

Business and Personal.

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Agricultural Implements and Industrial Machinery for Export and Domestic Use. R. H. Allen & Co., N. Y.

Woodworth Planer, made by Witherby, Rugg & Richardson; Combined Planer and Matcher, cheap for cash. Steptoe, McFarlan & Co., 214 W. 2d St., Cincinnati, O. Transit for Sale—W. Main, 1909 Pine St., Phila.

A Partner Wanted to take out foreign Patents on a Door Lock, recently patented in the U. S. Address M. C. Hawkins, Edinboro', Erie Co., Pa.

Amateur Scroll Saws, the best.—Address, with stamp, Trump Bro's, Wilmington, Del.

M. Shaw, Manufacturer of Insulated Wire for galvanic and telegraph purposes, &c., 259 W. 27th St., N. Y.

Sun Dial Makers, address W. E. Colton, Marion, Va.

For Sale, together or separately—Two 11 in. hydraulic Presses; Tubular Boiler, new, built by Fletcher & Harrison; Steam Engine, 25 h.p., built by Woodruff & Beach; three sets Hydraulic Pumps. Robert Dillon, 30 Burling Slip, New York.

Manufacturers of Campaign Goods and light Novelties, will find it to their interest to send Samples and Circulars to W. K. Lanphear, Baltimore, Md.

Makers of Tobacco Paper (see p. 23, vol. 35), send address to C. H. C., Box 773, New York City.

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

Baxter's Adjustable Wrench for first class Mechanics, 62 cents each. Sent by mail on receipt of price. Greene, Tweed & Co., 18 Park Place, New York.

Linen Hose, Rubber lined and unlined, for factories or fire engines, at lowest rates. Greene, Tweed & Co., 18 Park Place, New York.

Makers of Ice and Refrigerating Machines, send Circulars to Alden Fruit Company, 426 Montgomery St., San Francisco, Cal.

Drops for Sale—Very Cheap—One each 250 & 400 lb. Peck Drops—perfect order, with lifters, &c., suitable for sheet metal stamping. Hull & Belden Co., Danbury, Ct.

F. C. Beach & Co., makers of the Tom Thumb Telegraph and other electrical machines, have removed to 520 Water Street, New York.

Bone Mill wanted. W. J. Sanderson, Syracuse, N. Y.

For Sale—2d hand Woodworking Machinery, Pat. Scroll Saw, made by Cordesman, Egan & Co.; 3-sided Moulding Machine; also Band Saw, Fay & Co.'s makers. Steptoe, McFarlan & Co., 214 W. Second St., Cin., O.

Pat'd Graining Stencils—J. J. Callow, Cleveland, O.

Lathe Dogs, Expanding Mandrels, Steel Clamps, &c., for Machinists. Manufactured by C. W. LeCount, So. Norwalk, Ct. Send for reduced Price List.

For Sale Cheap—2 Gardner's Centering & Squaring Attachments for Lathes. Jackson & Tyler, Balt., Md.

Dynamo-Electric Machines for electro-plating and other purposes. Send for illustrated circular. W. Hochhausen, 132 William St., New York.

"Abbe" Bolt Forging Machines and Palmer Power Hammers a specialty. Send for reduced price lists. S. C. Forsyth & Co., Manchester, N. H.

400 new & 2d hand Machines, at low prices, fully described in printed lists. Send stamp, stating just what you want. S. C. Forsyth & Co., Manchester, N. H.

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

Celebrated John Scott Scroll and Jig Saws made to order, of Jessup's superior cast steel, by I. Roberts, 108 Hester Street, New York. Send for circular.

Scientific American—The early Volumes for Sale—very cheap—either bound or in numbers. Address A. F. R., Box 773, New York City.

Hydrant Hose, Pipes, and Couplings. Send for prices to Bailey, Farrell & Co., Pittsburgh, Pa.

Machine-cut brass gear wheels, for models, &c. List free. D. Gilbert & Son, 212 Chester St., Phila., Pa.

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

Power & Foot Presses & all Fruit-can Tools. Ferracute Wks., Bridgeton, N. J. & C. 27, Mch. Hall, Cent'l. Shingles and Heading Sawing Machine. See advertisement of Trevor & Co., Lockport, N. Y.

