

Business and Personal.

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Vertical Engines, 10 to 15 H. P., thoroughly well made. John Hartrick & Co., 47 Gold street, New York.

Assays of Ores, Analyses of Minerals, Waters, Commercial Articles, etc. Technical formulae and processes. Laboratory, 33 Park Row, N. Y. Fuller & Stillman.

The improved Gatling Guns fire over 1,000 shots per minute, and are the most destructive war weapons ever invented. Gatling Gun Co., Hartford, Conn., U. S. A.

For Town and Village use, comb'd Hand Fire Engine & Hose Carriage, \$350. Forsyth & Co., Manchester, N. H. Blowers.—One No. 5, two No. 6, regular pattern, steel, pressure Sturtevant's; one No. 6, Hot Blast Apparatus; also other sizes for sale very low. Exeter Machine Works, 140 Congress St., Boston, Mass.

Solid Walrus Wheels. Wood Wheels Covered. Fine Wool Felt Wheels for Polishing. Greene, Tweed & Co. Magneto Call Bells for Telephone Lines. The Best. No battery required. Bunnell, 112 Liberty street, N. Y.

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

For Sale.—Entire interest in a valuable Patent. Will command a large sale, and is the best instrument of its kind now in use. Call or address W. H. Rodgers, No. 96 Fulton St., room 5.

Wm. Sellers & Co., Phila., have introduced a new Injector, worked by a single motion of a lever.

Megaphonic Telephones.—Something new. Send stamp for circular. Reed & Sons, Fredericksburg, O.

Address Star Tool Co., Providence, R. I., for Screw Cutting Engine Lathes of 13, 15, 18, and 21 in. swing.

Wanted.—A reliable, honest, temperate man, and qualified to manage a Store in New York supplied with Engines and Boilers. Answer Drawer 50, Erie, Pa.

Use the Patent Improved Sheet Iron Roofing and Drip Crimped Siding made by A. Northrup & Co., Pittsburg, Pa. Send for circular and prices.

Engine Builders' Brass Goods, Oil Feeders, Glass Oil Cups, Shaft Cups. All goods strictly first class. Address Cincinnati Brass Works.

Dead Pulleys, that stop the running of Loose Pulleys and Belts, taking the strain from Line Shaft when Machine is not in use. Taper Sleeve Pulley Works, Erie, Pa.

Nickel Plating.—A white deposit guaranteed by using our material. Condit, Hanson & Van Winkle, Newark, N. J. English Agency, 18 Caroline St., Birmingham.

Write to E. & F. Gleason, 56 Canal street, Philadelphia, for standard wood tools.

Sperm Oil, Pure. Wm. F. Nye, New Bedford, Mass.

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

North's Lath Dog. 347 N. 4th St., Philadelphia, Pa.

Telephones.—J. H. Bunnell, 112 Liberty St., New York.

J. C. Hoadley, Consulting Engineer and Mechanical and Scientific Expert, Lawrence, Mass.

Boilers ready for shipment, new and 2d hand. For a good boiler, send to Hilles & Jones, Wilmington, Del.

Punching Presses, Drop Hammers, and Dies for working Metals, etc. The Stiles & Parker Press Co., Middletown, Conn.

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

1,000 2d hand machines for sale. Send stamp for descriptive price list. Forsyth & Co., Manchester, N. H.

Presses, Dies, and Tools for working Sheet Metals, etc. Fruit and other Can Tools. Bliss & Williams, Brooklyn, N. Y., and Paris Exposition, 1878.

The Cameron Steam Pump mounted in Phosphor Bronze is an indestructible machine. See advertisement.

Manufacturers of Improved Goods who desire to build up a lucrative foreign trade, will do well to insert a well displayed advertisement in the SCIENTIFIC AMERICAN Export Edition. This paper has a very large foreign circulation.

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

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.

Improved Wood-working Machinery made by Walker Bros., 73 and 75 Laurel St., Philadelphia, Pa.

Special Planers for Jointing and Surfacing, Band and Scroll Saws, Universal Wood-workers, etc., manufactured by Bentel, Mergelant & Co., Hamilton, Ohio.

Water Wheels, increased power. O. J. Bollinger, York, Pa.

We make steel castings from ¼ to 10,000 lbs. weight, 3 times as strong as cast iron. 12,000 Crank Shafts of this steel now running and proved superior to wrought iron. Circulars and price list free. Address Chester Steel Castings Co., Evelina St., Philadelphia, Pa.

