

Business and Personal.

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W. P. D. will find a recipe for a transparent cement for glass on p. 27, vol. 30.—W. H. P. will find the description of a paste that will not sour on p. 280, vol. 28.—M. M. F. will find the explanation of the gravity clock on p. 58, vol. 30.—E. R. D. should see our advertising columns for book publishers' names.—J. Mc. can repair his waterproof suit, if it be made of rubber cloth, by following the directions on p. 155, vol. 26.—S. H. Jr. should see p. 349, vol. 26, and p. 33, vol. 27, for directions for utilizing old rubber belts.—C. P. should read the directions on p. 408, vol. 24, for destroying moths.—P. H. R. should consult a qualified medical man, and beware of nostrums.—A. S. will find directions for destroying red ants on p. 122, vol. 27.—P. can mount his chromos by the process described on p. 154, vol. 27.—S. H. S. will find a recipe for a waterproof and fireproof cement on p. 211, vol. 27.—G. W. H. will find an answer to his query about American and foreign inventors in our editorial columns of this issue.—A. F. will find information about gas engines on p. 33, current volume.

B. F. P. asks: 1. Is it an easy thing for burglars to turn the key, if left in the lock of a chamber door, from the outside? 2. If so, can they pick a lever lock, if the key is taken out when the door is locked for the night? Which is safest? A. 1. Yes. 2. Yes. Perhaps the latter may be somewhat the safest, though neither of them would be likely to give much trouble to an expert burglar.

D. R. H. asks: In the case of two steam fire engines, one on a level and one at the foot of a hill, with the hose (2 lengths, or 100 feet) in the first case being level and in the second being laid up the hill, and the water gauges on the engines showing each 160 lbs. to the square inch, is there any more pressure on the inch in the hose laid up the hill than that laid on the level ground? A. We suppose not.

C. W. Jr. asks: Is there any special cause producing storms at the time of the autumnal equinox? A. We think not.

F. M. H. asks: Which of the three methods would be best for keeping the ceiling over the smoke stack of a 15 horse power boiler from heating? The pipe is about 15 inches from the ceiling, and runs horizontally with it for 9 feet. 1. Nail a piece of tin tight to it. 2. Have it hung on wires about two inches from it. 3. Have a pan made and have it hung on wires about 6 inches from the ceiling and keep it full of water. 2. What is a good treatise on steam heating? A. 1. Probably the last method is the best. 2. Box on "Heat." See our advertising columns for booksellers' addresses.

W. A. B. asks: 1. Will silver coin answer for anodes in electroplating, that is, without taking out the alloy? 2. Has the United States nickel coinage any alloy in it? 3. I had some old gold, and tried to separate the alloy from it by the moist method. I dissolved it in strong nitric acid, and then tested for silver, but there was not any. I then poured off the supernatant liquor, which contained copper, and found a brown precipitate remaining. Then I added aqua regia, but it would not dissolve the precipitate. Why is this? How can I make chloride of gold of it? 4. I wished to make a plating solution for rubbering with a sponge, according to a formula in an electroplating manual: I first took some pieces of pure silver (worn anodes) and dissolved in nitric acid and water. When dissolved, I evaporated. I dissolved the resulting crystals of nitrate of silver in rain water. Then (as per manual) I threw in a few crystals of hyposulphite of soda. A brown precipitate was formed, which eventually turned black. I threw in an excess of the hyposulphite to dissolve precipitate, but it would not dissolve. Why is it so? How can I make it into solution? 5. Having a quantity of copper wires coated with silver (slinging wires) I dissolved them in nitric acid, then diluted it with rain water, and precipitated with pieces of copper. I poured off the supernatant liquor. A white mass remained. How shall I make nitrate of silver out of this, in order to make silver solution? 6. Could you tell me how to test the strength of my batteries by some simple contrivance that I could make myself? A. 1. Yes. 2. The nickel is alloyed with a certain proportion of copper. 3. The material you dissolved in nitric acid was not gold. The only acid solvent for gold is a mixture of nitric and hydrochloric acids, and the solvent in this case is the nascent chlorine which is liberated, forming chloride of gold. 4. Ammonia will dissolve the precipitate. 5. The white mass which remained was metallic silver, thrown down by the copper from the silver solution. This will dissolve in dilute nitric acid, forming nitrate of silver. 6. Consult some good work on electricity.

