

Business and Personal.

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

The publishers of this paper guarantee to advertisers a circulation of not less than 50,000 copies every weekly issue.

GEM CITY TOBACCO WORKS, QUINCY, ILL., May 21, '80. H. W. Johns Mfg Co., 81 Maiden Lane, New York.

DEAR SIR: Please give us lowest figures on Asbestos Roofing. We bought several years ago 200 squares. . . . We are talking up your roofing wherever we have a chance. [Signed] M. GOODMAN, Secretary.

Foundry and Machine Shop.—A Practical Moulder wanted as Partner in a long established business. For particulars apply to or address W. B. McKeldin, Athens, McMinn County, E. Tenn.

For Sale.—A Baltimore City Fire Department Steam Fire Engine, in complete working order. Address P. O. Box 676, Baltimore, Md.

For Jack Chain Machines, making from 60 to 100 links per minute, direct from the coil, address Cross & Speirs, Waterbury, Conn.

The easiest Writing Pen made—the Choctaw—by the Esterbrook Steel Pen Company, 26 John St., New York. Price \$1 per gross.

About \$2,500 will buy a small Machine Shop. Can be seen at 155 Broadway, Newburg, N. Y.

Wanted—A good reliable person, who has sufficient means to apply for foreign patents for a valuable invention. Address George S. Agee, Minthill, Osage Co., Mo.

Metallic Piston Rod Packing Company, 773 Broad St., Newark, N. J. Agents wanted; terms liberal.

For Sale.—Patent for Perpetual Calendar Inkstand, illustrated in this paper, together with moulds, and a list of 5,000 stations. Address S. M. Howard, Administrator, 1207 Main St., Wheeling, W. Va.

Lubricene, Gear Grease, Cylinder and Machinery Oils. R. J. Chard, 6 Burling Slip, New York.

Skinner & Wood, Erie, Pa., Portable and Stationary Engines, are full of orders, and withdraw their illustrated advertisement. Send for their new circulars.

Patent Steam Cranes. See illus. adv., page 381.

Recipes and Information on all Industrial Processes. Park Benjamin's Expert Office, 49 & 50 Astor House, N.Y.

Asbestos Board on Chimneys prevents their heat from affecting the temperature of rooms through which they pass. Asbestos Pat. Fiber Co., lim., 194 Broadway, N. Y.

Wilson's Business Directory, second edition, and Wilson's Co-partnership Directory for 1880-81, are now ready. Price, \$3 each. All orders addressed to the Trow City Directory Company, No. 11 University Place, New York, promptly attended to.

\$5 to \$20. A County Right. A Clothes Line Fastener. Sample by mail, 20 cents. J. A. Worley, Cleveland, O.

Sweetland & Co., 126 Union St., New Haven, Conn., manufacture the Sweetland Combination Chuck.

Power, Foot, and Hand Presses for Metal Workers. Lowest prices. Peerless Punch & Shear Co., 52 Dey St., N. Y.

The Brown Automatic Cut-off Engine; unexcelled for workmanship, economy, and durability. Write for information. C. H. Brown & Co., Fitchburg, Mass.

Corrugated Traction Tire for Portable Engines, etc. Sole manufacturers, H. Lloyd, Son & Co., Pittsburgh, Pa.

For the best Stave, Barrel, Keg, and Hogshead Machinery, address H. A. Crossley, Cleveland, Ohio.

Best Oak Tanned Leather Belting. Wm. F. Forepaugh, Jr., & Bros. 331 Jefferson St., Philadelphia, Pa.

National Steel Tube Cleaner for boiler tubes. Adjustable, durable. Chalmers-Spence Co., 40 John St., N. Y.

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

Stave, Barrel, Keg, and Hogshead Machinery a specialty, by E. & B. Holmes, Buffalo, N. Y.

Steel Figures, \$1; Letters, \$3 a set. York & S., Clev., O.

Solid Emery Vulcanite Wheels—The Solid Inferior 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.

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

Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, importers Vienna lime, crocus, etc. Condit, Hanson & Van Winkle, Newark, N. J., and 92 and 94 Liberty St., New York.

Wright's Patent Steam Engine, with automatic cut off. The best engine made. For prices, address William Wright, Manufacturer, Newburgh, N. Y.

