

The Asbestos Roofing (with white or gray fireproof coating), now in use in all parts of the world, is the only reliable substitute for tin. It is adapted for steep or flat roofs in all climates, costs only half as much as tin, and is easily applied by any one. Samples and descriptive price lists sent free by H. W. Johns' Mfg Co., 87 Maiden Lane, New York.

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.

The most durable and economical protective coating in the world for tin roofs, exposed brick walls, etc., is the Asbestos Roof Paint. H. W. Johns' Mfg Co., 87 Maiden Lane, New York, sole manufacturers.

The E. Horton & Son Co., Windsor Locks, Conn., manufacture the Sweetland Improved Horton Chuck.

Special Tools for Railway Repair Shops. L. B. Flanders Machine Works, Philadelphia, Pa.

Wanted—The address of Mr. Good, or any manufacturer of Steam Generators inside the fire box or furnace of steam boilers. Address M. L. Slocum, Point Washington, Florida.

For Sale.—One large Corliss Engine, 23 x 48, with 16 8-12 ft. x 27 in. face wheel, right hand; now running in good order. The Arlington Cotton Mills, Wilmington, Del.

Books on Applied Science. Catalogue free. E. & F. N. Spon, 446 Broome St., New York.

A saving of 25 to 33 per cent of customary outlays can be effected by use of the Asbestos Liquid Paints, which are the purest, finest, richest, and most durable paints ever made for structural purposes. Samples of sixteen newest shades for dwellings sent free by mail. H. W. Johns' Mfg Co., sole manufacturers, 87 Maiden Lane, New York.

Brass or Iron Gears; list free. G. B. Grant, Boston.

For a thorough practical education in the duties of steam and mechanical engineers and firemen, apply to the National Institute, Stamford, Conn. For pamphlet and particulars, address Hy. R. Foote, C.E., Director.

Tapping Water Main Pipes.—Machines for tapping pipes under pressure, for sale by Wm. Young, Easton, Pa.

Steam Traps; best and cheapest in use. No blowing through to start. T. Saut, New Haven Conn.

The Friction Clutch that is doing work in many places satisfactorily, that has never been done by any other, can be seen at Institute Fair, New York. D. Frisbie & Co., New Haven, Conn.

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.

Steam Excavators. J. Souther & Co., 12 P.O. Sq. Boston.

The Secret Key to Health.—The Science of Life, or Self-Preservation. 300 pages. Price, only \$1. Contains fifty valuable prescriptions, either one of which is worth more than ten times the price of the book. Illustrated sample sent on receipt of 6 cents for postage. Address Dr. W. H. Parker, 4 Bulfinch St., Boston, Mass.

The Baker Blower runs the largest sand blast in the world. Wilbraham Bros., 2319 Frankford Ave., Phila., Pa.

Forsyth & Co., Manchester, N. H., & 213 Center 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.

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

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

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

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

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

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

Bradley's cushioned helve hammer. See illus. ad. p. 206.

Sheet Metal Presses, Ferracute Co., Bridgeton, N. J. Band Saws a specialty. F. H. Clement, Rochester, N. Y.

Diamond Planers. J. Dickinson, 64 Nassau 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.

Noise-quieting Nozzles for Locomotives and Steamboats. 50 different varieties, adapted to every class of engine. T. Shaw, 915 Ridge Avenue, Philadelphia, Pa.

Stave, Barrel, Keg, and Hoghead Machinery a specialty, by E. & B. Holmes, Buffalo, 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.

Oak Tanned Leather Belting, Rubber Belting, Cotton Belting, Polishing Belts. Greene, Tweed & Co., N. York

Automatic Machines for grinding quick and accurate. Planer, Paper, Leather, and other long knives. The best Solid Emery Wheels and Portable Chuck Jaws. Made by American Twist Drill Co., Woonsocket, R. I., U.S.A.

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

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

Pat. Steam Hoisting Mach'y. See illus. adv., p. 222.

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

Sawyer's Own Book, Illustrated. Over 100 pages of valuable information. How to straighten saws, etc. Sent free by mail to any part of the world. Send your full address to Emerson, Smith & Co., Beaver Falls, Pa.

Eclipse Portable Engine. See illustrated adv., p. 189.

Tight and Slack Barrelmachinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus'd adv. p. 30.

\$250 Horizontal Engine, 20 horse power. See illustrated advertisement, page 189.

Magic Lanterns and Stereopticons of all prices. Views illustrating every subject for public exhibitions. Profitable business for a man with small capital. Send stamp for 80 page illustrated catalogue. McAllister, Manufacturing Optician, 49 Nassau St., New York.

Shafting, Pulleys, and Hangers. Nadig & Bro., Allentown, Pa.