Machine Cut Brass Gear Wheels for Models, etc. (new list). Models, experimental work, and machine work generally. D. Gilbert & Son, 212 Chester St., Phila., Pa.

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

Holly System of Water Supply and Fire Protection for Cities and Villages. See advertisement in Scientific American of last week.

Self-feeding Upright Drilling Machine of superior construction; drills holes from ½ to ¾ inch diameter. Pratt & Whitney Co., Manfrs., Hartford, Conn.

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

For Shafts, Pulleys, or Hangers, call and see stock kept at 79 Liberty St. Wm. Sellers & Co.

The Turbine Wheel made by Risdon & Co., Mt. Holly, N. J., gave the best results at Centennial test.

Blake's Belt Studs are the strongest fastening for Rubber or Leather Belts. Greene, Tweed & Co., 18 Park Place, N. Y.

Bolt Forging Machine & Power Hammers a specialty. Send for circulars. Forsyth & Co., Manchester, N. H.

An exhibition of the Forster-Firm system of Amalgamating Metals will be given at Norristown, Pa., on September 13, 17, and 20. Circulars and cards of admission can be obtained at the offices of the company, 320 DeKalb St., Norristown, Pa.

For sale low.—Set Optician's Tools. Young, 43 N. 7th St., Philadelphia, Pa.

For Sale.—The factory property, 3 acres of ground inclosed by iron fence, factory building three and four stories, 250 feet front, with wing 40 x 90 feet, lately occupied by the United States Watch Company, at Marion Station, on the Pennsylvania Railroad, in Jersey City; also for sale the complete machinery of watch factory. Address P. O. Box 3100, New York city.

Notes & Queries

(1) J. R. asks for a recipe for staining wood dark mahogany, cherry, or rosewood color, something that will not have to be applied hot. A. 1. Boil ¼ lb. logwood in 3 pints of water, and add ¼ oz. salt of tartar. 2. Boil ½ lb. madder and ¼ lb. fustic in 1 gallon water. 3. Boil 1 lb. Brazil wood and 1 oz. of washing soda in 1 gallon of water, apply, and then brush over it before dry a solution of 2 ozs. alum in 1 quart of water. With these wood, if dry, may be stained in the cold; but the dyeing will be accomplished far more quickly and satisfactorily if the liquids are applied hot.

(2) J. M. B. asks: What is the difference between nitro-glycerin and tri-nitro-glycerin, and their formulae? A. The name nitro-glycerin is generally restricted to the tri-nitro-glycerin—C₃H₅(NO₂)₃—in which three atoms of hydrogen are replaced by three of nitryl (NO₂). It is the most stable and powerful, when properly exploded, of the nitryl substitution products of glycerin.

1. What is the authority for the observance of Saturday as the Sabbath? A. Gen. ii, 1st to 3d; Ex. xx., 8th to 11th; Matt. v., 17th, 18th; Rom. iii., 31st; Luke xxiii., 56th; Acts xiii., 14th-14th; xvi., 13th; xvii., 2d. 2. What is the authority for the observance of Sunday as the Sabbath? A. Encyc. Brit., art. Sunday; Kitto, Cyc. Bib. Lit., art. Lord's Day; Smith's Bible Dict., art. Lord's Day; Heylin's Eccl. Hist., part 2, I. 12.

(3) E. L. B. asks how to prepare a salicylic mouth wash. A. 3 parts salicylic acid dissolved in 1,000 parts of water is the usual strength. The continued use of these solutions (of salicylic acid) as a dentifrice has proved very detrimental to the teeth.

Please oblige me by stating the properties of salicylate of soda. A. It is a white, inodorous body, soluble in water, weakly resembling the acid in its antiseptic properties.

(4) A. K. asks for a chemical test by which to determine the amount of chloride of silver, the amount of sulphate of silver, and the amount of sulphuret of silver contained in a sample of ore that has been chloridized by heat in contact with salt. A. The chlorinization assay is made as follows: Weigh out two samples of the chloridized ore or "pulp," each 2-916 grammes, scorify one with 30 grammes of lead, and cupel. Place the second sample in a filter paper, and wash with a strong aqueous solution of sodium hypsulphite (2 lbs. to the gallon), until all the silver chloride has been leached out (when a drop of sodium sulphide solution no longer occasions a precipitate or brown color when brought into contact with a drop of the filtrate). Wash the residue with water, ignite it, mix with 30 grammes of pure lead, scorify, and cupel. Then, weight of bead No. 1: (bead No. 1—bead No. 2) :: 100 : x = per cent of silver chloridized, and 100 - x = per cent not chloridized. There are no ready means by which the amounts of silver combined with sulphur and sulphuric acid in the average of silver ores may be satisfactorily ascertained.

