

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.

For Sale.—Iron Planer, 50" x 54" x 16 ft.; engine lathes, 25" x 20 ft., 21" x 8 ft.; also six other lathes of various sizes, in A No. 1 condition. Apply to or address John Steptoe & Co., 214 W. Second St., Cincinnati, O.

Wanted.—Copper Ores. Address Stillman & Koefoed, 40 and 42 Broadway, New York city.

Knudson Electrical Company, Limited, No 39 Nassau St., New York, undertakes the patenting and sale in Europe of meritorious inventions on commission.

CHICAGO, October 25, 1882.

H. W. Johns Mfg Co., 87 Maiden Lane, New York. DEAR SIR: I have been using your Asbestos Packing, and can recommend it to engineers and the public generally as the best packing in use. W. CORLIS, Engineer, Sargent, Greenleaf & Brooks, 43 Franklin St., Chicago, Ill.

American Fruit Drier. Free Pamphlet. See ad., p. 301.

Am Twist Drill Co., Meredith, N.H., make Pat. Chuck Jaws, Emery Wheels, Grinders, automatic Knife Grinders.

Fire Brick Tile, and Clay Retorts, all shapes. Bornerg & O'Brien, M'rs, 23d St., above Race, Phila., Pa.

Drop Forgings of Iron or Steel. See adv., page 302.

For best Portable Forges and Blacksmiths' Hand Blowers, address Buffalo Forge Co., Buffalo, N. Y.

Brass & Copper in sheets, wire & blanks. See ad. p. 302.

The Chester Steel Castings Co., office 407 Library St., Philadelphia, Pa., can prove by 20,000 Crank Shafts and 15,000 Gear Wheels, now in use, the superiority of their Castings over all others. Circular and price list free.

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

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

Eagle Anvils, 10 cents per pound. Fully warranted.

Tight and Slack Barrel Machinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus. adv. p. 302.

Garmore's Artificial Ear Drums for relief of partial or entire deafness. Invented by one who has been deaf thirty years. Simple and scientific in construction; not observable in use. Send for circular. John Garmore, S. W. cor. 5th and Race Sts., Cincinnati, O.

Schools open.—Send for Catalogue of Drawing Materials. Keuffel & Esser, New York.

For Mill Mach'y & Mill Furnishing, see illus. adv. p. 300.

Red Jacket Adjustable Force Pump. See adv., p. 302.

Pays well on small investment.—Stereopticons, Magic Lanterns, and Views illustrating every subject for public exhibitions. Lanterns for colleges, Sunday-schools, and home amusement. 116 page illustrated catalogue free. McAllister, Manufacturing Optician, 49 Nassau St., N. Y.

Fine Taps and Dies in Cases for Jewelers, Dentists, Amateurs. The Pratt & Whitney Co., Hartford, Conn. Woodwork'g Mach'y. Rollstone Mach. Co. Adv., p. 302.

Trevor's Patent Key Seat Cutter. Trevor & Co., Lockport, N. Y. See page 302.

Wanted.—A situation by a practical "nickel plater" who understands polishing, grinding, dipping, and brass finishing. Address W. H. Wright, Indianapolis, Ind.

For Sale Cheap—One Boiler Plate Power Punch and Clipper. Inquire of Noble & Hall, Erie, Pa.

The Double Induction Motor and Automatic Battery, Grison's patents, are manufactured and for sale by the Electro Dynamic Co., Philadelphia. This little electric motor, illustrated and described in our editorial, June 24, 1882, is now on exhibition at the American Institute Fair, Alceve 14, New York. Power from 1,000 to 6,000 ft. lb., according to battery. Weight 2 1/2 lb. The only practical power for driving the family sewing machine, small lathes, dental and surgical instruments, etc. 1,000 stitches per minute on the sewing machine. 7,000 revolutions per minute on dental tools. Apparatus complete for sewing machines, lathes, \$35 and \$40. Dental apparatus, nickel plated, complete, \$50.

Cope & Maxwell M'fg Co.'s Pump adv., page 285.

