

Business and Personal.

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The best results are obtained by the Imp. Eureka Turbine Wheel and Barber's Pat. Pulverizing Mills. Send for descriptive pamphlets to Barber & Son, Allentown, Pa. National Steam Pump; best and cheapest. Send for prices. National Iron Works, New Brunswick, N. J.

Emerson's Patent Inserted Toothed \$100 Gold Premium Solid Saws are superseding all others. Send your full address for our Sawyer's Own Book (free). See illustrated adv. p. 381. Emerson, Smith & Co., Beaver Falls, Pa.

Lightning Copyist.—Secures copies of any article instantly. Sent post-paid for 50 cents. No circulars. Copying Company, Princeton, Ill.

Hearing Restored.—Great invention by one who was deaf for 20 years. Send stamp for particulars. Jno. Garmore, Lock Box 905, Covington, Ky.

Lathes, Planers, and Drills, with modern improvements. The Pratt & Whitney Co., Hartford, Conn.

To accommodate our friends and customers in different sections of the country we take this method of notifying them that our goods can be procured of the following: Philadelphia branch, 416 Arch St.; San Francisco branch, 5 First St.; C. W. Trainer & Co., 150 Oliver St., Boston, Mass.; E. & T. Fairbanks & Co., St. Johnsbury, Vt.; E. G. Marvin, 86 Main St., Buffalo, N. Y.; F. H. Wilson, 37 Light St., Baltimore, Md.; W. M. Bird & Co., Charleston, S. C.; A. P. Lufkin, Galveston, Texas; Semp & Birge Manufacturing Company, St. Louis, Mo.; T. S. & A. J. Kirwood, 171 Lake St., Chicago, Ill.; Parker, Wise & Co., Cincinnati, Ohio; S. W. Hempsted & Co., Columbus, Ohio; Moore & Kerrick, Indianapolis, Ind.; C. A. Parker & Co., New Orleans, La. H. W. Johns Manufacturing Company, sole manufacturers of genuine Asbestos Liquid Paints, Roofing, Boiler Covering, etc., etc., 87 Maiden Lane, New York.

For Sale.—9 pieces 2 7-16 turned shaft, 11 feet long; coupled; good as new. Frisbie & Co., New Haven, Ct.

American Fruit Drier Mfg. Co., Chambersburg, Pa.

Cheap.—Nearly New Vertical Tubular Boiler, 30 x 60 inches. Box 121, Salisbury, Md.

Downer's Anti-Incrustation Liquid.—J. W. Hamberger, Wholesale Furniture Manufacturer, Hester and Elizabeth Sts., New York, says: "Your Boiler Liquid is a success. I am using hard well water, but your Liquid prevents the formation of scale, and my tubes are clean. I shall continue to use it, and heartily recommend it to others." A. H. Downer, 17 Peck Slip, New York.

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

Factory Fire Hose.—A large lot for sale cheap. W. F. Corne, Agent, 117 High St., Boston, Mass.

For Sale.—Canadian Patent for Automatic Mash Machine, successfully introduced in the U.S. A most valuable invention, capable of being successfully introduced in every brewery. A rare chance for a live man. Michael J. Stark, Buffalo, N. Y.

Wanted.—A good Metal Pattern Maker of considerable experience. Sargent & Co., New Haven, Conn.

For Stationary or Portable Engines, Circular Saw Mills, Grist Mills, and Mill Machinery, good and cheap, address the old manufacturers of Cooper Mfg. Co., Mt. Vernon, O.

H. Prentiss & Co., 14 Dey St., New York, Manufs. Taps, Dies, Screw Plates, Reamers, etc. Send for list.

"Workshop Receipts" for Manufacturers, Mechanics, and Scientific Amateurs. Illustrated. \$2, mail free. E. & F. N. Spen, 445 Broome St., New York.

For Screw Cutting Engine Lathes of 14, 15, 18, and 22 in. Swing. Address Star Tool Co., Providence, R. I.

The Horton Lathes Chucks; prices reduced 30 per cent. Address The E. Horton & Son Co., Windsor Locks, Conn.