Presses, Dies, and Tools for working Sheet Metal, etc. Fruit & other can tools. Bliss & Williams, B'klyn, N. Y. Bradley's cushioned helve hammers. See illus. ad. p. 365.

Electrical Indicators for giving signal notice of extremes of pressure or temperature. Costs only \$20. Attached to any instrument. T. Shaw, 915 Ridge Ave., Phila.

Instruction in Steam and Mechanical Engineering. A thorough practical education, and a desirable situation as soon as competent, can be obtained at the National Institute of Steam Engineering, Bridgeport, Conn. For particulars, send for pamphlet.

Hydraulic Jacks, Presses and Pumps. Polishing and Buffing Machinery. Patent Punches, Shears, etc. E. Lyon & Co., 470 Grand St., New York.

Forsyth & Co., Manchester, N. H., & 207 Centre St., N. Y. Bolt Forging Machines, Power Hammers, Comb'd Hand Fire Eng. & Hose Carriages, New & 2d hand Machinery. Send stamp for illus. cat. State just what you want.

Burgess' Non-conductor for Heated Surfaces; easily applied, efficient, and inexpensive. Applicable to plain or curved surfaces, pipes, elbows, and valves. See p. 284.

Eclipse Portable Engine. See illustrated adv., p. 349.

Telephones repaired, parts of same for sale. Send stamp for circulars. P. O. Box 205, Jersey City, N. J. 4 to 40 H. P. Steam Engines. See adv. p. 348.

For best low price Planer and Matcher, and latest improved Sash, Door, and Blind Machinery, Send for catalogue to Rowley & Hermance, Williamsport, Pa.

Blake "Lion and Eagle" Imp'd Crusher. See p. 365.

The only economical and practical Gas Engine in the market is the new "Otto" Silent, built by Schleicher. Schumm & Co., Philadelphia, Pa. Send for circular.

Special Wood-Working Machinery of every variety. Levi Houston, Montgomery, Pa. See ad. page 366. Peck's Patent Drop Press. See adv., page 364.

Air Compressors, Blowing Engines, Steam Pumping Machinery, Hydraulic Presses. Philadelphia Hydraulic Works, Philadelphia, Pa.

Improved Solid Emery Wheels and Machinery, Automatic Knife Grinders, Portable Chuck Jaws. Important, that users should have prices of these first class goods. American Twist Drill Co., Meredithville, N. H.

Elevators.—Stokes & Parrish, Phila., Pa. See p. 382.

For best Portable Forges and Blacksmiths' Hand Blowers, address Buffalo Forge Company, Buffalo, N. Y. For Standard Turbine, see last or next number.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Eagle Anvils, 10 cents per pound. Fully warranted.

Wanted—The address of 40,000 Sawyers and Lumbermen for a copy of Emerson's Hand Book of Saws. New edition 1880. Over 100 illustrations and pages of valuable information. Emerson, Smith & Co., Beaver Falls, Pa.

\$275 Horizontal Engine, 30 H. P. See page 382.

For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling, see Christie's ad. p. 316.

Elevators, Freight and Passenger, Shafting, Pulleys and Hangers. L. S. Graves & Son, Rochester, N. Y.

For Wood-Working Machinery, see illus. adv. p. 380.

Tight and Slack Barrel machinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus. adv. p. 303.

For Separators, Farm & Vertical Engines, see adv. p. 383.

Best American Shot Gun made is the "Colts." Far superior to any English guns for the same price. For description, see Sci. AMERICAN of May 29. Send for circular to Hodgkins & Haigh, Dealers in General Sporting Goods, 300 Broadway, New York.

Comb'd Punch & Shears; Universal Lathe Chucks. Lambertville Iron Works, Lambertville, N. J. See ad. p. 301.

For Mill Mach'y & Mill Furnishing, see illus. adv. p. 381.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 381.

For Middlings, Mill and Mill Furnishing, see adv. p. 381.

C. J. Pitt & Co., Show Case Manufacturers, 226 Canal St., New York. Orders promptly attended to. Send for illustrated catalogue with prices.

Rollstone Mac. Co.'s Wood Working Mach'y ad. p. 380.

