

Business and Personal.

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For Sale by Geo. W. Grice, 426 Walnut St., Philadelphia, Pa.: One 2nd hand Dummy Engine, Cyl. 6x10, Gauge 4 ft. 8½ in.; two 2nd hand Locomotives, 25 tons. Gauge 4 ft. 8½ in.; one new Locomotive, 6 tons, Cyl. 6x10, Gauge 3 ft.; one new Locomotive, 10 tons, Cyl. 10x16, Gauge 3 feet 2½ in.

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See N. F. Burnham's Turbine Water Wheel advertisement, next week, on page 397.

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The Lester Oil Co., 183 Water St., N.Y., Exclusive Manufacturers of the renowned Synovial Lubricating Oil. The most perfect and economical lubricant in existence. Send for Circular.

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Three Second Hand Norris Locomotives, 16 tons each; 4 ft. 8½ inches gauge, for sale by N. O. & C. R. R. Co., New Orleans, La.

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For Tri-nitro-glycerin, Mica Blasting Powder, Electric Batteries, Electric Fuses, Exploders, Gutta Percha Insulated Leading Wires, etc., etc., result of seven years' experience at Hoosac Tunnel, address Geo. M. Mowbray, North Adams, Mass.

Genuine Concord Axes—Brown, Fisherville, N.H. Price only \$3.50.—The Tom Thumb Electric Telegraph. A compact working Telegraph Apparatus, for sending messages, making magnets the electric light, giving alarms, and various other purposes. Can be put in operation by any lad. Includes battery, key, and wires. Neatly packed and sent to all parts of the world on receipt of price. F. C. Beach & Co., 246 Canal St., New York.

For price of small copper boilers to drive small steam engines, address, with dimensions, and enclose stamp to Geo. Parr, Buffalo, N. Y.

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American Metaline Co., 61 Warren St., N. Y. City. Grindstones, 2,000 tons stock. Mitchell, Phila., Pa.

R. J. can dye cotton goods by the process described on p. 405, vol. 29.—A. J. B. can proportion his safety valves by the formula given on p. 363, vol. 29.—R. N. can make lard oil by the process given on p. 283, vol. 30.—R. S. T. will find a good recipe for furniture polish on p. 315, vol. 30.—R. N. S. can blue steel by the method detailed on p. 123, vol. 31.—N. T. will find, on p. 53, vol. 24, descriptions of various processes for molding.

(1) J. W. R. says: I have a boiler 16 feet by 40 inches, with 2 flues of 14 inches each and a 30 foot stack. My engine is 8 by 16 inches, running at 180 revolutions, and it does good work at 50 to 80 lbs. of steam. But it costs me all I make to pay for wood for fuel, burning 2 cords per day. I think my work ought not to take over ¾ of a cord per day. Is there really that difference between a two-flued boiler and a tubular or locomotive boiler? A. We do not think that the amount of fuel burnt is excessive. Measure your feed water, if possible, so as to get some idea of how much water is evaporated.

(2) F. S. S. asks: Will the flesh or grain side of a belt give the most friction? Which will wear the longest? A. A belt should be run with the grain side next the pulleys for both reasons.

(3) C. M. asks: Is there any cement that will answer to cast hot metal in, which would last for a long time? The metal runs at about 1,200° Fah., and it is necessary that the mold should get very hard, have a good polish, and not contract or expand more than iron. A. No. Iron is best. Use plaster of Paris for light castings.

(4) G. B. P. asks: What is saleratus? A. It is bicarbonate of soda.

(5) W. P. says: In your issue of April 10, 1875, C. H. P. asks: What is the difference between one square mile and one mile square? You answer: None. You are wrong. There is as much difference as between a circle and a square. A mile square is a square surface having sides each a mile in length. A square mile is a unit of area, and may be of any shape; and although it may be a milesquare, it is not necessarily so. A. You are wrong. The difference between two quantities is found by subtracting one from the other. If nothing remains, what is the difference?

(6) J. H. F. asks: In building an ice house, I constructed a dumb waiter which I can lower to same level as bottom of house. I am told that whatever is put therein, as meat, milk, butter, will taste of the new wood lining down which the waiter slides. What is the best plan to overcome this? A. Try two coats of paint without turpentine.