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, New York.

See Boul'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.

For Sale—A xle Lathe, the very best make. Send for photographs, &c., to Steptoe, McFarlan & Co., 214 W. 2d Street, Cincinnati, Ohio.

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 order. Job work solicited.

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

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.

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

Temples and Oilcans. Draper, Hopedale, Mass.

Notes & Queries

J. J. will find a recipe for artificial meerschau on p. 307, vol. 34.—L. M. G. will find a formula for the proportions of a safety valve on p. 363, vol. 29.—G. F. S. will find a formula for the flow of water through pipes on p. 48, vol. 29.—B. will find directions for preparing canvas for painting on p. 267, vol. 25.—C. and W. H. I. will find a recipe for a silver-plating solution, for use without a battery, on p. 408, vol. 32.—G. F. B. can fasten emery to leather, and leather to wood, with

good glue.—B. L. F. can dissolve glass with hydrofluoric acid. See p. 264, vol. 30.—E. A. S. will find directions for bronzing castings on p. 283, vol. 31.—G. W. C. will find a recipe for Babbitt metal on p. 123, vol. 28.—P. M. S. can solve his cone pulley problem by the formula given on p. 180, vol. 28.—F. E. B. will find directions for scouring brass on p. 54, vol. 32.—B. C. B. will find an explanation of the effect of the moon on the tides on p. 64, vol. 28. The belief that the moon affects the condition of meat is a vulgar superstition.—A. M. is informed that gas retort carbon can be cut with an ordinary saw.—Y. R. will find directions for soldering of all kinds on p. 251, vol. 28.—G. E. B. will find directions for preparing canvas for painting on p. 267, vol. 25.—A. P. R., Jr., will find directions for stereotyping by the paper process on p. 363, vol. 30.—W. T. S. should make a rubber stamp for marking cloth. See p. 156, vol. 31.—N. N. will find directions for getting rid of flesh worms, etc., on p. 233, vol. 31.—F. A. F. will find directions for promoting the growth of the beard on p. 363, vol. 31.—J. S. will find a recipe for the hop yeast cake on p. 234, vol. 30.—G. C. McC. is referred to the Naval Academy for answers to his questions.—H. H. L. will find a recipe for indelible ink on p. 129, vol. 28.—J. M. F. will find directions for extracting impurities on p. 89, vol. 28.—J. S. P. will find directions for galvanizing iron wire on p. 346, vol. 31.—W. H. W. will find a recipe for a fusible alloy on p. 27, vol. 30.—F. W. F. will find directions for removing paint from clothing on p. 75, vol. 30.—P. will find on p. 282, vol. 31, a good recipe for gun cotton. As to nitro-glycerin, see p. 341, vol. 34.—H. E. G. can make white ink for writing on colored paper by following the directions on p. 75, vol. 31.—S. N. C. will find directions for tempering taps, etc., on p. 75, vol. 28. For tempering millpicks, see p. 314, vol. 27.—A. R. H. will find a description of an egg-hatching apparatus on p. 273, vol. 33.—A. H. will find directions for making marine glue on p. 42, vol. 32.—E. N. will find a good recipe for whitewash for outdoor use on p. 133, vol. 34.—W. M. will find a recipe for a stove cement on p. 183, vol. 34.

(1) R. A. R. asks: What is the variation of the magnetic needle at this point, about latitude 32° and longitude 81°? A. The best way is to determine it experimentally. See Loomis' "Trigonometry and Logarithms."

(2) B. B. says: Where can I find tabulated variation of magnetic needle courses from the true meridian, for the last century, in Central New Jersey? A. We understand that the most complete statement of the results of American observations on the magnetic elements has been published by Dr. Bache, in American Journal of Sciences, (2) XXIV, p. 1, where all the earlier observations are collated, with the more extended result of the coast survey, with maps.