The Berryman Feed Water Heater and Purifier and Feed Pump. L. B. Davis' Patent. See illus. adv., p. 285.

For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling, see Frisbie's ad. p. 286.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 286.

C. B. Rogers & Co., Norwich, Conn.. Wood Working Machinery of every kind. See adv., page 286.

4 to 40 H. P. Steam Engines. See adv. p. 286.

Sheet and cast brass goods, experimental tools, and fine machinery. Estimates given when models are furnished. H. C. Goodrich, 68 to 72 Ogden Place, Chicago.

Drop Forgings. Billings & Spencer Co. See adv., p. 270.

Improved Skinner Portable Engines. Erie, Pa.

Engines, 10 to 50 horse power, complete, with governor, \$50 to \$50. Satisfaction guaranteed. Nearly seven hundred in use. For circular address Heald & Morris (Drawer 127), Baldwinsville, N. Y.

25" Lathes of the best design. G. A. Ohl & Co., East Newark, N. J.

Collection of Ornaments.—A book containing over 1,000 different designs, such as Crests, Coats of Arms, Vignettes, Scrolls, Corners, etc., will be mailed free on receipt of \$1. Address Palm & Fechteler, 6 West 14th Street, New York.

Combination Roll and Rubber Co., 68 Warren street, N. Y. Wringer Rolls and Moulded Goods Specialties.

Pure Water furnished Cities, Paper Mills, Laundries, Steam Boilers, etc., by the Multifold System of the Newark Filtering Co., 177 Commerce St., Newark, N. J.

Latest Improved Diamond Drills. Send for circular to M. C. Bullock Mfg. Co., 80 to 88 Market St., Chicago, Ill.

First Class Engine Lathes, 20 inch swing, 8 foot bed, now ready. F. C. & A. E. Rowland, New Haven, Conn.

Ice Making Machines and Machines for Cooling Breweries, etc. Ictet Artificial Ice Co. (Limited), 142 Greenwich Street. P. O. Box 3083, New York city.

Jas. F. Hotchkiss, 84 John St., N. Y.: Send me your free book entitled "How to Keep Boilers Clean," containing useful information for steam users & engineers. (Forward above by postal or letter; mention this paper.)

Steel Stamps and Pattern Letters. The best made. J. F. W. Dorman, 21 German St., Baltimore. Catalogue free.

For Power & Economy, Alcott's Turbine, Mt. Holly, N. J. Presses, Dies, Tools for working Sheet Metals, etc. Fruit and other (can) Tools. E. W. Biss, Brooklyn, N. Y. Presses & Dies (fruit cans) Ayar Mach. Wks., Salem, N. J.

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

Supplement Catalogue.—Persons in pursuit of information on any special engineering, mechanical, or scientific subject, can have catalogue of contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free. The SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.

Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y. Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J.

NEW BOOKS AND PUBLICATIONS.

ROCKS, MINERALS, AND STOCKS. By Frederick H. Smith, Chicago. The Railway Review.

Mr. Smith discusses rocks and minerals from the standpoint of the mining engineer, assayer, and expert. His style is apt to be freer than comports with a sober scientific treatise, and his vocabulary is rather that of the "street" than of critical science or literature. Nevertheless, his book is well packed with practical information, and is likely to meet with favor among, and prove a real utility to a class of men whose interest in mines and minerals is chiefly speculative. The chapters on stock companies, stock dealing, stock tricks, and so on, are calculated to increase the wariness of intending investors in mining stocks and properties.

MAGNA CHARTA STORIES. Edited by Arthur Gilman. Boston: D. Lothrop & Co.

A dozen tales of heroism, told by various writers, with varying merit, intended to stimulate in young people a love of history. The idea is a good one, and the book seems well suited for its purpose.

THE AGE OF FABLE; OR, BEAUTIES OF MYTHOLOGY. By Thomas Bulfinch. Enlarged edition, edited by E. E. Hale. Boston: S. W. Tilton & Co. \$2.50.