Lincoln's Milling Machines; 17 and 20 in. Screw Lathes. Phoenix Iron Works, Hartford, Conn.

Boilers ready for shipment. For a good Boiler send to Hilles & Jones, Wilmington, Del.

Shaw's Mercury Gauges, 5 to 50,000 lbs.; accurate, reliable, and durable. T. Shaw, 915 Ridge Ave., Phila., Pa.

New Pamphlet of "Burnham's Standard Turbine Wheel" sent free by N. F. Burnham, York, Pa.

Machine Diamonds. J. Dickinson, 64 Nassau St., N. Y.

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

Eagle Anvils, 9 cents per pound. Fully warranted.

Vertical Burr Mill. C. K. Bullock, Phila., Pa.

Eclipse Portable Engine. See illustrated adv., p. 382.

A Cupola works best with forced blast from a Baker Blower. Wilbraham Bros., 2,318 Frankford Ave., Phila.

Presses, Dies, and Tools for working Sheet Metal, etc. Fruit & other can tools. Bliss & Williams, B'klyn, N. Y.

Acme Lathes.—Swing, 7 in.; turn, 19 in. long; back geared; screw cutting. Send 3 cent stamp for circular and price, to W. Donaldson, southwest corner Smith and Augusta, Cincinnati, Ohio.

Forsyth & Co., Manchester, N. H., and 213 Centre St., New York. Specialties.—Bolt Forging Machines, Power Hammers, Combined Hand Fire Engines and Hose Carriages, new and 2d hand machinery. Send stamp for illustrated catalogues, stating just what you want.

Linen Hose.—Sizes: 1 1/2 in., 20c.; 2 in., 25c.; 2 1/2 in., 30c. per foot, subject to large discount. For price lists of all sizes, also rubber lined linen hose, address Eureka Fire Hose Company, No. 13 Barclay St., New York.

Nickel Plating.—A white deposit guaranteed by using our material. Condit, Hanson & Van Winkle, Newark, N. J.

Needle Pointed Iron, Brass, and Steel Wire for all purposes. W. Crabb, Newark, N. J.

The Lathes, Planers, Drills, and other Tools, new and second-hand, of the Wood & Light Machine Company, Worcester, are being sold out very low by the George Place Machinery Agency, 121 Chambers St., New York.

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing Metals. E. Lyon & Co., 470 Grand St., 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, N. Y.

Pulverizing Mills for all hard substances and grinding purposes. Walker Bros. & Co., 23d & Wood St., Phila., Pa.

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

The best Friction Clutch Pulley and Friction Hoisting Machinery in the world, to be seen with power applied, 95 and 97 Liberty St., New York. D. Frisbie & Co., New Haven, Conn.

Electro-Bronzing on Iron. Philadelphia Smelting Company, Philadelphia, Pa.

Improved Steel Castings; stiff and durable; as soft and easily worked as wrought iron; tensile strength not less than 65,000 lbs. to sq. in. Circulars free. Pittsburg Steel Casting Company, Pittsburg, Pa.

Wood-working Machinery, Waymouth Lathes. Specialty, Wardwell Patent Saw Bench; it has no equal. Improved Patent Planers; Elevators; Dowel Machines. Rollstone Machine Company, Fitchburg, Mass.

The Twiss Automatic Engine; Also Vertical and Yacht Engines. N. W. Twiss, New Haven, Conn.

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

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.

Dead Pulleys that stop the running of loose pulleys and their belts, controlled from any point. Send for catalogue. Taper Sleeve Pulley Works, Erie, Pa.

No gum! No grit! No acid! Anti-Corrosive Cylinder Oil is the best in the world, and the first and only oil that perfectly lubricates a railroad locomotive cylinder, doing it with half the quantity required of best lard or tallow, giving increased power and less wear to machinery, with entire freedom from gum, stain, or corrosion of any sort, and it is equally superior for all steam cylinders or heavy work where body or cooling qualities are indispensable. A fair trial insures its continued use. Address E. H. Kellogg, sole manufacturer, 17 Cedar St., New York.

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.

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.