(7) A. F. says: I have had the walls in my house painted with oil color, and find that those parts from which the light has been excluded (by the hanging of pictures or other articles) have changed color to a yellowish tint. Is there a way of removing these stains? A. Peroxide of hydrogen and ozone have been recommended in such cases, but their application is difficult.

(8) O. P. asks: How many pounds to the square inch is atmospheric pressure? A. About 15. Is it possible to distinguish the electricity of iron, copper, brass, etc.? A. No.

(9) G. L. S. J. asks: 1. Which contains the most electricity, air or water? A. There is no practicable means of ascertaining. 2. What number of insulated copper wire would you use to wind magnets for a line of 3½ miles? A. No. 24 B. W. G. 3. What form of battery would you recommend for such a line, with ground plate for the return circuit? A. The gravity or Callaud.

(10) F. P. asks: 1. Will winter apples keep as well if grafted upon the stock of a fall apple as they will upon the stock of a winter apple? A. Yes. 2. I set the graft with the end of the grain of the graft meeting the side of the grain of the stock, or with the end of the grain of the graft meeting the end of grain of the stock. Which is correct? A. The latter.

(11) C. S. C.—Your boiler is too small. Plumbago and gas carbon are infusible.

(12) A. P. F. asks: If two engines and trains of equal weight and resisting power, both moving at the same speed, should approach each other upon a level track and collide, would either train prove a greater wreck than if, running at the same speed, it had impinged upon an immovable object? A. Either train would have the same effect upon the other as an immovable body; for the reason that, at the time of collision, the motion of each train would be instantaneously arrested. At all events, we are confident that the wreck would be quite as complete in one case as in the other.

(13) Inquirer.—The solid column of iron will support a greater load than the hollow column, both being of the same diameter.

(14) S. asks: 1. What are the dimensions of the drydock at the Brooklyn navy yard? A. It is 286 feet long and 30 feet wide at bottom; 307 feet long and 98 feet wide at top, with a lock chamber by which the length of the dock can be increased 52 feet. The bottom of the dock is 26 feet below mean high tide. 2. How long does it take to empty it? A. The dock, when filled by the tide, contains about 600,000 cubic feet, and the pumping engine can remove the water in 2 hours 10 minutes.

(15) J. F. M. asks: How much steam ought a horizontal boiler, shell ¾ and heads ½ inch thick, single riveted, length 3 feet, diameter 22 inches, with a number of pipes connected to boiler for grate bars, and a dome 1 foot in diameter and 2 feet long, to carry? A. You can carry 130 lbs. steam; and then you can find out how fast your boat goes.

(16) R. B. C. says: I am building a propeller boat for towing, 60 feet long, 14½ feet broad, and 7 feet deep. I am going to put in a 16x16 inch cylinder, and want to make 150 revolutions per minute. What pitch ought I to have on a 6½ feet wheel? A. Make a true screw, pitch 8½ to 9 feet. We shall be glad to receive particulars of the performance of the boat.

(17) S. B. McC. asks: 1. What kind of coal is used in the foundry business? A. You can use charcoal, anthracite, soft coal, or coke. 2. How much iron would 1 ton of good coal melt? A. With hot blast, about 1 ton.

(18) C. M. B. asks: 1. What is an oscillating engine? A. One in which the cylinder swings during the revolution, the piston rod being connected directly to the crank pin. 2. What is the meaning of backlash in an engine? A. The striking of one connection against another, due to a stoppage or change of motion of one of the connections. 3. Why do all tugs use upright engines instead of horizontal ones? A. On account of the economy of space and the facility of arrangement, together with considerations of cost, weight, and durability.

(19) L. D. L. asks: What is the water pressure per square inch at the bottom of a pipe 100 feet in perpendicular height? A. About 43 lbs.

(20) J. K. asks: Please give me a rule for finding the wearing line of a saw tooth. What is the radius to be taken, in proportion to the diameter of saw? I want to lay it off for gumming the saw, and to have no further trouble. A. It will depend upon the form of teeth. Make a diagram of the saw, and continue the backs of the teeth, which will give you the lines required.