This is a most acceptable edition of Mr. Bulfinch's popular and useful work, enlarged by many references to the principal literary writings of the thirty years since the work was originally prepared. Nearly twenty recent English writers have thus been drawn upon by the editor, who has also considerably extended the chapters relating to the religions and mythologies of the far East. The admirable plan of Mr. Bulfinch's work has not been changed. The new edition is handsomely printed in large, clear type, the size of the page also having been materially increased.

PUBLICATIONS OF THE WASHBURN OBSERVATORY OF THE UNIVERSITY OF WISCONSIN. Vol. I. Madison, Wis.: State Printer.

This, the first publication of the Washburn Observatory, contains a description of the buildings and instruments, with several illustrations, records of the first year's work of the Observatory, observations and drawings of the great comet of 1881, and other papers of value.

CHAUTAUQUA SCIENTIFIC DIAGRAMS. Series No. 1. Geology. By A. S. Packard, Jr. Providence, R. I.: The Providence Lithograph Co.

This series embraces ten large and carefully drawn diagrams, designed to illustrate broadly the actions of water and heat in giving character to the earth's surface, and the varying aspects of the American Continent, and the typical animal and vegetable forms during the great geological periods. The drawings are accompanied by an explanatory text-book, "Easy Lessons in Geology," noticed some weeks ago.

AROUND THE HOUSE. Rhymes by Edward Willett. Illustrations by Charles Kendrick. New York: R. Worthington.

By long odds the most commendable children's book yet made in this country. The verses are bright, rhythmic, and intelligible to American little folk, while the illustrations are artistic and charming. There is a refreshing element of naturalness and honesty about both pictures and verses, with an equally refreshing absence of cant and pretense that cannot fail to make the book as popular with parents as it is sure to be with children.

Notes & Queries

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.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) J. K. H. writes: A friend of mine has a 6 1/2 horse power engine. Upon starting it the water rose in the boiler, and a friend advised him to put a

quart of petroleum in the boiler. I desire to have your opinion as to whether it would be advisable to put petroleum in a boiler to settle the water? A. Would not advise you to put petroleum or anything into your boiler but the purest water. Dirty water will make a boiler foam. Probably you started the engine too suddenly, or opened the valve widely, this may have caused a temporary foaming. If the boiler with clean water will not drive the engine steadily at the speed you require without foaming so as to throw water into the cylinder, it shows that the boiler is too small or you are trying to get too much work from it.

(2) E. E. T. writes: Can you give me a receipt for making a silver dip? It is used in manufacturing companies where they have a large amount of small brass work to silver, such as eyelets, buttons, corset trimmings, etc., and do not use a battery. A. Dissolve two ounces of nitrate of silver in a quart of water, add a solution of common salt until no more precipitation takes place. Pour off the liquid, wash the precipitate thoroughly, and dissolve it in a solution of cyanide of potassium in five times its bulk of water. Filter the solution, make it up to a gallon by adding water, and it is ready for use. The brass must be quite bright, and allowed to remain in the bath until of sufficiently deep color. The articles are then removed and washed.

(3) W. M. T. asks what to mix with lamp black to make a plumber's joint to keep the lead in proper place. A. The plumber's black is lamp black, glue, and water. Boil a small piece of glue in water; just enough to make the solution feel sticky between the fingers, then stir in lamp black enough to make it of the consistence of very thin paint when cold. If it should be too stiff when cold for the brush, add more water.

(4) E. P. B. W. asks for the best way to cut holes one thirty-second to three-eighths of an inch in glass shades or covers. A. If you have many to cut use a diamond drill. A hole can be drilled with a very hard steel drill and turpentine. 2. How to give Britannia or white metal a brass coating? A. Coating white metal with brass. This can be done by the electro process, using a solution of 2 1/2 parts sulphate of copper, 20 parts sulphate of zinc, and 45 parts cyanide of potassium, in 300 parts of water. The anode should be two plates of zinc and copper of equal size. Battery should be strong. If the brass does not deposit clear and even, start it in a solution of sulphate of copper and cyanide, as the various compositions of white metal do not have as good electric affinity as the copper.