(5) F. B. A., J. L., and others: For water-proof cement. 1. Soak pure glue in water until it is soft; then dissolve it in the smallest possible amount of proof spirit by the aid of a gentle heat. In 2 ozs. of this mixture dissolve 10 grains of gum ammoniacum, and while still liquid add half a drachm of mastic dissolved in 3 drachms of rectified spirit. Stir well, and for use keep the cement liquefied in a covered vessel over a hot water bath. 2. Shellac, 4 ozs.; borax, 1 oz.; boil in a little water until dissolved, and concentrate by heat to a paste. 3. Ten parts of carbon disulphide and one part oil of turpentine are mixed, and as much gutta percha added as will readily dissolve. 4. Melt together equal parts of pitch and gutta percha, apply warm, and press the parts firmly together until quite cold. 5. The ordinary marine glue consists of caoutchouc 1 oz.; genuine asphaltum, 2 ozs.; benzole or naphtha, q. s. The caoutchouc is first dissolved by digestion and occasional agitation, and the asphalt gradually added. The solution should have about the consistency of molasses.

(6) B. A. W. asks for a recipe for a gold lacquer or varnish that gilt moulding manufacturers use on gilt moulding to make silver leaf and bronze look like gold. A. Seedlac, 3 ozs.; turmeric, 1 oz.; dragon's blood, ¼ oz.; alcohol, 1 pint; digest together for a week, with frequent shaking, decant and filter. It is customary to dissolve the resins (pale lac or sandarac) and the coloring matters separately, so that at anytime a lacquer of a given tint may be produced by their mixture. The solutions of coloring matters should be concentrated.

Please give recipe for a fluid to repolish silver plated coffin trimmings that have been plated, but have tarnished by the action of air. A. Suchwork is best polished by moistened whiting, tripoli, or rouge. Solution of potassium cyanide is sometimes employed, but is not to be recommended.

(7) T. T. writes: We have an old 60 horse power engine which is considerably eaten out under the steam chest, so that it will not hold a rubber gasket. Now I would like to know the best manner of making a joint. We tried a rust joint, but a part of it blew out in a few weeks, which I have kept closed by driving in sheet lead with a calking tool. Would lead run in and then calked make a lasting joint? Or can rust be so prepared that tallow or cylinder oil will not eat it out,

or is there any better way? A. We think you can make a good job with the lead. A properly made rust joint will also answer. 2. Through some mistake in putting in a new crank, the piston has about ¼ or 1 inch clearance on each end; would it pay to have plates put on the cylinder heads or piston head to fill these spaces, or would there be danger of them coming loose and falling down? A. It would be advantageous in some respects, and there is no difficulty in securing the plates. 3. Would a pond of 75 by 200 feet and 4 feet deep be large enough to supply a condenser for aforesaid engine, supposing the water from the condenser to run through 300 feet of spouting back into the pond? A. Yes. 4. Are condensing engines (such as the Corliss) made so the condenser can be used or not at pleasure? A. Yes. 5. I have some 3 inch boiler flues and some 2 ½ inch gas pipe; could I make a cheap portable boiler out of either or both, for a 1 ½ by 3 engine? If so, how shall I proceed? A. You can make a sectional boiler by securing the tubes at each end to hollow castings.

Is my handwriting good enough for a bookkeeper, or would it be objected to? Is it of a kind that will improve by practice? A. As a general thing bookkeepers are required to write rather better; but you can improve your handwriting by practice.

(8) W. M. S. asks: What is the difference between the locomotives used for passenger trains and those used for freight trains, and where the difference of power lies? A. Generally freight locomotives have smaller driving wheels than passenger locomotives, or larger cylinders, or both.

Also, whether a boat at anchor swings with the wind or tide? A. With whichever is the most powerful, we imagine, but usually with the tide.

(9) J. B. C. asks for the name of some book on the engine used by the U. S. Navy, or describing the "Screw or Propeller Engine." A. You will find illustrations of marine engines and boilers and propellers in Burgh's "Modern Marine Propulsion" and "Marine Compound Engines," also in Bourne's "Treatise on Screw Propellers."

(10) A. K. D. asks: Can you inform me of the easiest and least expensive process to polish surfaces of hard stones, say agates? A. You will find the process given in detail in Byrne's "Handbook for Artisans," etc.