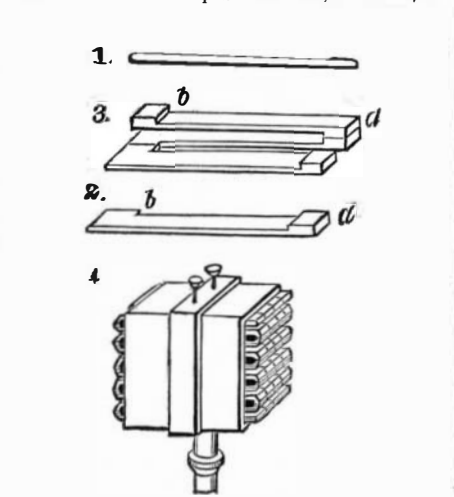
(1) C. L. writes: 1. In making induction coil (SUPPLEMENT No. 160) would it be of any advantage to wrap insulated wire (secondary) in two sections instead of across? A. Yes, the insulation need not be so perfect. You should use the same weight of wire as recommended in the SUPPLEMENT referred to. 2. Of what dimensions should it be to work electric pen (SUPPLEMENT No. 166), and would not a gravity battery answer better than a Grenet? A. A coil that will give a 1/8 (one eighth) inch spark will do. For continued use a battery composed of several gravity cells would answer very well. 3. I want to work a telegraph one hundred yards; shall I use ground connections or double wires? A. Use a return wire.

(2) J. K. asks: Which end of a horizontal cylinder receives the most steam? A. The piston rod end receives the least steam, and less work is done during that stroke.

(3) C. E. W. W. writes: I have not yet been able to find a cement entirely suitable for cementing rubber to wood: can you suggest something? A. 1. A good glue answers very well in some cases; the parts to be joined must, of course, be held well together while the glue is drying. 2. Melt together over a gentle fire equal parts of black pitch and gutta percha. If this is required to set very hard, one part of powdered shellac may be added. The addition of say a tenth part of caoutchouc clippings makes it more adhesive, but prevents in a measure its final hardening. This cement should be used hot.

(4) F. N. R.—The arrangement of copper lightning rods on the building, as you propose, will do very well, provided the bottoms of the rods are made to extend underground for a considerable distance, so that there will be a large conducting surface in contact with the earth. The common fault in lightning rods is that they are not sufficiently connected with the ground. They are generally stuck down two or three feet into dry earth; but such an arrangement is worse than useless; it is almost like placing the bottoms of the rods in a glass bottle. In all cases the bottoms of the rods underground should be connected with iron or water pipes, if they exist; or in lieu thereof, the rods should be extended a long distance underground, or should connect with a mass of old iron, or iron ore, or charcoal, or coal dust of any kind, laid in a trench. No lightning rod can be regarded as a safe conductor unless its lower extremity is carried deep into the ground, and there put in good connection with a large surface of conducting material.

(5) K. L. writes: With regard to Melloni's thermo-electric pile, one can read in books of physics sentences as the following one: "The thermo-multiplier consists of a series of small bars of antimony and bismuth, a and b, soldered together at their alternate ends." Well, this is all very nice, but the moment you come to put together those pieces of metal, all sorts of difficulties arise at once. 1st. You cannot get the bismuth to flow when melted; it is always in a kind of lump. 2d. The small piece of antimony is so brittle, that the moment you try to work it, immediately it falls into pieces. 3d. It seems impossible to solder them together. What is then to be done? A. The elements of the thermopile are made of antimony-glance and bismuth, cast in iron moulds and shaped with a file, as shown, full



size, in Fig. 1. The bars of antimony must be tinned on both heads, a b, with very fusible solder by means of a small soldering iron. The bars of antimony and bismuth may be held together between spring forceps, and the spaces between the bars filled with pieces of wood, which may be allowed to remain to impart greater solidity to the pile, but they must not extend beyond the joints. The vertical rows of five pairs each are first soldered, and these are united when all of the pairs are complete. The end pieces of each row must have an offset at right angles to the bar, as shown in Fig. 2. Fig. 3 shows the combination of the end pieces of two vertical rows. When the pack of 20 or 25 pairs is completed, lay it in a round or square case of brass, having first soldered to the middle of the first and last bars short copper wires, which pass through two ivory lined holes in the case and are provided with permanent binding screws. The vacant spaces are then filled with plaster of Paris, which is afterward scraped away so as to leave the ends of the bars bare, and these are then blackened. In making this instrument a great deal of patience is required, as a breaking of a number of the bars is unavoidable.

