surfaces of contact.

(12) G. W. C. says: I was running a locomotive engine, when the firebox gave way. She had a solid gage of water in the boiler; but the crown and flue sheets sprang from the sides, and her flues were collapsed. She was carrying 135 lbs. pressure at the time. She had been known to stand on a grade for twenty minutes at a time before; and she would show water at the bottom cock, with a good injector at work all the time. I contend that the water getting low so often weakened the boiler, which, carrying a heavy pressure of steam, could not stand any longer. I also think that, if she had not been running at the time, the boiler would have exploded; but as she was pulling a train, a strong draft passed through the flues and helped to resist the pressure of steam. A. The boiler was, no doubt, weakened from the wide range of temperature, and therefore of expansion and contraction, which necessarily follows from letting the water get so low as to require to stand still on the road to fill up. Under such conditions, the destruction of the strength of the boiler is very rapid. Your idea as to the draft through the flues resisting the pressure is erroneous.

(13) J. M. M. says: I turned a paper calender roll so that it ran perfectly true. I then applied an emery wheel to finish with; but before the wheel had gone across the face of the roll, the roll ran out of true about 3/16 inch. The lathe center ran true, the wheel post was firm, and everything else about the lathe was right. Why did the roll run out? My theory is that, in pressing the roll, the shaft was sprung; and in turning the paper off, the shaft sprung back, thus throwing the roll out of true. A. Your theory is probably a correct one.

(14) H. K. S. asks: 1. Would even a good lightning rod contain one of the heavier charges of lightning, such as would shiver a good sized tree to pieces? A. Yes. 2. What would you consider a good rod? A. An iron rod half an inch in diameter.

(15) P. C. C. asks: I have a rotary steam engine running at 4,000 revolutions per minute. The piston is 1x1 1/2 inches. I hold 100 lbs. pressure on piston of engine. How many horse power has this engine? A. The horse power of rotary engines varies too much to admit of calculation, a remark which applies equally to consumption of steam, and hence to size of boiler.

(16) R. D. W. says: We are having some trouble in making a quarter twist belt run. We have been running a 6 inch rubber belt which ran all right; but now we wish to change to a 6 inch leather belt, which will not run anywhere with the pulleys in the same position as the rubber belt. Is the trouble with the shafting? A. Since your rubber belt ran properly, the shafts must be right; hence a wider leather belt will remove your difficulty.

(17) I. H. S. says: I have had lightning rods placed on my house this spring, but I am doubtful if they have been properly put on or not. They are galvanized, are run up about four feet above the chimneys, one on each end of the house, and run along the ridge of the roof, joining in the center, thence down the roof on to a back kitchen, when another branch joins on from the kitchen chimney, and all run down to about 4 1/2 feet in the ground, which the person who put them up says is sufficient, as the ground is only about 8 or 10 feet above the level of Lake St. Louis. I would like to know if it is proper to have the rods laid on to the shingles, as has been done, and merely fastened on with tacks and strips of zinc. Is a galvanized conductor as good as a

copper one? A. Iron has only about one fifth the conducting power of copper. The value of the rod depends upon its size. If it has a diameter of half an inch, it will answer. There ought to be several conductors leading into the earth. Four and a half feet is not sufficient for a ground. You should dig down until you reach water, then dig several lateral trenches, say 10 feet in length, lay down in them iron bars or rods, the larger the better, and connect all your rods to them. Your rods should be welded together so as to leave no bad joints. There is no objection to nailing the rods to the woodwork or shingles.

(18) F. E. N. says: Has not atmospheric electricity small quantity with great intensity? A. Atmospheric electricity may possess both great quantity and great intensity.