(11) J. L. W. asks: Does the successful working of a hydraulic ram depend upon any power not generated or gained by or from the momentum of the water in the pipe leading from the spring to the ram, or does the air in the air chamber have any power of its own? A. The air chamber does not generate any power, but a ram does not usually work successfully without it. You may find some analogy in the flywheel of a steam engine, which, while it does not generate any power, alternately accumulates and gives it out.

(12) A. R. asks: What is meant by the indicator card of an engine? A. The indicator card from an engine is a diagram showing the pressure of steam at every point of the stroke.

Please tell me when Cooper Institute opens for night session, and how I can get registered in class for civil engineering. A. For information in regard to Cooper Institute, call on or address the secretary.

(13) C. W. W. asks how to find the horse power of an engine. A. The horse power of an engine can only be determined by experiment, since the mean pressure of the cylinder must be known. 2. How large a pleasure boat will a one horse power engine run at the rate of a mile in about ten minutes, with screw propeller, and also the size of the propeller? A. Make a boat 15 feet long, with a screw 20 inches in diameter and 30 inches pitch.

(14) P. J. M. asks: What quantity of water can be condensed on one superficial foot of cooling surface in an hour in a surface condenser, the steam entering condenser from a boiler wherein the pressure is, say, 70 lbs., condenser being well supplied with the ordinary sea water? A. From 10 to 12 lbs. in ordinary practice, although much better results have been obtained in special cases.

(15) E. O. H. asks: What ingredient shall I use in a solution to clean clay soil from marble tombstones? A. Wash it with water, apply a mixture of 3 parts sodium carbonate (sal soda) and two parts caustic lime made into a paste with water; after a time wash this off thoroughly, using a stiff brush.

Please give recipe for a reliable shoe gloss. A. Shaw's patent blacking is made as follows: Soft water, 1 gallon; logwood extract, 6 ozs.; dissolve by gentle heat; soft water, 1 gallon; borax, 6 ozs.; shellac, 1 ½ oz., boil until solution is effected; potassium dichromate, ½ oz.; water, ½ pint; dissolve, and add all together. It is preferred to add to this before boiling 3 ozs. of spirit of ammonia or aqua ammonia.

Does the moon's eclipse have any effect whatever on the weather? A. No.

(16) C. M. H. asks: 1. What is gas carbon (such as is used in the electric lamp)? A. It is similar to that used in batteries. See pp. 60 (40), 189 (2), and 203 (2), vol. 37, SCIENTIFIC AMERICAN. 2. Will lamp-black pressed or moulded into sticks answer for carbon pencils for trying Hughes' and Edison's experiments? A. Yes.

(17) C. S. + is a division mark. You should buy an elementary book on arithmetic.

(18) T. G. P. asks: What are the materials used for flavoring smoking tobacco, and, if possible, as to the manner of its preparation? A. Consult "Handbuch des Tabaks," and "Cigarrenfabrikation mit besonderer Berücksichtigung der im Handel vorkommenden Tabaksorten, deren Zubereitung, etc.," by L. von Wagner.

(19) H. E. H. asks (1) how to find the proper size and weight of flywheel for an engine, and if the rule is the same in upright and horizontal engines, and also give example. A. Let r = radius of wheel, measured to the middle of the rim, in feet. N = revolutions per minute. v = velocity of point whose radius is r, in feet per second. P = horse power of engine. E = ratio of greatest fluctuation in power during

stroke, to mean power exerted during stroke. Then the weight of the flywheel in pounds varies, according to the nicety of the regulation required, from 1,000 to 2,000 times $\frac{P \times 33,000}{v^2 \times N}$. 2. How do we make an engine run a certain number of revolutions per minute? A. The most common method is a governor, which supplies or shuts off steam as required.

(20) J. E. W. asks for the best method to prevent a new upright boiler from foaming. The first two or three days they run they foam badly, and we would like to prevent it. A. Frequent blowing off and throttling the steam are often efficacious.

(21) G. A. C. writes: My boiler is 9 x 30 inches, with 5 flues. Size of cylinder 2 ½ x 4 inches. With 40 lbs. steam it runs a small lathe and jig saw, one at a time, very well. Would it run a 6 inch rip saw if I ran the belt directly from a 7 inch pulley on the engine to a 2 inch pulley on the saw, running engine at 300? A. We think so. 2. Boiler made of ½ iron, is it safe at 100 lbs. pressure? A. Yes.