(3) L. P. D. says: 1. What size of box will it require to enclose the steel band or spring by which Mr. Leveaux has succeeded in getting a draft of 3,000 lbs.? A. The boxes used by Mr. Leveaux are each 14 inches in diameter. 2. What is meant by a draft of 3,000 lbs.? A. The draft of the spring is the force in lbs. which it exerts in unwinding. Mr. Leveaux proposes to wind up his springs with steam engines. By using several springs, he expects to be able to propel as large a car as is required.

(4) L. H. P. says: 1. I am making an electric engine, as described on p. 301 of the SCIENTIFIC AMERICAN SUPPLEMENT, by Mr. Sawyer. The magnet is made of 1 x 3/4 inch Ulster iron. How many feet and what size of wire will I need to wind on it? A. About 20 feet of No. 16, or a couple of hundred feet of No. 20. 2. Does it make any difference which way I wind it? A. No, provided the connections are made in such a way that the upper ends of the magnet are of opposite polarity. 3. What kind of battery is the best? A. One cell of Grove if the large wire is used, or two of Daniell's battery if the small wire is preferred. See any schoolbook on natural philosophy. 4. Are all the parts to be insulated from the table on which it rests? Would a stand made of plate glass be the best? A. Convolutions of wire should be insulated from each other; this is best effected by using silk or cotton covered wire. A wooden base will answer. 5. Would light brass springs answer in place of mercury cups? A. Yes.

(5) C. N. M. says: You state that Dr. Joule's powerful magnets were wound in the direction of their length. Please explain how this was done. A. The wire was wound around the iron in the direction of its longest dimension, from end to end, instead of around it laterally, as is usually done for small magnets.

(6) R. & Co. ask: What is the difference in the method of galvanizing wrought and gray or cast iron? A. The iron is cleaned by dilute acid and friction, is heated and plunged into a bath of melted zinc covered with sal ammoniac, and is stirred about until the surface becomes alloyed with zinc. Mallett recommends an amalgam of zinc, 2,202, mercury, 202, and about 1 of sodium or potassium; this melts at 680° Fah. The cleaned iron is dipped in this and removed as soon as it reaches the temperature of the alloy. Wrought and cast iron may both be treated in this manner.

(7) A. W. T. says: If 1 cubic foot of gas, at 100 lbs. to the square inch pressure, be liberated into a receiver capable of holding 3 cubic feet, would the pressure of the gas be 50 lbs. to the square inch? In other words, does the elastic pressure of a certain weight or quantity of gas vary uniformly as its volume? A. This law is as you state it, if the temperature of the gas is kept constant.

(8) J. V. R. says: I have made an induction coil mostly from instructions gained from the SCIENTIFIC AMERICAN; it is capable of throwing a spark 6 inches. From reading No. 17 of your SUPPLEMENT, I proceeded to lengthen and

strengthen the spark from instructions therein contained, and failed. I made the attachments as you recommend in your article this week; but it would not work. What was the cause of the failure? A. Your previous question was not fully understood. We think a better plan is to attach the secondary wires to the inside and outside castings of a Leyden jar of considerable capacity. This will increase the volume of the spark, but it is not likely to lengthen it much. The plan is used in studies with the spectroscope.

(9) C. B., of Holaa Hauai, Sandwich Islands, asks: Can you give me a plan by which, in plowing with 4 horses abreast, the tension will be equal and the plow in its proper place, and yet 3 of the animals will travel on the unplowed land and one in the furrow? A. Some of the farmers who take our paper can perhaps answer this correspondent. If so, we would be glad to hear from them.

(10) A. B. J. says: In your paper of March 25, 1876, you give a recipe for a new nickel-plating solution, which you say gives beautiful results. This recipe seems to be indefinite, and I would be very much obliged for a lucid explanation of it. There are two solutions mentioned. The first of these is easily understood, but I cannot understand how to make the second solution, as I do not see how 1/2 oz. nickel can be dissolved in 2 ozs. cyanide of potassium in 1 lb. of water. And again, after the solutions are mixed, is there to be any water added? If so, what quantity? A. The half ounce of metal for the second solution is dissolved in aqua regia, the same as for the first. The acid is then driven off by heat and the pasty mass redissolved in a solution of cyanide of potassium and water (2 ozs. cyanide to 1 lb. water). No more water need be added.