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

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.

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

Machines for cutting and threading wrought iron pipe a specialty. D. Saunders' Sons, Yonkers, N. Y.

Steam Engines, Automatic and Slide Valve; also Boilers. Woodbury, Booth & Pryor, Rochester, N. Y. See illustrated advertisement, page 29.

Microscopes, Optical Instrum's, etc. G. S. Woolman, 116 Fulton St., N. Y.

Cylinders, all sizes, bored out in present positions. L. B. Flanders Machine Works, Philadelphia, Pa.



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) J. R. M. asks for the best way to fill barometer tubes so as to exclude the air. The tubes are straight, about 34 inches long. I have never filled any, and am afraid I will fail without some instruction. A. Invert the tube, pour a little pure mercury into it. Boil the mercury to expel the air and moisture. Add more mercury, boil again, and so on until the tube is filled. As the vapor of mercury is very poisonous, you should not inhale it.

(2) J. J. D. asks (1) how screw heads are nicked. A. By means of a circular saw or cutter. A number of screws are held by a rotating holder, which carries their heads over the edge of the saw. 2. How can I make in malleable iron a groove 1-32 inch wide and 1/8 inch deep? A. By employing a circular saw. See article on rotary cutters, p. 340, vol. 40, of SCIENTIFIC AMERICAN.

(3) C. F. B. asks: 1. Can I make a telephone from the shop to the office, distance 800 feet, without a battery? A. Yes. 2. What would be best for a diaphragm? A. Use ferrotyp plates or mica. 3. Would a fine copper wire be best for a conductor; if so, how should it be supported, and what gauge should it be? A. No. 24 copper wire will answer. Support it on elastic rubber bands or strings. 4. How large should the diaphragm be? A. 2 inches in diameter.

(4) W. A. asks whether mercury in a glass tube will rise more degrees at a certain heat when weighted than it will if not weighted. A. As mercury is practically incompressible, there can be little or no difference.

(5) W. H. B. asks (1) how to stain the white part of a black walnut board so as to have it the same color as the rest. A. Apply a thin asphaltum stain, (asphaltum dissolved in turpentine). 2. How to make shellac varnish? A. See p. 252, current volume. 3. Is it proper to apply it with a brush; if so, how can I make it so as to have a smooth surface? A. Apply it with a camel's hair brush. 4. To ebonize walnut wood? A. See vol. 40, p. 91 (18).

(6) W. S. H. asks: What is the Herreshoff coil boiler? A. For illustrated description of this boiler see p. 210, vol. 40, SCIENTIFIC AMERICAN.

(7) W. T. writes: We have a skylight in our store (dry goods) which is surrounded by high brick walls, and black goods shown under this skylight take on an unnatural color from the glare of the sun shining upon the red brick walls. Can you tell us of anything that we can do to remedy this and obtain a soft white light? The skylight is made of hammered glass. A. Your remedy will be to whitewash the brick walls.

(8) T. E. G. asks: 1. How many feet of copper wire of No. 16, 18, and 20 American gauge are equal to a resistance of one ohm? A. No. 16, 310 feet; No. 18, 200 feet; No. 20, 110 feet approximately. The resistance will vary with different specimens. 2. What is the average resistance of the gravity battery? A. 2 to 4 ohms. 3. What should be the resistance of electro-magnet so as to use the battery to the full? A. The resistance of the battery and electro-magnet should be the same.

(9) W. B. asks: What finally becomes of heat? Is it changed into some form of force, or is it scattered and wasted and resolved into nothing? The sun has been for countless ages pouring his store of heat upon the earth. If it receives nothing back, where is the accumulation? The coal beds account for part of it, but not for what has been received since their formation. As the earth and the materials of which it is composed are limited, it seems that the capacity for the storage of force must also be limited. Again, when those forces are liberated, the same amount of heat is evolved that was originally stored there. If there is no loss, the heat must accumulate somewhere. Then, a very small portion of the sun's heat falls upon any planet. What becomes of the rest? A. It is assumed that heat is simply the rapid vibration of an imponderable elastic ether which pervades all matter and infinite space. This hypothesis as to the nature of heat is now generally admitted. If it be correct, it is evident heat is not matter, but a state of matter, and can not therefore be stored.

(10) W. R. writes: To an acoustic telephone line, 1,500 feet long, No. 22 copper wire, with 10 cotton cord insulations, I propose to add at each end an ordinary electric call bell (size 2 1/2 inch box pattern), and to use the above wire for the line. The ground connections will be as gas pipe at one end and an iron water pipe at the other. 1. Can I make the battery at one end answer for both? A. Yes, by using closed circuit bells. 2. How many cells of Calland battery are necessary? A. Probably six or seven will answer. 3. Of the wires from the battery, which is connected to the main line? A. Either. 4. How are the wires arranged to bell battery and ground connection respectively? A. From ground to one pole of the battery, from the other pole to the line, from the line to the ground. Place in your line the closed circuit bells and keys according to your convenience.

