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Brass Gear Wheels, for Models, &c., on hand and made to order, by D. Gilbert & Son, 212 Chester St., Philadelphia, Pa. (List free.)

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For best Bolt Cutter, at greatly reduced prices, address H. B. Brown & Co., New Haven Conn.

"Lehigh"—For information about Emery Wheels &c., address L. V. Emery Wheel Co., Weisport, Pa.

American Metaline Co., 81 Warren St., N. Y. City.

Small Tools and Gear Wheels for Models. List free. Goodnow & Wightman, 28 Cornhill, Boston, Mass.

Peck's Patent Drop Press. Still the best in use. Address Milo Peck, New Haven Conn.

Faught's Patent Round Braided Belting—The Best thing out—Manufactured only by C. W. Army, 301 & 303 Cherry St., Philadelphia, Pa. Send for Circular.

Genuine Concord Axes—Brown, Fisherville, N. H.

All Fruit-can Tools, Ferracuta W. K's, Bridgton, N. J.

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

Hydraulic Presses and Jacks, new and second hand. Latnes and Machinery for Polishing and Buffing Metals. E. Lyon 470 Grand Street New York.

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The "Scientific American" Office, New York, is fitted with the Miniature Electric Telegraph. By touching little buttons on the desks of the managers signals are sent to persons in the various departments of the establishment. Cheap and effective. Splendid for shops, offices, dwellings. Works for any distance. Price \$6, with good Battery. F. C. Beach & Co., 246 Canal St., New York, Makers. Send for free illustrated Catalogue.

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Spinning Rings of a Superior Quality—Whitinsville Spinning Ring Co., Whitinsville, Mass.

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.



A. K. will find a recipe for water glass on p. 225, vol. 23.—A. F. will find directions for making a sun dial on p. 409, vol. 29.—F. J. C. will find directions for making colored glass on p. 390, vol. 30.—J. N. will find a recipe for blackboard composition on p. 91, vol. 31.—J. N. can utilize the tin of tinned plate scraps by the process described on p. 319, vol. 31.

(1) J. H. asks: How can I make pure chloride of gold and nitrate of silver from United States gold coin? A. Dissolve the coin in a limited quantity of a warm (not hot) mixture consisting of one part nitric and three parts hydrochloric acid. When solution is complete, filter from the white residue of chloride of silver; dilute largely with distilled water, and add a filtered aqueous solution of common sulphate of iron (6 parts to 1 of gold); collect the precipitated gold, which is now free from copper; redissolve in aqua regia as at first, and evaporate to dryness on a water bath. Place the filter paper containing the chloride of silver, along with a quantity of borax, in a small Hessian crucible, and heat strongly until the silver is separated and rests as a small button on the bottom of the crucible; remove from the fire, cover, and allow to cool. Then separate the silver from the borax by means of boiling water; dissolve in nitric acid, and evaporate to dryness on a water bath.

What chemicals will act as a bleaching agent when exposed to sunlight? A. Moisture, chlorine gas, chloride of lime, etc.

(2) M. H. K. asks: What is the green substance that gathers on the outside of a porous earthenware drinking vessel? Does it come from the water inside, or from the atmosphere? It washes off readily, and resembles the green slime of stagnant waters. A. It is probably due to the quantity of organic matter dissolved in the water, which, on evaporating, leaves it behind in the form you mention. Test a little of the clear water by coloring it slightly with permanganate of potash; if, after standing for some time, the color disappears, the water is unfit for drinking purposes.

(3) S. D. G. says: I have a steam whistle which sounds well at 100 lbs. steam. If I now raise steam to 1,000 lbs. what effect will it have on the whistle? Can it be heard so much farther, or will it fail to sound at all? A. It is problematical whether the expansion of the metal would not altogether alter both the tone and effectiveness of the whistle.

(4) W. M. J. says: The boiler of a thrashing machine engine recently exploded at Lexington, Md. On examination it was found that the safety valve was stuck fast in the guide, it being a light globe valve with a stem about 3¼ inches long, like a common globe valve stem, with thread left off, being a close fit. I am under the impression that the hand had gone once clear around and up to the 65 lbs., as the sheets do not show any signs of having been over heated. A. The safety valve stem being fast totally impaired the efficiency of the boiler, and it is possible that the needle of the pressure gage (if the construction of the gage would permit) had made more than an entire revolution. The pressure in such case is an unknown quantity; hence the explosion.

(5) J. C. asks: Is it possible to plane a piece of hardened steel? A. It is impracticable, and would be, if it could be done, disadvantageous.

(6) C. W. M. asks: 1. If I make an engine of brass, it will turn blue when heated. Will the color change if I plate it with nickel? A. No. 2. How large a copper boiler should I have for an engine 1¼x3 inches, and how thick should the shell be? A. Size of boiler about 8 inches diameter and 15 inches long; shell ¼ inch thick for moderate pressure. 3. Should it be brazed or riveted? A. It should be brazed and riveted. 4. Will ports ½x¾ inches be large enough for a 1¼x3 inch cylinder? A. You will find a rule for size of ports in No. 16, etc., of Practical Mechanism.