(21) E. S. M. says: I have a yawl 24 feet long by 5 feet beam, which I wish to propel at the rate of 6 or 7 miles an hour. What should be the dimensions of boiler, engine, and screw? A. Engine 3 by 5 inches, propeller 20 to 24 inches in diameter and of 2¾ to 3 feet pitch. Boiler 24 to 30 inches diameter, 3½ feet high.

(22) G. E. R. asks: In screwing gas or steam pipe, what number of threads are used for pipes of different sizes? A.

Inside diameter.	Threads per inch.	Inside diameter.	Threads per inch.
¾	27	1½	11½
1	18	2	11½
1¼	18	2½	8
1½	14	3	8
1¾	14	3½	8
2	11½	4	8
2½	11½		

Taper of threads, 1/16 per inch of length. These inside diameters are only estimated, as they vary for pipes of different strength, the thickness varying for the different grades, and the outside diameter remaining the same.

(23) P. R. says: 1. A friend states that the top of a chimney about 400 feet high will, in a severe storm, swing from 2 to 3 yards out of perpendicular. I say it is simply impossible. Which is right? A. It would be possible, but improbable. 2. My friend also says that, somewhere in Europe, there are very tall towers or chimneys considerably out of perpendicular. Is this so? A. You doubtless refer to the leaning towers of Pisa and Bologna. The tower of Pisa is 315 feet high, and a plumb line from the top of the inclined side will meet the ground 12 feet 4 inches from the base. The tower of Bologna is 134 feet high, and a plumb line falls 9 feet 2 inches outside the base.

(24) G. L. R. L. asks: What would be a safe pressure for a boiler 9 inches high by 1 foot in diameter, with four 1 inch tubes, made of sheet copper ¾ inch thick? A. From 15 to 20 lbs. per square inch.

(25) A. M. G. asks: What is meant by "a twin screw propeller"? A. Twin screw propellers are two propellers side by side. These propellers are commonly called twin screws. For information in regard to your other questions, you should consult some good treatise on the screw propeller, as their discussion would occupy too much space for these columns.

(26) H. K. asks: 1. Will a boiler 24 inches long, 15 inches in diameter, with 5 two inch return flues, produce steam enough to get the full working capacity out of a 1½x3 inches engine? A. Yes. 3. If the boiler were made of ½ inch copper, would it be strong enough to sustain 50 lbs. to the inch with safety? A. Do not run it above 40 lbs.

(27) R. A. P. asks: 1. I claim that the shorter an exhaust pipe is, the better for an engine running at 95 revolutions per minute; others claim that an exhaust one hundred feet high of 4 inches diameter to an engine 12x24, making 95 revolutions per minute (slide valve cutting off at ¾ stroke), would be beneficial. They claim that the steam passing through that length of pipe would produce a vacuum, and the steam would rush from beneath the valve to fill the same. Is this so? I claim that, if there be a partial vacuum, the exhaust produces it; and if we can produce a vacuum in that length of pipe, without loss of power, why not make use of all the exhausts that are puffing outside of our numerous manufactories? A. We doubt the formation of a vacuum in such a case.

(28) R. S. E. says: I want to make a piston to work inside a sheet copper cylinder, for holding oil, and I wish to have the piston move easily. What is the best material? A. Make it either of wood or metal, and pack it with hemp.

If I put a coiled cast steel spring in connection with a steam boiler, in the steam space, but not where the water can touch it, shall I run a risk of drawing the temper? A. The spring will retain its temper for some time under these circumstances, but not as long as under ordinary temperatures.

(29) C. B. D. asks: For an engine of 3 inches stroke and 2 inches in diameter, what size boiler will be necessary, and of what metal should it be? A. Make the boiler of wrought iron, 20 inches in diameter and 3 feet high.

(30) H. G. H. says: A steam gage is found by a test gage to show a pressure of but 130, when it should have shown 185 lbs. per square inch. Is it correct to say that the gage is 55 lbs. light or 55 lbs. heavy? A. The former would be the more correct of the two.