(11) W. A. W. asks: I wish to evaporate liquids by steam heat. How much pipe surface will it take to evaporate 1 cubic foot of water per hour after the temperature of the water has been raised to the boiling point, the steam pressure being maintained at 60 lbs. to the square inch? A. We think that from 10 to 12 square feet will be sufficient.

(12) J. F. A. says: I heard a man say that a pump would work easier if the bottom of the suction pipe was only just covered with water than it would if it were at the bottom of a great depth of water. I differ with him, and I can prove that it will not, if the suction pipe and discharge pipes are of the proper area for the cylinder. Take, for example, a quantity of water 20 feet in depth, with the surface of the water 15 feet above the vacuum in the pump. I claim that the water will find its way into that vacuum at every stroke, if there were no atmospheric pressure acting on the water, showing that a pump will work as easily with the bottom of the pipe at the bottom of the water, as it would if it was only just covered with it. A. We think there would be a slight difference in favor of the arrangement proposed by your disputant, principally because, the water passing through a shorter length of pipe, there would be less friction.

(13) J. W. P. asks: Does a propeller wheel, submerged, do its work of propelling the boat during its entire revolution, or only for half of it? A. Throughout the whole revolution. Its action is somewhat like that of a screw advancing into a nut, as it is turned.

(14) W. H. B. asks: 1. What is commonly understood by the expression "press equally in all directions," when using it in speaking of the action of steam or other fluids? Is it so much pressure to the square inch of surface acted upon? A. Yes. 2. If so, in what does the evidence consist of the truth of it? A. It is most simply proved by experiment. 3. When we say that a man can raise so much weight, do we mean to say that his force (or weight) applied at the end of one arm of a lever (or its equivalent) will balance the weight raised? A. Yes. 4. Does weight alone give water its downward pressure? A. Yes. 5. What natural law does water follow in seeking its level? A. It moves under the action of force until this force is balanced. 6. Is what is termed the hydrostatic paradox easily explained by known natural law? A. Yes. 7. What is the law? A. That the pressure of a column of water is equal to the weight of a prism of water having the same base and altitude as the given column.

(15) M. M. says: Please find sample of a crust that forms in my boiler. Can you tell me what will prevent it? I use well water, and it tastes strongly of sulphur. A. It is a lime deposit. We doubt whether you can entirely prevent the formation if you continue to use the present feed water; but the use of a good heater will be advantageous.

(16) M. M. asks: Would borax make a good addition to a dentine? A. No. How is precipitate of lime made? Precipitate any soluble salt of lime by addition of an alkaline carbonate.

(17) D. B. T. asks: What force would be necessary to support a body in mid air, so that it would neither fall nor rise, but be supported in equilibrium? A. A force equal in intensity to the weight of the body.

(18) E. H. says: There is a cast iron cannon in our town made in 1822, which will shoot a 9 lbs. ball. It used to sound well, and make a loud report; but for the last year or two, it seems to have lost its ring or clear loud report. It sounds dead, when the same amount of powder is used as formerly. A. If you have correctly stated the particulars, we do not feel able to explain the matter. In general, we should imagine that in such a case the quality of the powder rather than the gun had deteriorated. Possibly, however, there may be other reasons; and perhaps some of our readers can furnish them.

(19) C. A. asks: What pressure of steam per square inch will be necessary in a double kettle to keep sugar sirup boiling at 350° Fah.? A. About 125 lbs. per square inch, by gage.

(20) J. R. P. asks: 1. What is the strength of a good Manila rope 1 inch in diameter, and also of one 1 1/4 inches in diameter? A. One inch rope, about 3,000 lbs.; 1 1/4 inch, about 4,500 lbs. 2. What is a four fall tackle block? A. We believe the term has no precise definition, but commonly refers to a tackle with two blocks, each having 2 sheaves. 3. How much weight can be safely raised with an inch rope in a good tackle block, say with 3 pulleys in one and 2 in the other, and how much with a rope 1 1/4 inches diameter in a like block? A. It will depend somewhat on the rigidity of the cordage and friction of sheaves but the maximum safe weights will be about 7,500 lbs. for the 1 inch rope, and 11,000 lbs. for the 1 1/4.