(7) W. E. S. says: A friend of mine asserts that, in a common bucket pump the only water lifted by the bucket is that which is above the bucket. Is he right? A. Yes.

(8) A. D. T. says: In my daily experience in the use of twist drills, I have remarked one improvement which a manufacturer might make. It is this: Flatten three sides of the shank; this will do away with all slipping. Also put a good center in the shank. All this can be done at very little expense and cannot fail to give great satisfaction.

A. Twist drills ¼ inch and over in diameter usually have a taper shank, and a feather on the end which effectually holds them. Those below that size, and those having parallel shanks, may be held sufficiently firm in an ordinary chuck. It would be difficult to make triangular holed chucks run true.

(9) A. C. T. says: I have seen an article in relation to a certain alloy of metals, which when melted was of the required degree of heat for tempering edge tools. What is it? A. We know of no special alloy for that purpose. Common lead is sometimes used, the work being greased before immersion.

(10) L. H. R. asks: 1. I have two shafts situated 24 inches from center. I have an endless belt 66 inches long. How can I find the diameter of two pulleys, both to be the same size, on which this belt will fit tight? A. Subtract twice the distance between the centers of the shafts from the length of the belt, and divide the remainder by 31416; the quotient will be the required diameter of each pulley. 2. Under similar circumstances, the size of one pulley being given, how can I ascertain the correct diameter of the second? A. To twice the distance between the centers of the shafts, add half the circumference of the given pulley, and subtract their sum from the length of the belt: the remainder, multiplied by 2 and divided by 3, will give the diameter of the second pulley.

(11) G. D.—It is likely that the law of your State, forbidding the sale of goods manufactured under your patent without a seller's license, may be enforced; but by a number of judicial decisions, you are at liberty to travel in any State or Territory and sell rights to manufacture under your patent, and no State legislation can legally stop you.

(12) H. M. says: We are putting up a horizontal engine. Please give us your method of getting out the template, and the lines and right angle line for back box, distance, etc. A. The cylinder and crosshead guides are set true horizontally, and parallel with the bed frame. The crank shaft is set by running a line, true with the bore of the cylinder, the full length of the bed, and setting the crank shaft at a right angle to it, keeping all parts level with a spirit level.

(13) A. M. B. asks: What kind of steel shall I use for making a gun barrel? A. Forge it from a square bar of soft machine steel of not too fine a quality.

(14) J. N. P. asks: What is the rule for calculating the strength of boilers, steam pipes, etc.? A. "For calculating the strength of a singly riveted steam boiler, multiply the internal diameter of the boiler in inches by the pressure of steam in lbs. per square inch, and divide the product by 8900. The quotient is the proper thickness of the boiler plate in inches."—Bourne.

(15) A. H. D. says: We turn our axle nuts in soda and quinine, and put them away without cleaning or oiling, and they rust. Is there a way to keep them from rusting without much expense or labor? A. Coat them with boiled oil and white lead, mixed to a thick paint.

(16) C. P. asks: 1. Is the temperature in the hot air space of furnaces, used for heating purposes, enough to make steam? Yes, generally. 2. My house is heated by steam, but not satisfactorily, and I thought of putting in a furnace with a boiler inclosed in the air chamber, believing that I should get the heat of the furnace for the lower floors, and make steam enough for the upper stories. Would it work? A. This plan will answer if properly constructed.

(17) J. G. asks: 1. Could I have a brass cylinder, 2x4 inches, made, that would be equal to one half horse power? Yes. 2. Would it be a high pressure engine? A. Yes. 3. Could a small boat be fixed so that the wheel can be propelled with one cylinder? A. Yes.

(18) W. S. S. says: If I place two cylinders, 10x30 inches, side by side, and connect them with a pipe, stop cocks, etc., and attach to the pipe a small engine, cylinder 2x2 inches, and if I fill cylinder No. 1 with compressed air, 200 lbs. to the square inch, and cylinder No. 2 is empty, and if the air from No. 1 is liberated through pipe and engine to No. 2, and I keep the pressure to a minimum of 200 lbs. per square inch until all the air is forced into No. 2: What power will I obtain, and how long will it take to empty No. 1 into No. 2, and so on, alternately? A. Your power will depend upon the point of cut-off and the speed of the engine, and would gradually decrease, as the air entering cylinder No. 2 would create a constantly increasing back pressure upon the engine which would prevent cylinder No. 1 from ever becoming empty. The time necessary to bring the engine to a standstill in consequence of the above back pressure of course depends upon the size of cylinder No. 1.

(19) C. E. K. Jr. asks: For vulcanizing rubber plates I have a small boiler, 4½x5½ inches, which I heat up to 320°. I fill it about ¼ full of water, and then put in the flask, which makes the boiler about half full. Is all the water converted into steam at a temperature of 320°? If not, what temperature would it take to convert it into steam, and what amount of pressure should I have? A. Only a small portion of the water is converted into steam, and it would not be practicable, with an ordinary apparatus, to evaporate it all in the closed space.

(20) J. T. says: I send you a piece of scale from a boiler. What is in the water to make such scale, and what will take it off? A. A good feed water heater will probably be efficacious in preventing further deposit; and it is probable that annate of soda will loosen what is already formed.