Machine Knives for Wood-working Machinery, Book Binders, and Paper Mills. Large knife work a specialty. Also manufacturers of Solomon's Parallel Vise. Taylor, Stiles & Co., Riegelsville, N. J.

Penfield (Pulley) Block Works. See illus. adv. p. 382.

Wheels and Pinions, heavy and light, remarkably strong and durable. Especially suited for sugar mills and similar work. Circulars on application. Pittsburg Steel Casting Company, Pittsburg, Pa.

For Patent Shapers and Planers, see ills. adv. p. 380.

NEW BOOKS AND PUBLICATIONS.

THE AMERICA HOYLE. Dick & Fitzgerald, New York. Price \$2.

A revised edition of this authoritative handbook of games, rewritten and adapted to the American method of playing, has just been issued. The compiler claims for this book the most recent and reliable rules practiced in this country. A chapter on the doctrine of chances embraces curious problems which interest every one.

ON THE GHOSTS IN RUTHERFORD'S DIFFRACTION SPECTRA. By C. S. Peirce. 4to, pp. 17.

A QUINCUNCIAL PROJECTION OF THE SPHERE. By C. S. Peirce. 4to, pp. 3, with Chart of the World on a Quincuncial Projection.

Two important contributions to exact science, published by the authority of the Superintendent of the United States Coast and Geodetic Survey, in the American Journal of Mathematics, Vol. ii., 1879. The quincuncial projection which Mr. Peirce has invented possesses the following properties: 1. The whole sphere is represented on repeating squares. 2. The part where the exaggeration of scale amounts to double that at the center is only 9 per cent of the area of the sphere, against 13 per cent for Mercator's and 50 per cent for the stereographic. 3. The angles are exactly preserved. 4. The curvature of lines representing great circles is in every case very slight over the greater part of their length.

METHODS AND RESULTS. NOTE ON THE THEORY OF THE ECONOMY OF RESEARCH. By C. S. Peirce. Quarto, pp. 7.—MEASUREMENTS OF GRAVITY AT INITIAL STATIONS IN AMERICA AND EUROPE. By C. S. Peirce. Quarto, pp. 145. Washington: U. S. Government Printing Office. 1879.

These valuable reports are reprinted from the Report of the United States Coast Survey for 1876, to which they form appendices No. 14 and No. 15.

TWELFTH AND THIRTEENTH ANNUAL REPORTS OF THE TRUSTEES OF THE PEABODY MUSEUM OF AMERICAN ARCHEOLOGY AND ETHNOLOGY. Cambridge: 1879 and 1880. Vol. II. Nos. 3 and 4.

In addition to matters purely official these reports contain reports by the Curator on the progress of special explorations under the direction of the museum, and valuable papers by gentlemen engaged in such work. A large part of the Twelfth Report is occupied by the third part of Ad. F. Bandler's elaborate study of the social organization and mode of government of the ancient Mexicans.

THE STANDARD SERIES. New York: I. K. Funk & Co.

Five years ago, in an article entitled "A New Style of Bookmaking Needed," the SCIENTIFIC AMERICAN expressed the successful book maker of the future would print for the million as well as for the few and be the

gainer by it; and that any responsible firm which should enter at once upon the work of publishing good books, especially scientific books, at a quarter the usual price would achieve a splendid success. But they would have to print editions of a hundred thousand. Since that day the business of publishing in cheap form books of temporary interest, chiefly novels, has developed wonderfully; but it has been left for Messrs. Funk & Co. to do the same with books of sterling value, such as we called for so long ago; and they are printing them on legible type, using a good quality of white paper, at rates that are marvelously low. For example there have come to our table Ruskin's Letters to Workmen and Laborers (Fors Clavigera), in two parts, at 15 cents each; Carlyle's Essays on Goethe, Burns, Luther's Psalm, Schiller, Memoirs of Mirabeau, and Death of Goethe, complete in one volume for 20 cents; John Stuart Blackie's three Essays on Self-Culture together, 10 cents; and Knight's Popular History of England, in eight volumes, at 30 cents each, or no more for the entire work than a single volume has cost hitherto. Enterprise and sound judgment of this sort deserves, and we are confident will win, the highest success. The books which are thus placed within the easy reach of the million are such as the million may read with pleasure and profit.