(6) D. writes: Take a dozen or more sheets of blotting pad, size of your letter book. Dip every other one in water and put under press, wet and dry alternately, for a few minutes. Keep in tin box with lid, and use instead of wetting with brush. No need of oiled paper even after a little practice. Twenty or more letters can be copied at once as well as one, placing pad, tissue paper, letter, pad, tissue, at pleasure. One wetting will last several days.

(7) D. D. asks if black and white are colors in a scientific view. A. Black is the absence of color; white is the union of all colors.

(8) H. S. H. writes: In your issue for March 8th, you tell D. J. C. (34), that you "do not think sunlight ever put out fire;" that "the difference in the heat of a fire with and without sunlight must be infinitesimal, if anything." I have repeatedly seen the brightest fire grow dull and cease burning when the full sunlight fell directly on the draught. The effect of the sunlight was the same as if some one had put water in the fire. In a west room at my father's house there was a stove so situated that the rays from the afternoon sun fell directly on the hearth, and unless the curtain was lowered the fire would almost cease to burn. This is the experience of many a housewife, and I with many others have often wished to know just why this was so. A. It is possible that the sun heat may in some slight degree affect the draught, but we are still of the opinion that the superior brightness of the sunlight renders the fire very dull by comparison, in much the same way as an electric light in proximity to a gas flame makes the latter appear of a deep orange color, whereas, before comparison with the electric light it would have been considered fairly white.

(9) H. J. B. asks: 1. What size balloon does it require to hold 10,000 cubic feet of ordinary street gas? A. The inflated bag should have a diameter of nearly 27 feet. 2. What weight is it capable of raising? A. About 340 lb., less the weight of the bag. 3. What would be about the cost of a balloon that size? A. Properly equipped, about \$500.

(10) W. H. S. asks: 1. What part of a horse power would a small stationary engine, 3 inch stroke, cylinder 1 1/2 inch bore, with a balance wheel 12 inches in diameter, be? A. See rule for calculating the horse power of engines on p. 267 current volume, query (4). 2. How large a boiler would it require to run the engine: the diameter and length? A. This will depend upon the pressure of steam you wish to carry and the number of revolutions per minute. 3. Could it be arranged to heat by kerosene or alcohol? A. Yes. 4. Which would be the best? A. Alcohol. 5. Please tell me how to arrange it to get the most heat with the least fuel. A. Arrange the lamp like any alcohol lamp, but with a sufficient number of wicks; it would be safer to have the vessel for alcohol at a distance from the lamp, like a German student's lamp.

(11) C. S. C. asks for the best method for making a soldering fluid for mending tinware without an iron. A. Dissolve zinc in muriatic acid until bubbling ceases, and add a quantity of water equivalent to that of the acid.

(12) "Investigator," writing of his father's experiment in treating wood some 40 years since, says: He buried in bituminous coal dust different descriptions of wood, and passed a current of hot steam through the pile; by this means he accomplished his intention even beyond his expectations. The wood became thoroughly imbued with the acid from the coal and shrank up to smaller proportions; the pores of the wood closed and became densely compact. The softer the fiber of the wood the more thorough the result, seemingly.

(13) S., B. & Co. ask if it will be possible to speak through a tube 400 to 500 feet long, running through the air (or on the outside of a wall), and of what material it would be best to make the tube of, iron or tin. A. Yes. Make the tube of tin, and have well rounded elbows.

(14) S. P. T. asks: Where would a person have to begin to study to be an engineer in the navy? A. At the Naval Academy at Annapolis, Md.

(15) B. writes: In your paper of the 19th of April, J. L. C., among other questions, asks: Will more water run through a one inch perpendicular pipe, 10 feet long, than through a one inch pipe, one foot long? Your answer is, Yes if they are even at the top and both taken from the same tank. Now why is more water forced into the long pipe, when the head or pressure is the same upon the opening of each? Please explain. A. There is a greater head on the 10 foot pipe than the one foot. The head is the height above the point of delivery, and not above the point of entrance to the pipes.