(31) S. M. asks: We run a 4½ horse power upright engine and boiler. Last winter we inserted a pipe to convey steam for heating purposes, and from it connected another pipe to heat water in a tank. We found it impracticable to run the engine and admit steam in this heating pipe at the same time, by reason of the water rising in the boiler and into the cylinder. What is the cause, and what the remedy? A. Either the steam room in the boiler is too small, or the connections are improperly made.

(32) A. P. asks: How can I deodorize kerosene oil? A. Digest the oil with a quantity of chloride of calcium reduced to a fine powder, at a temperature not exceeding 140° Fah. for several days. It should then be drawn off from the limey sediment and treated with a little carbonate of soda. The alkaline sediment should next be drawn off, and the oil washed with water.

How is dammar varnish made? A. It is formed by dissolving gum dammar in oil of turpentine. Can the coloring matter called reginine be obtained? A. Yes, in the shops.

(33) T. M. C. asks: What is the best remedy to prevent unpleasant odors from the feet caused by perspiration? A. Use carbolic soap.

Notes & Queries

(34) R. B. N. says: We cut muriatic acid with zinc, then dilute with $\frac{3}{4}$ water, to solder tin. Are the fumes, arising from soldering with this production by the application of hot copper, injurious to health? A. Yes.

In canning lobsters, we do not use the bodies. Can they be utilized by being converted into guano or manure? A. They may be used directly as a manure.

I have replaced the copper used in soldering tin, with cast steel; can I tin the steel to stand heat permanently? A. Use a coppered iron.

(35) F. B. G. asks: What can I use as a solvent for marine glue which has become hard with age, so as not to destroy its adhesive properties? A. The proper solvent for this is ether containing little alcohol, in which it dissolves with the aid of heat and agitation. The operation should not be conducted in the vicinity of any flame.

(36) J. C. R. asks: 1. What are the analyses of oxide of zinc, red lead, litharge, and raw and boiled linseed oil? A. Oxide of zinc is composed of zinc 65 parts, oxygen 16 parts, litharge of lead 207 parts, oxygen 16 parts. Red lead consists of lead 621 parts, oxygen 64 parts. Linseed oil consists of 76 parts of carbon, 11 of hydrogen, and 13 of oxygen. The boiled is the raw oil heated with litharge. 2. Why does litharge dry so much faster than oxide of zinc, when mixed with linseed oil? A. Because drying results from the absorption of oxygen from the air, and this result is more promoted by the litharge than by the oxide of zinc. 3. What pigment is of a nice orange color, suitable for striping? A. Try chrome yellow. 4. How can linseed oil be refined and bleached? A. By successive treatment with acid, alkali, and water. 5. What is oxychloride of zinc? A. It is a combination of zinc, oxygen, and chlorine, made by union of the oxide of zinc and the chloride of zinc.

(37) L. K. Y. asks: Is the band saw patented? A. No.

What does 1 oz. of pure sheet silver cost, and 1 oz. gold? A. One oz. of pure gold will cost about \$25; of silver, about \$1.50.

In what kind of oil or solution should I harden my steel burnishers? A. Any fatty oil will answer.

(38) A. M. H. asks: Considering iron pyrites as Fe₂S₃, what would be the formula for the residue when as much sulphur as possible has been driven off by heat? Some of the books say Fe₂S₃, others say Fe S. Which is right? A. When iron pyrites have been subjected to roasting, it has been found that it has assumed magnetic properties, and, according to Berzelius (who investigated the matter), its composition is Fe₃S₄. This has been confirmed by Rammelsburg.

(39) C. L. says: For soldering and other blowpipe work, alcohol at \$3 per gallon is too expensive, and we have no gas. What can I burn in place of alcohol that will burn freely, be clean, and get up heat enough to melt gold or silver on a piece of coal? A. Rape seed oil.

(40) O. U. asks: 1. Of what cloth are artificial leaves made, and how is the gloss put on them? A. Usually of the fine glossy silk stuff known as tafeta. The tafeta is dyed of the proper green in the piece before cutting out. It is then stretched out to dry, and afterwards further prepared with gum arabic on one side, to represent the glossy upper surface of the leaves, and with starch on the other, to give the velvety appearance of the under side. The latter preparation, colored to suit the exact shade of green to be given to the leaf, must be just of the proper consistence, making the leaf neither too stiff or too limp, while it gives the proper kind of under surface. Where the leaf requires a marked degree of this velvet texture, it is given by the nap of cloth, reduced to a fine powder and properly tinted. A little gum is lightly passed over the surface, and when partly dry this powder is dusted over the surface, the superfluous portion being shaken off. 2. Are the veins and coloring done by hand? A. For giving to the leaf the appearance of nature, by representing the veins and indentations which they always exhibit, various gaufering tools are made use of.