(5) A. J. asks: 1. What is parchment paper as used for battery purposes, as described in the Reynir battery in SCIENTIFIC AMERICAN of July 22, and where can it be obtained? A. Ordinary paper dipped in dilute sulphuric acid, and well rinsed off with water. May be bought at any chemical or electrical apparatus shop. 2. What principle of construction has been found the most economical for an electric motor, and at the same time the highest? A. See "The Double Induction Motor," No. 25, vol. xlvii, SCIENTIFIC AMERICAN.

(6) C. R. asks if a rotary engine of 3 horse power will drive a boat 25 feet long, 5 foot beam; and what would be the most economical style and size of boiler? What would the size of propeller be? A. It would probably drive your boat three to four miles per hour. A vertical tubular boiler would suit you best. The size of the screw depends somewhat on draught of water; about 18 inches to 22 inches diameter.

(7) R. W. N. asks: Can you tell me of some effective substance to put within the double sides of a refrigerator? I would like something light. A. Powdered dry charcoal (not too fine) is best. Dry sawdust is commonly employed, and answers the purpose very well.

(8) J. E. B. asks: 1. What will be the diameter of the air pump (single acting)? A. Air pump 8 in. diameter, if 5 in. stroke. 2. Circulating pump (double acting); the stroke being 5 inches? A. 6 1/2 in. diameter, if 5 in. stroke, if these pumps are worked direct by steam engine. 3. How many square feet of cooling surface for an engine of the compound system (surface condenser), having two cylinders, one 9 inch diameter by 10 inch stroke, using the steam direct from the boiler, and expanding in another cylinder of 17 inches diameter by 10 inch stroke, and then to the condenser; the steam pressure being 100 lb. to the square inch? A. Condenser 200 to 270 ft. surface.

(9) J. K. T. says, in answer to E. F. B.: I have found it to be a curious fact that by putting into a pan of any size, water (cold) two or three inches deep, placing a cloth (any kind) also in bottom of pan or vessel, then placing a glass fruit jar, without any previous preparation, upon the cloth, surrounded slightly by the cold or cool water, he may with impunity fill the can with hot liquid.

(10) S. C. T. asks: 1. How can I fill up a broken place in a marble slab, it to remain perfectly steady, so as to make the broken place perfectly hard and smooth? A. This, we think, is impossible. Plaster of Paris mixed with a little oxide of zinc, will make a hard, white filling, but it cannot be polished like the marble. 2. Also, give your opinion in regard to the quality of marble, in the commercial value of Vermont and Italian marble. This I wish to settle a question in regard to which is the finer, Vermont or Italian marble, for general use? A. The qualities of these marbles vary. Italian marble ranks the highest in the market.

(11) T. C. H. asks: What will be the size of the smallest boiler from which I can get six horse power? A. Depending upon the kind of boiler, you should have from 75 to 110 ft. fire or heating surface—the greater proportion in tubular boilers vertical. 2. Has coal oil been successfully used to generate steam for a locomotive? A. We believe coal oil is not yet used economically, but many boilers are run with it in the oil regions, where it has comparatively little value.

(12) B. W. S. asks: Is white lime mortar a preservative for wood and iron? A. No; but hydraulic lime is preservative.

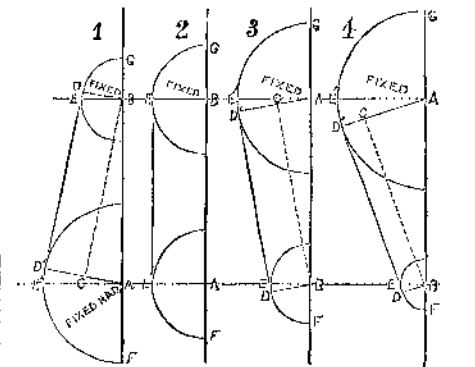
(13) O. B. asks for rules for the construction of symmetrical cone pulleys. A. The following formula, by Rankine & Cooper, for pairs of three pulley cones that are alike, gives good results:

Where R' = diam. of large pulley
R'' = " " small " } in inches.
R = " " middle " required
C = dist. " centers " }
Then $\frac{R'}{2} + \frac{R''}{2} + \frac{(R' - R'')^2}{6 \times 25 \times C} = R$, the diameter of the

middle pulley in inches. Or, in plainer words, the middle pulley must be made a little larger than the mean of the diameters of the large and small pulleys. Where four or more pulleys are required, or one cone smaller than the other, the computation becomes more complex, and can be done in the following manner:

First—Compute the speeds required approximately, and make the speed sizes a fixture for one complete cone, and the largest pulley upon the other cone.