(21) T. McG. asks: What welding mixture used on vises to weld the faces on the jaws? A. For welding steel to iron, borax will do.

(22) F. M. asks: Please tell me of a remedy for cold feet. A. A fast walk of 2½ miles, morning and evening, is in most cases a sure cure.

(23) H. L. S. says: 1. I have an engine 1¼x3 inches, with a fly wheel 10 inches in diameter. Would it be large enough to run a skiff 10 feet long and 2 feet wide, with a pressure of 40 or 50 lbs. of steam? A. It would be better to use a steam pressure of 100 or 125 lbs. per square inch. 2. What size of boiler would it take? A. Make a boiler with from 20 to 25 square feet of effective heating surface. 3. Could a boiler be made to give that amount of power, using gasoline as fuel? A. Unless you have had experience in the use of gasoline as fuel, it would be better to depend upon coal or charcoal.

(24) H. M. N. asks: Which will be the most economical way of feeding a boiler, by a steam pump driven by an engine, or by an injector? A. The pump driven by the engine will be the most economical in general, but not the most convenient or desirable in all respects.

(25) W. J. N. says: I have a small boiler 8 inches in diameter and 2 feet long, and propose to enlarge it by having a double shell of ½ iron made, having a water space of 2 inches between the skins. The shell is to be 3 feet high, with an outside diameter of 16 inches, and an inside diameter of 12 inches. Inside of this, I intend to suspend my old boiler, connecting the walls and steam spaces by ½ inch pipes. I will make the lower part of the shell act as a firebox, fitting a door at one side and putting in four cross tubes through the furnace one inch in diameter. Is this a practicable plan? A. If you make the connections so as to secure good circulation, there is no reason why the arrangement will not prove satisfactory.

(26) J. W. S. asks: How can I melt German silver? It runs well enough; but when we roll it it is full of scales. A. Do not add the zinc until the copper and nickel are fused together, and put in a little borax with the zinc.

(27) J. B. R. says: Your paper of August 14 contained an article referring to paper suitable for copying purposes. I enclose a sample of an okra paper, originated by me a few years ago. Until I saw the article referred to above I had never tested my new paper for copying purposes. I think I have reason to be satisfied with the result. You will see that the copy is as distinct as if done with the best Japanese tissue paper; and this has been accomplished with paper that was manufactured for ordinary newspaper printing. The strength of this paper is such as to adapt it for copying important documents, legal papers, etc., while there is no doubt that the paper may be made still heavier (if desired) and yet answer for making distinct copies. Another purpose for which this paper would be well adapted would be in the manufacture of vegetable parchment. A. The paper you send is a fine specimen of exceeding toughness, and is, we think, the strongest unsized paper we have ever seen. It is an admirable copying paper, and would answer well for the purpose you suggest.

(28) F. C. W. asks: What is the best metal for an expansion tube for hot water? A. Copper.

(29) M. R. says: 1. I send a sample of stuff found in a reservoir for condensed steam from an engine. We run steam through 650 feet of pipe (the last 100 feet of which is perpendicular) to a steam pump, the cylinder of which is 8x10. I have found the same material in every spare space between the engine and the pump, making it necessary to clean it out every six months. There has not been any grease in the pipe. I should like to know what it is. A. It resembles the material produced by the action of impure grease on the piston. Examine the piston of your engine and see whether or not it is changed in places into a charcoal-like substance, that can be readily cut with a knife. 2. I have had a discussion about the distance that water can be raised with a siphon. One claims it could be raised any distance, provided the discharge end was low enough, while I claimed that it could not be raised more than 34 feet. Which is right? A. You are.

(30) M. W. asks: Will you explain in your answers to correspondents how a locomotive will run around a curve, the outside rail of the track on the curve being longer than the inside rail, and the wheels, of the same size, being keyed on the axle at both ends? A. Under the circumstances, the wheels would slide on one of the tracks.

(31) W. P. asks: 1. Is there more pressure on the top side of a boiler than on the lower side, or is there the same pressure upon every square inch in the boiler? A. There is a little more at the bottom. 2. What is the rule for calculating the horse power of an engine? A. See p. 33, vol. 33.

(32) R. M. says: We want some black paint for smoke stacks that are heated nearly red hot. Is there such a paint? A. We know of nothing that will stand such a temperature.

(33) R. F. H. says: I have a coarse half round file, 6 inches long, which has been in use for some time. It has become quite strongly magnetized, with the south pole at the tip and the north pole at the tang. Is not this unusual? A. Such an example as you notice is interesting, and not at all usual. Perhaps some of our readers may have observed similar instances.

(34) G. W. I. asks: 1. What practical gain would result from the use of a feathering wheel instead of the ordinary paddle wheel, in the propulsion of steamboats? A. Increase of speed or diminution of power required. 2. Does the float or paddle exert the most force as it enters the water or as it leaves it? A. There is very little difference.

(35) J. W. W. asks: Will paraffin in nitric and sulphuric acids act the same as nitro-glycerin? A. Paraffin is not suitable for this purpose.