(21) C. M. says: There have been lately many storms and tornadoes in this and in foreign countries. Does our present mode of telegraphing help to create these storms? A. No. On the contrary, so far as the telegraph lines have any effect, it is to lessen the violence of electric storms by carrying the fluid to the earth and thus tending to bring about an equilibrium.

(22) J. L. W. says: We have a siphon of 2 inch pipe from a canal to a tank about 100 feet distant. The top of the tank is a few inches above the water in the canal, and the pipe enters the tank near the bottom, which gives it a fall of about 5 feet (the tank being 6 feet deep) at the start, and is intended to keep the water in the tank on a level with the water in the canal. Sometimes it stops and has to be started again with a pump. Will you explain the cause of this? A. Observe the height in the tank when the siphon stops working, and insert a waste pipe just below this level. There should be a valve at the highest point of the siphon, to let out the air that accumulates from time to time.

(23) A. D. B. asks: What substance can I use to make a watertight flooring over a plank floor? The floor is of two inch yellow pine plank and very stiff; it is in the second story of a building, and so exposed to the air beneath, it is soaked with water two or three times a day. There is no wheeling or rolling of heavy articles over it, only persons walking. Would a concrete 2 inches thick of cement and coarse sand do, or would it crack? I would prefer a slightly elastic flooring. A. If there is not much wear upon it, why not take sheet lead?

(24) P. G. asks: Is there any known way to purify the gas made by gasoline machines, so as to obtain a steady light, equal or nearly so to coal gas? A. If the machines are properly constructed, they should give a good steady light fully equal to that of coal gas. The gas (or vapor) does not require purification.

(25) E. T. D. asks: Would a battery made of an iron cylinder 10 inches deep and 3 feet in circumference, and a lead one 10 inches deep and 15 inches in circumference, charged with common salt, give enough current to heat a small platinum wire to white heat? A. You had better use zinc and copper instead of lead and iron. Salt will answer to charge the batteries with.

(26) O. R. M. asks: 1. On what principle is an electric engine constructed? A. Various forms are made, but they depend upon the alternate magnetization and demagnetization of soft iron cores and the consequent attraction of other soft iron pieces placed within their influence. The moving piece or parts are provided with attachments called commutators, by means of which the battery connection is made and broken at the proper moment. 2. Is it possible to store electricity up in any manner so that an engine can be run without the batteries being present? A. No, not in the sense you mean. Magnetic machines are made to run by steam power and give powerful currents, but it would be a great waste of power to use them as motors. 3. Is it possible to construct an electric engine of any large power, say 1 horse power? A. Yes. 4. Is the power of the engine dependent only (within limits) on the strength of the current? A. The strength of the current is only one of the factors on which the power of the machine depends. 5. In that case, could not a powerful engine be constructed within a small space? A. Motors capable of running sewing machines can be made to occupy but little space, but for much power their proportions become more considerable.

(27) O. K. says: If of two pulleys, one be 20 inches in diameter, making 190 revolutions per minute, the other being 6 inches in diameter, what is the rule for finding number of revolutions of smaller pulley? A. Divide the speed of belts in feet per minute by the circumference of the pulley in feet.

(28) J. J. says: 1. A great many people, contemplating building concrete houses from your directions, would have many things to learn yet. In preparing the sand and gravel, would not two screens, one above the other, do, first putting the earth as it comes out of the bank, containing gravel, sand, and loam, on the upper screen, that which remains after shaking being gravel, the balance passing down to the lower screen which, on being shaken, would pass the finer dirt or sand through it, and that which remains being sand? Would this mode be sufficient to prepare the sand and gravel? A. There are sand beds where the sand is found of a very even grade of fineness and purity, and it would be better if possible to take it from these beds; and the same is true in reference to the gravel. If these beds are not to be found within a convenient distance, the sand may be screened from a gravel bed as you suggest. 2. How fine should the screens be? A. For the sand 1/8 of an inch, but what is left in front of the screen may be taken for the gravel without further sifting. If not entirely free from loam,