COMMON MIND TROUBLES, AND THE SECRET OF A CLEAR HEAD. By J. Mortimer Granville, M.D., etc. Philadelphia: D. G. Brinton. 1880.

Dr. Granville discusses in a sensible practical way mental and moral failings, defects of memory, confusions of thought, sleeplessness, low spirits, good and bad tempers, etc., and the American editor adds in the same vein chapters on "mental languor and listlessness," and "morbid fear." The second part enforces the lessons taught in the first part and tells how to keep the head clear and the mind efficient. The work is hopeful, thoughtful, and cannot fail to be useful.

MULTIPLICATION AND DIVISION TABLE. By Leonard Waldo, S. D. (Harv.) New York: John Wiley & Sons. 1880. Folio, pp. 4.

This table, containing the product of numbers between one and one hundred, is intended for the use of accountants, computers, and teachers in primary schools. The arrangement of the table is excellent; and, if the large size of the pages does not make it awkward to handle, it cannot fail to greatly facilitate computation.

REPORT OF THE NEW YORK STATE SURVEY FOR 1879. THE NIAGARA FALLS RESERVATION. By James T. Gardner, Director. Albany: Charles Van Benthusen & Sons. 1880.

The first and larger part of this Report is devoted to the examination of the lands around Niagara Falls, with reference to their convenience into a sort of International Park. Part II. covers the work of the general State survey, during the past year, in Onondaga, Oswego, Madison, and Oneida counties. The Report is accompanied by a map of Eastern and Central New York, showing the results, of accurate survey; and the first part is illustrated by a number of heliotype prints of photographs of Niagara scenery.

REPORT OF THE STATE ENGINEER TO THE LEGISLATURE OF CALIFORNIA, SESSION OF 1880. Sacramento: State Office.

In this report State Engineer Hall reviews: 1. The year's operation of the department; 2. The drainage of California valleys, and the improvement of the navigation of the rivers; 3. The flow of mining detritus; 4. The irrigation of the plains; 5. Present condition of the inquiry with regard to California river improvement, storage and disposal of mining detritus, and irrigation.



HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

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.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

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.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

(1) W. F. B. asks: 1. Will not a galvanic battery containing fifty cells become exhausted as soon as one containing but one cell? A. If the work performed is proportionately the same there will be no difference. 2. Is there any way of regulating the consumption of the zincs of a battery, as of coal in a furnace? A. Keep the zincs well amalgamated, and keep them out of the solution when the battery is not in use. This does not apply to sulphate of copper batteries. 3. What dimensions must I follow, if there is any fixed rule, in making electro-magnets of any lifting capacity I may desire? A. As the lifting power of magnets depends on many conditions, no fixed rule can be given. You will find in any good work on electricity rules which will enable you to determine approximately the size of electro-magnets for a given capacity.

(2) J. I. H. writes: I have a piece of table land with a gulch 250 feet deep in it. Fifty feet from the bottom is a spring running a two inch stream. By putting a hydraulic ram in the bottom of the gulch, I will have a head of fifty feet. Will a ram throw a stream to the

top of the gulch? A. Yes; you will probably lift one-eighth to one-tenth the quantity of water running to the same from your spring to the top of the gulch.

(3) G. R. B. writes: In SCIENTIFIC AMERICAN, Vol. xlii., No. 15, you state in answer (10) to E. E. G. that it requires 106 lb. pressure to raise the safety valve under the given conditions. Please give the formula for obtaining said calculation, and oblige your reader. A. The lever is taken at 6 inches length from the valve=21 lb. on the valve (excluding weight of lever), and $21 \times 0000 = 106$ lb. nearly.

(4) W. S. F. asks what to apply to cloth to make it suitable for a small pair of bellows. A. Dissolve gum caoutchouc (native rubber) in about five times its weight of benzine or naphtha by digestion over a hot water bath away from fire. To one part of this solution add eight parts of boiled oil (warm), strain and keep warm (by a hot water jacket) while using.

(5) A. F. O. asks: Why must the materials of the gelatin printing pad be heated in a salt water bath? Suppose I use a simple fresh water bath, what then? A. The boiling point of salt water is higher than that of fresh. A greater heat may thus be obtained without danger of burning the composition.