(41) J. B. H. asks: 1. Can I correct my clock by the aid of the almanac? A. Find the moment that the sun is on the meridian, by the sextant. An almanac calculated for that meridian will give you how much the sun is fast or slow for that day, which will be the correction required. 2. How is it that the almanacs differ as to the time of sunrise, etc., at any given place? A. They should not if properly calculated for the meridian of the place.

(42) T. G. B. asks: Can kalsomining be done on a papered wood ceiling, and how should it be mixed and put on? A. Yes; use a large proportion of glue.

How can I clean up an old gilt window cornice to make it look like new? A. Use a very soft sponge and tepid water.

If a body in motion strikes another body of equal weight at rest, which receives the greatest shock? A. The shock will be mutual and equal.

How is dry steam made? A. By superheating.

(43) W. T. G. asks: Please give me a recipe for making a gold ink. A. The ordinary gold writing ink is made by simply mixing gold powder with some mucilaginous liquid, in which the very finely divided powder is held in suspension.

(44) D. W. S. says: I have made a mixture of equal parts of strong lye and water, saturated with sulphate of copper, and obtained a green mass of the consistence of cream. What is it? A. The addition of an alkali to a solution of sulphate of copper is always accompanied with a precipitate of hydrated oxide of copper, which is insoluble. This body is of a green color, and has simply rendered the solution turbid.

How is verdigris made? A. Verdigris is a subacetate of copper, and is formed by placing masses of the metal in contact with the fermenting masts of the grape, or with cloth dipped in vinegar.

What is glass etching, and how is it done? A. It is the art of producing designs, etc., on glass by the corrosion of its surface by means of hydrofluoric acid. The glass is first coated with a thin film of wax, through which, to the surface of the glass, the lines of the drawing are cut with fine steel instruments. On submitting the plate so prepared to the action of the acid, the surface of the glass only, immediately under the lines cut through the wax, is reached and acted upon by the acid.

How can I make a small hand stamp? A. There are several methods that accomplish this; one of the best is that known as the Woodbury process, which consists in first photographing the object on a plate prepared with a solution of bichromate of gelatin, the action of light on which is to render the bichromate insoluble. Upon immersion in water, the parts of the plate not affected by the light dissolve out, leaving the picture standing in relief, which, on drying, becomes very hard. It is next placed upon a smooth, even block of zinc, and submitted to great pressure in a hydraulic press. The zinc die thus produced is used for printing.

How can I transfer engravings on to plate glass? A. Fix the engraving to the glass with ordinary paste. Etch with hydrofluoric acid, specific gravity 1.14. At the end of a few minutes, wash off the paper, and the design will be found reproduced upon the glass, the printer's ink having protected it.

(45) A. Z. asks: What will neutralize tartaric acid in sugar or candies? A. Freshly precipitated chalk will answer, or carbonate of soda; but it will be necessary for you to experiment with small quantities of the sugar until the proper proportion is determined. Care should be taken that the acid should always be slightly in excess of the alkaline substance used.