(11) A. S. P. asks how papier mache is made for fine, small work. A. Boil clippings of white or brown paper in water, beat them into a paste, add glue or gum, size and press into oiled moulds.

(12) O. A. asks: 1. Can I with a plane slide valve to steam engine cut off at 1-3 or 1/4 the stroke with as good results and economy as I can with a cylinder valve; if not, why is it? A. Probably one style of common valve is as good as another, but it is impossible to cut off with such valves shorter than about 2-3 advantageously on account of the compression of the steam within the cylinder. 2. What are the objections (if any) to a slotted cross head. It is full as cheap to make, and the motion of piston and crank pin are alike, when with the ordinary connecting rod motions are not the same. A. "Slotted" cross heads are frequently used in small engines and steam pumps, but the friction is too great and wear too rapid for larger engines.

(13) J. R. writes: I want to buy a work on engines, one containing steamship and stationary engines, also works on mechanical drawing. Which are the best in use on the subjects named? A. Probably "Roper on Land and Marine Engines" and "MacCord on Mechanical Drawing" will suit.

(14) W. R. writes: A is building a small turninglathe of cast iron 5 feet long; spindle is of cast steel, with a hole clear through, and is to run in a case-hardened iron box in the front, and behind is a plug fitted in, also of case-hardened iron, which is V-shaped on its extremity, and is to run in a center of hard cast steel; the spindle, where it runs in the box in front, also being hard and of conical shape. B claims the box should be of hardened steel instead of iron. Who is right, A or B? A. We do not think there can be any material difference, as a properly case-hardened iron surface is steel.

(15) N. P. R. asks: 1. Which is considered to be the best and most practical signal for railroad switches, those showing bars at different angles, or color signals? Which is most in use in this and in the old country? A. Semaphore signals are largely in use, and we believe increasingly so, for daylight signals, though colored signals are used on many of our principal railroads. We think for daylight signals the semaphore is generally preferred.

(16) B. E. & S. M. write: Having had a dispute with B about the travel of a valve, I contend that the true meaning of travel is the distance the valve moves in traveling from its middle position to the extremity of its stroke and back again to its middle position; but B says I am mistaken. Who is right? A. The travel of a valve is its whole movement between its two extreme positions, or, in case of a direct connection, twice the throw of the eccentric.

(17) L. G. writes: A planer in our factory has been giving us considerable trouble for a long time. The boxes heat, compelling us to re-Babbit every week and sometimes oftener. I noticed an article in the SCIENTIFIC AMERICAN several months ago concerning the use of plumbago in such cases. I cannot find the paper now. Can you name a remedy, or rather a preventive, to the heating? A. You can try fine plumbago and oil, or fine soapstone and oil; but the probability is that your shafts and boxes are out of line, or the cylinder may be out of balance.

(18) H. C. H. asks: If two balls of the same size, and one twice as heavy as the other, be dropped from a great height, which will reach the ground first? Of course there will not be much difference, but will there be any? A. If falling in the atmosphere, the heavier ball would reach the ground first; if falling in a vacuum, there would be no difference.

(19) G. B. asks: What is the best composition for expansion metal? A. Brass is generally used for expansion tubes and bars.

(20) H. S. writes: You say in your answer to J. G. B., in SCIENTIFIC AMERICAN, September 27, 1879, that 150 revolutions=300 feet per minute, and 150 revolutions=500 feet per minute. This I do not understand—that is, when you obtain the 300 feet and 500 feet in finding the horse power of an engine. It occurs on page 204 (29). A. 150 revolutions is 300 strokes of the piston, as it requires two strokes to one revolution. In the first case

the stroke is 1 foot, hence the speed is 2x150=300 feet; and in the second case the stroke is 1 2-3 feet, two strokes = 3 1-3 feet; 3 1-3x150=500 feet.

(21) G. H. S. writes: In your issue of the 27th inst., I noticed an error in the figures given in answer to "Novice" (26). Diameter of wheel should be 19-77 inches; diameter or pinion should be 5-60 inches, without any regard to pitch or number of teeth.