(22) J. E. H. asks: Does the top of a carriage wheel move faster than the bottom when the carriage is in motion? If so, does the point of contact with the earth come to a full stop? A. Faster with reference to external objects; at the same speed with reference to a point on the wagon.

(23) W. C. S. writes: With steam at 60 lbs., what horse power will be developed in two horizontal boilers, each being 16 feet long by 58 inches in diameter, and each having 34 four inch flues? What power with 80 lbs.? A. As we have frequently stated, there is no standard for the horse power of a boiler. If these boilers are properly set they should evaporate at least 7 or 8 lbs. of water for each pound of coal burned.

(24) A. B. P. writes: I kept some sulphuric acid in a large bottle for several weeks. On examination I found that it smelled strongly of SO₂. What is the reason? A. Probably to the presence of organic matter in the boiler.

A friend of mine had a bottle of moist potassium cyanide. It stood aside for some time. On opening it he found that the odor of the cyanide had disappeared and was replaced by that of ammonia. What was the reason of that? A. Potassium cyanide is decomposed by the feeblest acids, even the carbonic acid of the atmosphere; and the unstable hydrogen cyanide set free soon suffers decomposition, ammonia being one of the products.

(25) B. G. writes: I. Having bought a steam engine for grinding cider apples and other farming purposes for my own use, will I have to have a license to run the same? A. We think not. 2. If I fill the boiler with water and heat it so that the gauge rises to 100 lbs., will it be safe to carry steam 75 lbs.? A. Yes, if no imperfections are developed on the trial.

(26) P. P. P. asks (1) for the rule or operation necessary to determine the correct pitch of screw propellers. A. Make it from 1 ½ to 1 ¾ time the diameter. 2. Also the rule to obtain the wheels to cut ½, 1 ¼, or 2 ½, and all odd threads in a screw cutting lathe. A. See articles on "Practical Mechanism," by Joshua Rose. 3. Is the diameter of a propeller taken from the tip of the blades? A. Yes.

(27) G. A. R. asks what the substance was that fell with the rain some six weeks ago. It looked like sulphur, and fell quite abundantly in New England and in parts of New York State. A. It is the pollen of the common white pine—*Pinus strobus*.

(28) J. J. D. asks: 1. What size of ports is required in engine 7 inches bore and 12 inches stroke? A. Make them one tenth of piston area. 2. Should there be any more than the thickness of the port between the piston and cylinder head when the crank is on dead centers? A. No; it should be much less. 3. What size of return tube boiler would I require for cylinder that size, and what power would I have? A. A boiler 30 inches in diameter and 9 feet long will answer. The engine might develop 10 horse power.

(29) T. C. writes: The tube sent you was taken out of an upright tubular boiler, 30 inches in diameter and 4 feet high, and one year old, belonging to a launch, 30 feet long, fitted with a pipe condenser made of galvanized iron pipe, in which fresh water was used. The oil used in the cylinder was lard oil. The part of tube wasted away is the top. What do you think was the cause of it? Was it the oil used or the water? A. It was probably due to the grease. By allowing a slight scale to form in the boiler the action may be prevented, and possibly a piece of zinc suspended in the boiler will have the same effect.

(30) F. S. asks: Would it not be injurious to a horizontal boiler to extend the fire space above the waterline? I see it advocated in the SCIENTIFIC AMERICAN, although contrary to usual practice. A. The plan we have recommended is one in very common use, with no injurious results.

(31) L. S. W. asks: Which requires the most power—for a horse to walk up an inclined plane, 100 slope and 20 feet rise, or to walk on a "horse power" with the same rise as the hill or inclined plane, until 100 feet of power surface had passed under him? A. As we understand your question, there will be no difference.

(32) J. B. writes: I have a well on top of a hill that is 30 feet deep, vein of water strong, will have to go 500 feet down the hill to get level with the bottom of the well. Can I draw the water with a siphon successfully? Will size of pipe make any difference? A. You can use a siphon if provision is made for removing the air at all high points. The size of pipe to be used depends upon the delivery required.

(33) A. M. writes: I have a steam launch 25 feet long, 6 feet beam, with a double engine; each cylinder 3 ½ bore by 3 ½ stroke. Boiler carries 120 lbs. Wheel 23 inches diameter, 28 inches pitch, making 585 revolutions per minute. Speed of boat without injecting water into boiler is fully 9 miles per hour, but as soon as injector is started the steam drops somewhat and reduces her speed. When running at full speed her bow rises and stern drops down, notwithstanding the shaft has a good rate downward. If I built another