(19) I. V. R. says: In No. 17, vol. 1, of your SUPPLEMENT I noticed an article in relation to the increase of the spark of an induction coil. I have a very fine six inch coil made mostly from instructions which you have from time to time published in the SCIENTIFIC AMERICAN, and upon which I tried the following experiment without any result: I attached one end of a copper wire to the street water pipes, and the other to one of the secondary poles of the coil; and the spark remained in every respect as before. Judging from the article above referred to, I should have obtained a lengthening and strengthening of the spark. Did I work correctly or not? A. You should touch the two ends of your induction coil wires together to get a spark.

(20) W. D. E. asks: 1. How powerful a battery would it require to light 100 gas jets at an average distance of 100 feet from the battery? A. Use 100 cells of the gravity battery, or 75 cells Leclanché. 2. What would be the original cost of battery, and what the cost of keeping in operation? A. The cost would be about \$150. The cost of maintenance would be small.

(21) A. N. H. says: I have erected a private telegraph line (stove pipe wire, painted and well insulated) 300 feet in length, having a sounder and relay at each extremity, and wish to connect another set about midway, without local battery. I have applied five cells of Daniell's battery at one end of line, and one cell Watt's battery (electroplating) at the other; but I do not get as strong a current to operate instruments as I desire. How many cells should operate said line? A. A greater number of cells will be required to work a line 800 feet in length if the earth is used for a return than if a wire is used to complete the circuit. 2. If I place different kinds of batteries in the circuit, having unequal dynamical power, will they not unitedly give a steady electrical force, in whatever juxtaposition the cells are placed in line of battery, provided the anodes and cathodes are properly arranged? A. You can use different kinds of battery cells upon one wire without difficulty. 3. Please give a definite idea of one ohm of electrical resistance, or actual power of said unit of measure. A. An ohm is equal to the electrical resistance of about 400 feet of the best quality of No. 8 iron wire.

(22) J. R. C. says: I have read of a telegraph by which it is possible to send and receive two messages at the same time, over the same wire, without either message interfering with the other. Can you help me to find out the particulars of the experiments above referred to? A. The Western Union Company are extensively using apparatus by which four messages are simultaneously transmitted over one wire. See p. 151, vol. 33.

(23) G. L. B. asks: What can I put on a brass plate so that the fingers and the damp air will not tarnish it? A. Try lacquer.

(24) C. S. P. asks: What shape of stationary cutter should I use to turn wood in a lathe, so as not to tear the wood? A. A flat cutter made with a lip on the top face, with a keen edge, will answer your purpose.

(25) G. A. M. asks: Can a person in a very deep well see stars in the daytime? A. Yes, if the atmosphere is clear. 2. If so, why? A. Because the light reflected from the surrounding objects on the earth is cut off, and there is not light enough reflected from a column of clear air, of the size of the well, to obliterate the light of the larger stars.

On Thursday in America, what day is it in Europe? A. It will be Thursday also, at any time before about 6 o'clock P. M., Washington civil time. The day changes at every place at midnight.

(26) J. B. says: I cannot give my crayon drawings a fine finish, and wish to know what paper is best. A. We believe your trouble is in the paper. To make smooth drawings, the paper should have a close body with a very fine tooth. Bold effects (to be examined only at a distance) may be made on the coarser paper.

(27) V. M. D. asks: Is cow hair used for any purposes other than for plaster? A. Yes; it is made up into cloths.

(28) A. L. L. says: 1. What is gelatin of which magnetic fish are made? A. It is refined glue. 2. What is the process by which the fish are made? A. By stamping from sheets that have already been rolled to the proper thickness.

(29) J. F. & J. G. say: What causes hair to turn gray in young persons? A. It may be congenital or accidental, depending upon some constitutional peculiarity in the organization of the individual; causes which have been observed to produce it are mental emotion, disease, and injuries. Grief and terror have been known to cause it, varying in time from a few hours to years. Bichat says: "The different passions of the mind have a remarkable influence over the internal structure of the hair; often, in a short period of time, grief effects changes in its color, bleaching the hair, probably by means of absorption of the fluids contained in its tissues." The treatment is to re-