(22) W. S. W. writes: 1. I have a condenser working with a pair of Corliss engines, 20 inch by 28 inch cylinders, adapted to use with either or both. It acts on the principle of an injector, and a column of water, with a head of 9 feet, flows through a nozzle (which has an adjustable nozzle that regulates the quantity of water passing in), and the steam from either or both engines meets this water at the combining nozzles and is condensed. After having condensed the steam, the column of water flows through an expanding tube and is discharged into a canal. The natural head gives this column a velocity of about 24 feet per second, and when there is a 27 inch vacuum, the velocity is increased to over 400 feet per second. Now with both engines on, we have run with a steady vacuum of 26 inches to 28 inches, but when running only the 20 inch engine, the vacuum would dance up and down from 27 inches to 15 inches, and the only way we could get it steady was to admit a small quantity of air into the exhaust pipe, when it would hold at 22 inches. Can you explain why this should act so, as we have always aimed to exclude every particle of air to hold a vacuum? A. It is difficult to say, without actual examination, precisely what is the cause of the peculiar action of your condenser; it may be due to an air leak, but we are inclined to think that it is the irregular action that we have heard attributed to this class of condensers. 2. The level of water behind our dam extends back some ten miles. Now, theoretically, would we gain more power in our water wheels, by keeping the water 3 inches below the level of the dam, so as to make the water flow more rapidly towards it; or by keeping it right up to the top of the dam and having the 3 inches more head? A. Keep your 3 inches additional head. 3. How is it that authorities like Cooper, Haswell, Buel, etc., state that rubber belts will drive 25 per cent and 30 per cent more than leather ones? I had a 12 inch leather belt, driving from a 30 inch to a 20 inch pulley, 10 feet apart, and keeping 16 roving frames up. On some days it would slip badly, so I put on a 12 inch, 4 ply, rubber belt, thinking there would be a gain of 25 per cent, and the result was it would not drive eight frames. I had to take it off and put on the old 12 inch leather one, with a six inch rider on the outside, and I have heard no complaints. A. We do not remember any experiments to test the relative adhesion of leather and rubber belts under the conditions of actual use. It is probable that in a damp atmosphere rubber would be superior.

(23) F. M. asks for a receipt to make a black ink for the copying press described in the SCIENTIFIC AMERICAN. A. Dissolve soluble nigrosine in about 5 parts of boiling water and strain through a fine cloth. When cool it is ready for use.

(24) W. R. H. writes: We want to use kerosene in a liniment, but the offensive odor is very objectionable. Can you tell me how to destroy it without taking from its virtue as a medicine? A. It cannot be completely deodorized without altering its character. The odor may be cloaked by the addition of various essential oils without materially affecting its properties.

(25) A. E. F. writes: I wish to make good red sealing wax in quantities of about 5 lb. I have hunted through several books of receipts and can find no receipt for my purpose. Will you kindly furnish formula? A. Yellow resin, 1 lb.; shellac, 5/8 oz.; Venice turpentine, 5/8 oz.; vermilion, 1 oz. Melt the shellac in a copper pan over a fire, add the resin, pour the turpentine slowly in, and soon afterwards add the vermilion, stirring continually.

(26) F. E. H. asks: What will make the darkest brown lacquer to put on copper bronze? A. 2 1/2 oz. shellac, 2 quarts wine spirit, 2 oz. gum sandarac, 1/4 oz. gum elmi. Mix and keep warm until solution is effected, then strain and color with dragon's blood and aniline brown to suit.

(27) R. F. B. asks: 1. Can commercial zinc be made sufficiently pure for battery use by remelting? What is the dross left in the crucible? A. Your question was answered on p. 187 (4), current volume. Zinc cannot be purified by fusion, as you suggest. The dross is zinc oxide, formed by the action of atmospheric oxygen on the molten metal. 2. Can electroplating be done as economically with the gravity battery as with the Smee? How do they compare as to first cost? A. Yes, on a small scale; they are cheaper. The gravity form is the cheapest. 3. Please explain how stencil dies and solid burning brands are made. A. Stencil dies are made by driving red hot steel into suitable matrices, afterward filing them into shape. Burning brands are moulded in sand from a pattern and cast.

(28) J. H. K. writes: I wish to know how to make Pharaoh's serpents' eggs, as I have need of some in experiments I am about to make. A. To solution of ammonium sulphocyanide add mercuric nitrate solution; mercuric sulphocyanide is precipitated as a white powder. This washed, made while moist into little cones, and thoroughly dried, are the so-called serpents' eggs. They are very poisonous.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

S. G.—The sample contains lime phosphate, clay, quartz sand, iron oxide, lime carbonate and sulphate, of some value for fertilizing purposes. A full analysis would be advisable.—H. J. D.—A, B, D, and E are banded agates, of very little value in the rough state. C is a variety of jade and jasper. F is jasper, of little economic value.—A. E. F.—It is a lignite of good quality.

COMMUNICATIONS RECEIVED.

On Sea Sickness. By C. K. M.
On Wear of Shafts. By J. B.
On Explosion of the Alaska. By J. H. R.