(16) G. McD. asks: In a B flat cornet which has the most friction, a piston or a rotary valve? A. Practically a piston valve.

(17) E. D. W. asks if there is any more danger from lightning on a telegraph line, in using bare copper wire for a ground from the lightning arrester, than in using insulated wire. A. No.

(18) R. T. C. writes: I wish to cut a piece of Iceland spar to a particular shape and polish it. Please inform me how I can polish the Iceland spar when I cut, so a ray of light will pass through it. I want it very smooth, as much so as a looking glass. A. You may cut it with a thin iron rotating disk supplied with emery and water, and you may polish it with a lap of copper charged with emery and water or emery and oil. Use different grades of emery, gradually increasing in fineness, and finally polish with a paste of putty powder, using a pewter lap.

(19) R. M. M. asks: 1. What books or papers must I procure in order to get a thorough knowledge of making ice by artificial means? A. Consult SCIENTIFIC AMERICAN SUPPLEMENTS, Nos. 85 and 91, and pp. 95 and 335, volume 37, and 159 and 387, volume 38, SCIENTIFIC AMERICAN. 2. Also, is there any process by which raw hide may be rendered impervious to water? A. We believe there are several patented processes which claim to accomplish this. Paraffine under pressure and in solution is claimed to satisfy the requirements.

(20) P. G.—For directions for removing superfluous hair, see volume 39, p. 75 (26), p. 91 (1) SCIENTIFIC AMERICAN.

(21) J. B. H. writes: I see in a recent number of the SCIENTIFIC AMERICAN, that J. P. J. asks you about building a scow to be run by a steam wheel. I have just finished the machinery for a scow 65 feet long, 16 feet beam, 3 feet draught of water. We put in a propeller wheel, 46 inches diameter, with a power of cylinder 8x12, with an upright boiler, 38 inches diameter by 78 inches high. She will carry about 28 cords of hickory wood, and make 6 to 7 miles per hour with 60 lb. steam. My experience is that the propeller wheel works better and with much less power than the old time steam wheels that we used to use down on the Ohio and Mississippi rivers.

(22) J. C. asks: What will remove the glossiness on cloth that appears on the knees and elbows of clothing after having been worn some time? A. There is no permanent remedy, since it is due to the wearing away of the "nap." A weak solution of ammonia will remove the gloss temporarily.

(23) W. K. asks: Can you inform me how to make cider in vinegar in a quick, wholesome way, or refer me to some number of your paper that has the process in? I have plenty of cider 6 years old that is very slow to make into sharp vinegar. A. Consult a General Treatise on the Manufacture of Vinegar, by Professor H. Dussauce (including all known quick processes). A full description of this process would occupy too much space in these columns.

(24) W. F. H. asks how to turn and fit a butterfly valve which has a solid stem running through the boss on valve. How to tell whether both ends of valve will fit before the sides are small enough. A. Cast on the valve a spindle which will coincide with the axis of the pipe to which the valve is fitted. Turn the valve to fit its seat, then saw off the cast spindle and fit in the spindle which is to support and move the valve, then fit the valve by filing or by turning off a very little from its sides near the spindle.

(25) I. C. McL. asks if there is any chemical that could be put into white iron to toughen it, that is, to put in the mixture when the iron is melted; if so what is it? We use this iron in the manufacture of bells. A. The toughness and hardness of iron and steel are increased by the addition of certain amounts of tungsten.

(26) C. E. L. writes: I frequently notice in your paper inquiries about ground connections on telegraph lines, and I think the subject is one that deserves more attention than is commonly given to it, as poor grounds are causes of more trouble to the amateur and inexperienced telegrapher than anything else. Current school text books describe a ground connection as a sheet of copper ten or twelve feet square buried at each end of the line. The expense of such a ground would in many cases be greater than the whole cost of wire and instruments, and of course it could not be thought of for an amateur line, where, as a general thing, expense is the first consideration. The best ground is a connect-