(46) H. S. asks: To what degree must water be heated to become steam? If there is a certain degree, why does not water in a vessel (as it necessarily is all of the same temperature) all go off into steam at once? A. The specific heat of water is found to be the highest of any known substance, and is taken as unity. If we take an ounce of water at 170° Fah., and an ounce of ice at 32°, and put them together, we shall have, when the ice is melted two ounces of water at 32°. The ounce of water has therefore parted with 142° of its heat in melting, the ice, which heat is said to have become latent. Water, at the normal atmospheric pressure, boils at 212° Fah., which is its maximum of temperature. Here again this apparent anomalous phenomenon occurs. As the temperature of the water reaches 212°, it becomes stationary; any further addition of heat is absorbed in converting the water into steam, which has the exact temperature of the water that produced it. Here also heat has been rendered latent, with an accompanying change in form of the water. As from ice to water, so from water to steam; or, from solid to liquid, so from liquid to gaseous. On condensation of the steam, and recongelation of the water, the exact amount of heat absorbed by the body is given out. A certain weight of steam condensed, at 212°, gives out 950° of latent heat. In its descent from 212° to 32° it gives out 180° of sensible heat, and again in its recongelation it restores 142° of latent heat, amounting together to 1,272°. Pressure influences the boiling point of water, and for that reason water may be heated (with the application of an adequate pressure) so as to melt lead. Likewise as the pressure decreases, the boiling point is lowered. At the hospital of San Bernard, in the Swiss Alps, which is 8,400 feet above the sea, water boils at 184° Fah.

(47) G. A. F. asks: How can I tell if a piece of quartz polished on one side is artificially colored? A. By seeing whether rubbing with benzine affects the color, also whether, on careful heating as near redness as can be done safely, the color changes or blackens.

(48) A. H. W. G. asks: I intend making small quantities of nitrate of silver. What kind of furnace would you advise, to burn coal or wood? A. A stove of suitable form will answer the purpose.

In making a swimming belt, what weight of cork is necessary for supporting a man of 170 lbs. weight, and what kind of cloth should be used for covering? A. About 10 to 12 lbs. cork. Use canvas, a light duck.

Have photographs ever been taken with the natural colors of objects? A. No.

What is a good work on founding and casting, etc., and on beet root sugar? A. Ure's Dictionary is an excellent authority on all the subjects you mention.

(49) F. C. asks: How can I detect adulterations in claret wine? A. Such tests are too complicated for description here, and require a considerable knowledge of chemistry to be at all satisfactory.

(50) S. G. asks: Can you tell me of an easy way of separating water into its parts, and burning the gas? A. Water is decomposed when it is made part of a galvanic circuit of an adequate electromotive force, the oxygen being freed from the positive pole, while the hydrogen is found at the negative. The gases may without difficulty be collected separately, and burned in a compound blow-pipe; but the experiment is a costly one.

(51) J. A. H. asks: What is burnt lead? A. When metallic lead is exposed at a high temperature (above 612° Fah.) to the action of the air, it is rapidly converted into the oxide, which has the appearance of small beautifully colored yellow flakes or leaves. This is readily soluble in weak acids.

(52) W. S. asks: What tests are used to detect acids in oils? A. You do not state what kinds of oils. If free acids be present, the addition of a little concentrated solution of carbonate of soda to a sample of the oil will immediately cause an effervescence to take place.

(53) F. H. Jr. says: I have drawn some portraits in pencil on common drawing paper, and a few of them became soiled by handling. I want to go over them again with India ink. In what can I dissolve the ink so that it will not blur when I clean them? A. Good India ink, rubbed up with water, will not rub off when dry.

Is not the earth about as heavy now as it was at its creation? A. Probably heavier, on account of the constant falling of meteoric masses from the depths of space upon the earth's surface.

What are the two specimens enclosed? A. Iron pyrites.

(54) J. B. B. asks: What is decarbonized steel? A. It is a fancy name given to the material of which cheap gun barrels are made.

(55) T. S. S. says: We wish to run a mill-stone by a belt. There is not room enough between the timbers to use a 12 inch belt. I say that we can use two 6 or 7 inch belts, one on top of the other, on the same pulley, and get the same power that would be given by one 12 or 14 inch. My partner says we cannot. Which is right? A. The driving power of a belt depends upon the friction between it and the pulley; and this, in turn, depends upon the pressure or tension of the belt. Two belts being twice as strong as one, the tension can safely be doubled. Hence you may do the work of a 12 inch belt with two 6 inch belts, one above the other. There are some practical difficulties in the way, however, and you can readily put in an angular belt, which will do the work and take up less room.

(56) S. says: 1. I am building a small engine of 4 inches stroke and 2 $\frac{1}{4}$ inches diameter. How large should I have the ports? A. Make the port area from $\frac{1}{10}$ to $\frac{1}{8}$ the area of the piston. 2. Which would be the best packing for the piston? A. Thin rings without springs will answer for piston packing.