F. H. asks: What is the proper rule for reducing logs to cord measure? A. A rule frequently used is as follows: Multiply the square of one fifth the girth of the small end of the log, in feet, by twice the length in feet, and divide the product by 128.

F. E. C. says: I wish to be a machinist. 1. What branches should I study in addition to arithmetic and algebra? 2. I am now 16. When will I be old enough to enter a shop? 3. Will I have to serve as an apprentice? If so, how long and on what terms? A. 1. You should know something about drawing. 2. We think you are old enough now. 3. Arrangements are different in the various shops, and we advise you to make some inquiries from their proprietors.

W. McC. asks: Can you suggest a substance to be used in the manufacture of corundum wheels that is better than shellac, as adhesive as that material, but harder, and such as will render the wheels capable of being used both wet and dry? A. Such wheels are made, to be used both with oil and water. We believe the process of manufacture is patented.

J. C. S. says: I have an engine 6 inches bore by 10 inches stroke, now running 100 revolutions per minute, and doing about 3 horse power of work. At what speed should it be run to do that amount of work with least steam, at 20 pounds pressure, the driving pulley being changed to suit the speed of the engine? Probably the faster you can run it, without injury, the better.

W. & B. ask: Will three fans blowing into a common receiver, to supply blast for puddling furnaces, be as effective as the same three fans blowing through separate pipes? A. We suppose so, if application of blast is similar in both cases.

S. says: 1. I have a blank in which I wish to cut teeth for a gear. The diameter is 1/2 inch. I want the teeth to be small. The gear is to work in a rack not yet made. Can you give me some simple method of obtaining the number of teeth, etc? I should like an even number of teeth to the inch. 2. How do you calculate how many threads to the inch to cut a worm to run in a gear? A. We advise you to study some standard work on gearing. "The Engineer's and Machinist's Assistant," will give you full information on the subject.

W. E. C. asks: Why is it that when a piece of steel with a hole in it has been hardened and annealed, it is necessary to bore the hole out, as it has contracted in the process? A. We suppose that the steel, when hardened, contracts more than it afterwards expands, when annealed. As the nature of hardening is not understood, it might be difficult to give a precise reason for this.

H. C. asks: 1. What will be the difference in the work of a pump, the perpendicular height being 18 feet, if I work it through a slanting tube 44 feet long, to the same level? 2. Has there been a patent taken out for a roof tile? 1. The difference would be that due to the friction of the water in the pipe, caused by its increase of length. See article on "Friction of Water in Pipes," p. 48, vol. 29. 2. We think there have been a number of patents for roof tiles.

C. H. S. says: I find the following memorandum: "Grade, 374 1/2 feet in 1 1/2 mile; 2 cuts, one 96 feet, one 140 feet." This refers to the inclined plane of the railway at this place, which is built nearly as straight as a line can be drawn; and at the above gradient, the cuts referred to are through solid carboniferous limestone, which is a great curiosity to many. I saw in the SCIENTIFIC AMERICAN, a few weeks since, an account of the railway over the Alps, in which you state that they use a third rail, which is notched, and into which a toothed wheel, on the engine, works to aid the ascent. That plan was used here until about four years ago, and was invented (or claimed to be) by a resident of this city, a master mechanic in one of the machine shops here. I am not sure, but am under the impression, that he had a patent; if so, its date was about 20 years ago, as that is about the time it came into use here. A. We think this idea is quite an old one, and we aid nothing to give a contrary impression.

P. C. asks: 1. What is meant by mean pressure on the piston of an engine, and how is it calculated? 2. How many inches in cylinder are allowed to a horse power in manufacturing an engine? 1. The average pressure during the stroke. It must be determined by experiment. 2. It depends on intended pressure and piston speed.

J. W. K. says: I want to run kerosene through a gas pipe. What cement shall I use on the joints? Red or white lead, or our ordinary cement, will not stand it. A. You will probably have to make face joints, without cement, or you might use solder at each joint.