Then make a diagram as here shown, putting in place



of the word fixed, the semi-diameters in figures of the speed sizes assigned. Beginning with Fig. 1, compute the half belt length.

The dotted line, B C, being parallel with and of the same length as the straight part of the belt for all the pairs, and A B the distance of the centers, which may be marked upon the diagram, all the triangles will be found proportional and their relative values found as follows:

No. 1. A D' - B D = A C.
No. 2. A B^2 - A C^2 = B C = straight part of belt, D' D.

No. 3. A B : A C :: A E' : D' E' = the lap in excess of 90°.

No. 4. A B : A C :: B D : D E = the lap less than 90°.

Then
D B
... x 3'1416 - D E = D G

A D' / 2 ... x 3'1416 + D' E' = D' F

For Fig. 2. E E' = distance of centers or straight part of belt.

B E / 2 x 3'1416 = G E.

Half belt length - G E E' = E' F.

Then
E' F x 2 = A E' = radius of required pulley, Fig. 2.

For Fig. 3. A E' / 2 x 3'1416 = G E' Find D' E', as in No. 3.

Find D' D, as in No. 2, and D E, as in No. 4.

Half belt length - G E' + D' E' + D' D = D F

Then
D F + D E x 2 / 3'1416 = B D = radius of required pulley,

Fig. 3.

For Fig. 4, the same formula as for Fig. 3.

The small difference for the curve of the overlap, D' E' may be overlooked in practice.

(14) F. D. A. asks: 1. Will you please tell me what part is iron of the iron ores found at Iron Mountain, Mo., and at the other iron mines in the United States? A. From 32 to 48 per cent iron. Some of the clay ores run as low as 27 per cent. 2. With what wind—i. e., whether fair, beam, or otherwise—will a sail boat attain its greatest speed, and on what principle? A. If properly rigged, usually on the three-quarter beam. See "Velocity of Ice boats," in SUPPLEMENT, No. 214. The same laws apply here.

(15) G. S. asks: 1. How many feet of wire are required for the primary and secondary coils of an induction coil, the current of which is supplied from a single Smee's cell, pint size, so as to give shocks as great as can possibly be borne, and of what size wire? A. Make the core of the coil half an inch in diameter and five inches long, wind it with four layers of No. 20 magnet wire; cover this with two thicknesses of shell-lacked writing paper, and wind around this about ten or twelve courses of No. 36 silk covered wire. 2. Would cotton covered wire answer well? A. Cotton covered wire will answer, but not as well. 3. Is electro-magnetism affected by the size of a cell or by several? A. It depends upon the winding. If wound with coarse wire large cells are best adapted to it. 4. Is there any battery more powerful than Grove's, and how is it constructed? A. No; but the bichromate batteries are more desirable on account of the absence of smell. 5. Would thin lead foil answer for a Faure's secondary battery, and could it be charged from a plate electrical machine? A. Rather thick lead is to be preferred, say one-sixteenth of an inch thick. It may be charged very feebly by a plate machine. 6. What battery is most suitable for an induction coil? A. For continuous use employ the gravity battery; for occasional use the Grenet answers well. 7. In what proportion does Smee's, Bunsen's, and Leclanche's stand to Grove's battery? A. The electro-motive force of the Grove battery is 1'956 volts; Bunsen's, 1'964; Smee's, 1'090 volts; Leclanche, 1'481 volts.

(16) F. C. F. asks: 1. The best and easiest way to polish a violin? Have been using shellac dissolved in alcohol, but don't like it. It is too much work to apply, and does not give satisfactory results. Is