(57) W. B. M. says: In reply to the question: What power (as usually rated on steam engines) is required to drive a 15 inch circular saw in 6 inch soft wood? You answer: "From 12 to 15 horse." I differ with you on this point, as I know of a 9 horse power engine which drives a 48 inch circular saw. A. By reading our reply again, you will see that the power was given for driving the saw up to its full capacity, that is, at the greatest speed and with the largest feed that could be safely maintained.

(58) H. L. K. says: A friend says that the pressure of steam has nothing to do with calculating the power of a steam engine, provided the engine has a governor on it; he contends that an engine working at 20 lbs. pressure will do as much work as it would working at 90 lbs. pressure. I claim that the power is calculated by the pressure of steam, length of stroke, and diameter of piston. Which is right? A. You are.

If a heavy weight were let fall into the deeper parts of the ocean, would it reach a point where it would remain stationary before it comes to the bottom? A. Yes, if the water is deep enough.

It is said that a ship on the ocean draws less water as it recedes from the shore, and that in fresh water a boat will gradually rise as it removes from the shore. Will the saltness of the water in the former case, and the warmth in the latter, account for these facts, provided they are true? A. Yes.

How do you account for this apparent inconsistency: A meat diet shortens life, yet life may be prolonged by food which supplies the waste of the system? A. Who is responsible for the statement that a meat diet shortens life?

(59) J. R. E. asks: I would like to know the best way of transmitting power from a water wheel on nearly level land to a distance of 1,000 feet? A. The most economical system under ordinary circumstances will be by means of a wire rope.

(60) H. H. C. asks: Is there anything less expensive than alcohol that will be as safe and clean for making steam in a small boiler fitted in a boat 3 $\frac{1}{2}$ feet long? My lamp uses about a pint of alcohol in two hours. I have tried kerosene and found it too smoky. A. There are lamps for burning kerosene that do not smoke and are quite effective. Wedoubt, however, whether you can find anything that gives so little trouble, and is so generally satisfactory, as alcohol.

(61) M. G. asks: In a steam boiler, with the steam up, is the pressure more or less below the water level? A. The pressure is least at the top of the boiler, and increases towards the bottom, by the weight of the steam and water above.

(62) J. W. M. asks: Having occasion to open the steam chest and cylinder of my engine, neither of which had been examined for more than a year, I found the flanges under the rubber packing eaten into hollows about half way across. When cleaning I found the metal in these places would cut like, and had all the appearance of, plumbago. The joints thus affected were all below the tallow cup. The cylinder (on the upper side principally, and close to the covers) had hollows eaten into it; from one of these hollows I scraped the enclosed sample. The interior of the piston was nearly solid; and in cleaning away I found the face of the piston with hollows nearly quarter of an inch deep. Can you tell me the cause of the corrosion? Is the enclosed simply rust and grease, or has the iron undergone some chemical change? A. It was no doubt caused by impurities in the tallow. The iron is chemically changed, being converted into an oxide, which resembles plumbago. The use of tallow is becoming less common, as engineers discover its effects. Pure tallow is an excellent lubricant for cylinders, but little of the tallow that is sold is pure.

(63) R. C. asks: How can I mend the broken glass of an aquarium? A. Fasten a strip of glass over the crack, inside the aquarium, using for a cement white shellac dissolved in $\frac{1}{2}$ its weight of Venice turpentine.

(64) W. E. C. asks: What is the shortest method for finding the amount of water in a plain cylinder boiler when partially filled? A. Find the area of the cross section of that part of the boiler which is filled with water, and multiply by the internal length of the boiler. You will find rules for this area in any good treatise on mensuration.

(65) A. F. H. says: In a communication about tides, it was claimed that the Hudson river was 25 feet lower at New York city than at Troy, N. Y. Is this so? A. No. The fall from Albany to New York city is only 5 feet.

If a steamboat going at 20 miles an hour has occasion to back, how is sufficient power applied at the dead centers to overcome the resistance of the water against the paddle wheels? A. The power is exerted at other parts of the stroke, and the wheel is generally counterbalanced.