J. F. M. says: I wish to build an engine with a two inch cylinder, with stroke of 1 1/2 inches. 1. Can I get a piston speed of 300 feet per minute, with suitable connections? 2. Can I use a direct acting valve, moved by the piston, using no crank or shaft, only the reciprocating motion of the piston rod? 1. Yes. 2. Probably not with safety.

S. K. S. asks: How is the storm glass (referred to on page 234, vol. 29) made? 2. How do you find the horse power of a double cylinder engine? The cylinders are set so as to act on the crank shaft at right angles. 3. Is the number of revolutions the number which the engine makes while doing its usual amount of work? A. 1. The best form of storm glass is that of a thin glass tube about 12 inches long and 3/8 inch diameter, filled 3/4 full of the following liquid: Camphor 2 drams, niter 1 1/2 drams, sal ammoniac 1 dram, proof spirit 2 1/2 fluid ounces; dissolve. The top should be covered with a brass cap with a very small hole through it, or tied over with bladder. 2. Find the power of one cylinder by the process frequently given in these columns and multiply by 2. 3. Yes.

G. M. asks: 1. What is the best process of photographing on wood for engraving? 2. How is wood best prepared for pencil drawing? 3. Which is considered the best, a photograph on wood or a pencil drawing, to engrave from? 4. When types or stereotypes are cast, is compression used to get a perfect cast. A. 1. Consult some good work on photography. 2. The surface is whitened with chalk. 3. A pencil drawing is considered the best to engrave from. 1. We believe not.

M. M. asks: 1. Do bones lose any considerable portion of their value as manure, by being reduced with caustic alkali? I notice that the steam escaping from them while boiling appears to have the smell of ammonia. 2. When bones are reduced with sulphuric acid, a pungent vapor is discharged. What is that vapor, and is it injurious to inhale? 3. If 100 lbs. of bones are reduced with caustic alkali, and 100 lbs. with sulphuric acid, which (not taking into account the manure value of the alkali) will possess the greater value as manure? 4. Are the hoofs of animals as rich in fertilizing properties as the bones, and how can they be reduced to a condition suitable for use as manure? A. 1. The action of the alkali will be such as to dissolve or decompose the organic matter of the bones. 2. This is carbonic acid gas, from the decomposition of the carbonate of lime in the bones by the sulphuric acid. 3. The valuable constituent of bones is phosphate of lime. A portion of lime is removed from this by the action of sulphuric acid, converting it into a superphosphate which is soluble in water. 4. No. They can be chopped up fine and mixed with compost.

J. L. E. asks: How can I remove white paint from a black alpacaga garment? A. Rub on the spot a mixture of fuller's earth and soft soap, made into a paste with spirits of turpentine.

C. W. C. asks: 1. Was not H. B. M. ship Captain, which foundered in the Bay of Biscay 3 or 4 years ago, the first turret ship on the Coles system? 2. Was she not a new ship? 3. About how many men were drowned? A. 1. We think so. 2. Yes. 3. Somewhat over 100, we believe.

E. S. asks: 1. Is there any possibility of polished silver corroding so as to become a non-conductor of electricity, by being buried in the ground, exposed to weather, or by any other treatment? 2. Can hard rubber be turned into nuts having threads cut, etc., and will they be strong enough to turn with a wrench? 3. How are platinum points fastened to sounders? 4. Can platinum be worked into strips and riveted or soldered to wires, and will it become corroded so as to impair its conducting powers under any circumstances? A. 1. We think not. 2. Probably it can. 3. By the use of solder. 4. It can be, and we do not think it will lose its conducting power.

R. asks: Will it be safe to use, for dyeing, the steam generated in a boiler that contains a compound for removing scale? A. We think it quite likely, but could not answer positively without knowing more particulars.

C. B. R. says: 1. The rain water taken from our brick tank is quite hard. The tank is lined with Portland cement. What is the probable cause, and what will help it? 2. I am now using an engine, the cylinder of which is 16 x 8, making 60 revolutions. I want about double the power. What would be the best dimensions for a new cylinder? I want the shafting to run faster to do away with so much countershafting and to use smaller pulleys. Which would be the best for a 52 inch boiler, 3 inch tubes or two large flues? A. 1. We cannot answer this question without knowing more details. 2. You could readily get double the power from the present engine by running it twice as fast. Both styles of boilers that you mention are good. If you have plenty of room, the flue boiler may be desirable on some accounts, especially if you use hard water.