(6) I. A. R. asks: 1. Is it possible so to destroy mill picks in tempering that they cannot afterward be tempered so as to be of any use? A. Yes. 2. Is milling a science or an art? A. Both. 3. What is the best modern work on milling? A. "Cralk's Millwright and Miller."

(7) D. G. W. asks: Why does it take more length of piston rod to drive an engine's crank pin from one dead center to the quarter than it does from the quarter to the other dead center? A. Because of the angle of the connecting rod. If you drive the crank pin by a "slotted" cross head, you will find no such difference.

(8) R. K. writes: I wish to know if it would be advisable to run a steam hammer 166 feet from the boiler, even if the pipe was lagged with felt? If I get a steam hammer, I will have to use the boiler that distance or get a separate boiler. A. You can drive the steam hammer as you propose, but the steam pipe should be of large size, well protected, and a provision made for drawing off the water of condensation.

(9) G. F. W. writes: One of the hands says a piece of steel, $\frac{1}{8}$ inch thick, taken from the tempering fire and allowed its own time to cool, will continue to draw while cooling; while I say the color changes but the temper does not. A. We are of the opinion that the temper changes with the color; the color is the index of the temper.

(10) R. D. asks: Can the telephone described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 142, page 2261, be made to talk over 50 feet of cotton covered wire by using a battery? A. Yes; use some form of carbon transmitter in connection with it.

(11) E. F. C. writes: 1. In constructing a steam boiler from mercury flasks, as described in your SUPPLEMENT, how many would I need to produce one horse power? A. Eight, six for water and two for steam chamber. 2. I understand that with a magneto-electric machine, properly arranged, an amount of power may be generated greatly superior to the primary source or inducing power. Why is this? Can the same be accomplished with an induction coil; if not, why? A. You are misinformed. The magneto-electric machine does not create power.

(12) W. H. W. asks: 1. What is the power required to drive the dynamo-electric machine described in SUPPLEMENT 161? A. One man power. 2. Can it be used to electro-plate small articles? A. Yes.

(13) W. R. M. asks: What shall I use to cement the edges of window glass to make a salt water aquarium? A. See receipt for aquarium cement, SUPPLEMENT, No. 157.

(14) T. S. B. asks: 1. What is the best pickle for cleaning brass castings? A. Use a nitric acid bath. Do not allow the articles to remain too long in this. 2. How are steel faces welded on cast iron anvils? A. By placing the steel in position in the mould and pouring in the melted iron.

(15) A. T. B. asks for a receipt for lacquer for brass, one that is thoroughly practical. A. Spirit of wine, 2 quarts; shellac, $2\frac{1}{2}$ oz.; gum sandarac, $\frac{1}{2}$ oz.; gum elemi, $\frac{1}{2}$ oz.; mix and keep gently warmed for several days; strain, color with dragon's blood, and thin with 1 quart spirit of wine.

(16) C. M. M. asks: What is the cheapest fluid that will undergo exposure in pipes to a minimum temperature of 10° Fah. below zero without congealing, or becoming too viscid to flow readily at a velocity of 2 feet per second in a $\frac{1}{2}$ inch pipe—exposure to be for a protracted period? A. Have you tried a saturated aqueous solution of common salt and sulphate of soda?

(17) B. S. asks: 1. How can I ascertain the capacity of a centrifugal pump at different speeds? Its utmost capacity, I presume, would be the quantity of water contained in 500 feet of its suction pipe. A. There is no general rule, as it much depends upon the construction of the pump and height to which the water is to be lifted; the quantity of water in the pipe has little influence upon the quantity delivered. 2. Will not a centrifugal pump lift water with as much ease if placed 20 feet above the level of the water, as it would if only placed 5 or 10 feet above it? A. No; as the smallest air leak would have greater prejudicial effect.

(18) G. S. H. asks: 1. Can you give me an ink that may be applied to enameled calling or playing cards that will show perfectly plain, and that will not destroy the gloss; also tell me how to apply it? I wish a dark blue color, such as is often seen on the back of playing cards. A. Try printer's ink diluted with oil of lavender.

(19) J. L. P. writes: 1. I am building a fountain. Water pumped into reservoir 10 feet from ground by wind engine. Fountain a $\frac{1}{4}$ inch jet fed