Can an ordinary rifle ball (60 to the lb.) be dropped from a height sufficient to perforate a two inch oak plank, upon striking the earth? A. We think not.

(66) E. N. B. asks: How fast should a $\frac{1}{4}$ inch twist drill run to drill common iron? A. From 150 to 175 revolutions a minute.

(67) A. S. says: I have a steam engine, of which the lid of the steam chest has a hole about $\frac{1}{4}$ inch in diameter, probably the result of bad casting. I have poured melted Babbitt metal into it, but it will not last. I cannot put a screw tap into it. How can I plug it? A. Braze a plug in.

My cold water pipe is of lead, and it is very troublesome to keep the joints tight. I always used wrap joints made of thick cloth, with a coat of white lead, and wrapped tight with string. Can you tell me of some other means of closing these joints? I cannot get at them to solder them. A. The plan you follow is the best under these circumstances, if you cannot solder the joints; but if you can get at them to wrap them, they would seem to be accessible for soldering.

Can I find the horse power of a machine when the pressure of steam in the boiler is known? A. Not without more particulars than this.

(68) J. H. P. asks: Will a coil of steam pipe heat a kiln any higher than the heat of the steam? A. No.

(69) C. W. M. asks: 1. How can I remove a lime deposit or scale that has formed on the bottom of the boiler, and how can I prevent its formation? A. Try some of the scale preventives that have been noticed in our columns. 2. Should a boiler be refilled immediately after being blown off, or allowed to cool? A. It should be allowed to cool. 3. In what manner is it best to treat a boiler that is not going to be used for a long time? A. Either dry it thoroughly and give it a coat of oil, or leave it full of fresh water.

What is the best method of grinding a spindle valve? A. There are several machines for re fitting valves and seats that seem to give very satisfactory results.

(70) W. says: 1. I want to run a 58 inch saw at 600 revolutions. It will be run from a shaft, which also runs several other, smaller saws. Engine is 15 inches diameter x 3 feet stroke, with a wheel 10 feet in diameter. Saw pulley is 2 feet in diameter. What is the best practice as to speed of engine? A. If the engine is in good order, you can run it at 75 revolutions a minute. 2. What should be the size of the pulley on shaft? A. You can drive the main line of shafting at 250 revolutions a minute. This will give you an idea in regard to the size of pulleys.

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

W. J. W.—It is a micaceous hematite. It is useful for iron ore, and for making a sparkling paint, for dusting fancy signs.—C. A. P.—It is magnesian limestone, and does not indicate the presence of a water-bearing stratum.—G. M. F.—They are lead, zinc, and antimony.—R. G. V.—It is a decomposed magnesian mica, of no value.—W. L. K.—It is plumbago, but not entirely pure.—A. M. G.—No. 1 is not iron; it is a magnesian limestone containing a small percentage of iron. No. 2 is a highly bituminous coal.—J. F. W.—It is not kaolin; it is sulphate of barytes, sometimes used to adulterate white lead paint.—P. F.—It is bronze mica. See *Science Record* for 1875.—J. D. P.—It is plumbago, but very impure. It should be experimented upon to see whether it could be used for polishing or for crucibles, etc.—E. B. K.—It is black tourmaline, a hexagonal crystal. It is a compound of boracic and silicic acids with alumina, lime, magnesia, soda, and potash.—S. D. M.—These disks are not fossils. They are marks of structure which are sometimes developed in anthracites as well as bituminous coals. The disks are frequently $1\frac{1}{2}$ inches in diameter, as may be seen in some of the Pennsylvania anthracites and in Wigan coal of England. These structural markings appear to have arisen from a partial attempt at crystallization or from a tendency to develop planes at right angles to the direction of pressure, subsequent to the formation of the coal, and at a time when it was being consolidated under an increase of pressure and heat.—J. H.—It is an impure steatite or soapstone. The brown specks are coatings of oxide of iron.—J. F. W.—It is galena.—G. B. C.—Both specimens contain iron pyrites.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

- On the Locomotive. By J. F. J.
- On the Use of Mosquitoes. By S. J. W.
- On Gas Lighting. By J. D. P.
- On the Trevelyan Rocker. By R. S.
- On the Earth's Aerial Motion. By D. L. C.