E. F. J. asks: If a cannon on the stern of a ship be fired at a target fixed on the bow, the ship moving forward as fast as the ball travels, can the target be hit, as it is moving as fast as the ball? A. We think so. There are several interesting questions involved in the solution of this problem, and we should be glad to hear from our readers.

A. J. D. asks: What is your opinion of the following plan for a dry house for drying timber? My factory is 100 feet long, and 2 stories high, the boiler being in the west end, and the chimney going up through one corner of building. My idea is to put a drying room in the second story, 12 feet wide x 8 feet high x 100 feet long, and connect with the chimney, just on the second floor, a brick flue and build it horizontally to the east end of building, then turn it into dry room at the bottom, the heat from the furnace to pass through this flue into the drying room, and into a flue leading back into the chimney again. The main difficulty is to prevent sparks from passing through into the dry house and setting fire to the lumber or staves. Do you know of any plan by which that can be prevented? A. Your idea does not strike us very favorably. It would be difficult to secure perfect immunity from sparks, and probably you would seriously injure the draft in your boiler.

H. & C. Co. ask: How can we best ascertain the horse power of an engine? A. Multiply mean effective pressure in lbs. during stroke, by piston speed in feet per minute, and divide the product by 33,000.

J. B. E. asks: 1. Who will, on application, examine me and, should I pass examination, give me such papers as should certify that I am a competent engineer? 2. Are 3/4 inch common iron braces in a cylinder boiler strong enough to stand a pressure of 120 lbs., provided that each brace has a surface of over 92 square inches to brace. A. 1. The supervising inspectors appointed by the Government grant licenses to those who pass satisfactory examinations. 2. We think such bracing is insufficient.

E. J. H. asks: If water be applied to a wheel made upon the principle of some of the rotary steam engines, could a better percentage of power be obtained than from the present improved turbines? A. It seems probable that the turbine wheel will give better results, judging from experience.

J. W. F. asks: Please give me a correct rule for estimating the horse power of a high pressure engine, and also for estimating the amount of horse power in a boiler. I have tried four different rules, but I get different answers, that vary very much. The engine has a diameter of cylinder 12 inches, length of stroke 30 inches, average pressure of steam 80 lbs., revolutions 80. The boiler is 16 feet long and 4 feet diameter, with 32 two and three quarter inch tubes. Will increasing the number of revolutions of the engine increase the horse power? I tried your rule as given to M. C. in No. 3, vol. 23, but was not sure I was right. A. Area of piston 12 x 12 x 0.7854 = 113.1 square inches. 80 x 5 = 400 feet piston speed per minute. Horse power = 113.1 x 400 x 80 / 33,000 = 109.37. This solution supposes that the mean effective pressure in the cylinder is 80 lbs. per square inch, which is probably untrue. An increase of speed, other things being equal, increases the horse power. In regard to the horse power of a boiler, it has many different meanings. In some cases a boiler of one horse power designates a boiler that furnishes steam enough to produce one horse power, when used in an engine; others employ the term to distinguish a boiler that evaporates one cubic foot of water an hour; others a boiler that evaporates half a cubic foot; and there are many other significations of the term. A committee of the Franklin Institute, appointed to investigate the meaning of the "horse power of a boiler" failed to make any recommendation that was approved by the Institute, after deliberations extending over a period of more than a year and a half.

H. M. P. says: If I have a cylinder full of water with a flexible tube running lengthwise through it, also full of water, and I put 50 pounds pressure on the inch on cylinder with a force pump with a piston of the same diameter as the flexible tube, one end of the tube being closed: What resistance would be required to prevent water escaping at the open end? A. As we understand the question, 50 lbs. per square inch.

E. C. asks: 1. Does the induction coil, if of sufficient size, produce an induced current more powerful than the inducing or battery current? If so, what lengths of wire must be employed to produce an induced current equal to the inducing one? 2. How is the bichromate battery constructed? A. 1. The induction coil produces a current of greater intensity than the battery current, that is, one capable of giving shocks, decomposing water, etc. 2. The carbon cell is filled with a mixture of a solution of bichromate of potash and dilute oil of vitriol, and the zinc cell with dilute sulphuric acid.