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ANSWERS TO CORRESPONDENTS

H. F. C.'s question is incomprehensible.—R. G. M. will find directions for setting a safety valve on p. 363, vol. 29.—C. W. D.'s query as to the ball falling through the earth is answered on p. 107, vol. 30.—F. M. B. should apply to a dealer in mineral specimens.—B. C. will find a recipe for coating plate iron pipe on p. 11, vol. 29.—J. L. C. will find full particulars of the boiler test commission on p. 97, vol. 30.—S. F. B. should apply to the chainmakers mentioned in our article—S. should consult Crookes and Rohrig's work on the metallurgy of copper.—J. A. B.'s explanation of a snake's movements is the generally received and, doubtless, correct one.—N. E. can tin small pieces of iron wire by the process described on p. 378, vol. 28.—J. M. R. will find an explanation of the mystery of the long and short screw drivers on p. 393, vol. 18.—J. S. can fasten leather to iron by the process described on p. 42, vol. 26.—A. G. can temper mill picks by following the directions on p. 170, vol. 25.—G. H. W. should apply to a lumber dealer. See our advertising columns.—L. H. H. should consult a boiler maker.—W. L. C. will find a description of the manufacture of lamp black by burning mineral gas on p. 21, vol. 28.

F. E. says: I have a brick building, one story high, 14 feet from the floor to the eaves, and 35 feet from the floor to the ridge pole of the roof. It contains one large open space, used for a machine shop, 120 feet long x 70 feet wide, with an iron truss roof. The roof covering is made of 2 inch matched pine plank, nailed tightly together and covered with iron, well painted outside and inside. This roof is perfectly tight in all stormy weather; but in frosty weather I am troubled by its sweating and water dripping down all over my tools, etc. I heat by steam pipes round the room under the benches. The usual temperature is 62°. Can you tell me what to do to stop its sweating? I have tried a dead air space under the roof of 1 1/2 inches, which helped but does not entirely stop it. Would letting the cold air from outside into the dead air space do any good? A. If the 1 1/2 inch air space were enlarged to one foot in depth, and the cold air were admitted to it sparingly, and tempered by admitting also some of the warm air, it would probably remedy the difficulty. At the same time, the inside ceiling that encloses the air space might be of such material and set at such a grade as to catch and carry off any drip that might still be formed on the inside of the roof itself.

J. L. C. asks: 1. In the spring I wish to build a bank wall 150 feet in length and 3 feet high. This wall I wish to make of concrete. What thickness ought the wall to be? A. The thickness of the wall should be about 2 feet at top, increasing to 3 feet at bottom, the wall commenced 3 feet below the level of the ground and carried up 6 feet high, so as to be 3 feet underground to prevent its being disturbed by frost. Fill in behind with loose stone, and provide openings through the wall at the bottom of the bank to discharge the water which may accumulate behind it. 2. Will such a wall stand the cold and frosts of a New England winter? A. Yes, if proper precautions are taken to build it properly; bring out a projection at top of the concrete, to act like a coping. 3. As Portland cement is high in price, would it do to build the body of the wall with a cheaper article, and skintcoat with Portland cement? A. No; it will be found that Portland cement is the cheapest, as there will be less required of it. 4. What are the best proportions for the various articles used in making concrete? A. Of Portland cement, one may be used to thirteen of the other ingredients. Take one barrel of the cement to four barrels of clean sharp sand, and fill in with as much gravel, stone chips, and small stones as can be worked into it, when well supplied with water, and have their surfaces coated with the same. 5. After the wall is built, I wish to paint in imitation of granite. Can it be done? A. Paint with a cement wash. 6. What kind of cement, other than Portland, is best to use? A. Rosendale cement is a good article.

T. O. H. asks: If a man has a right to sell a patent plan in a certain county, has he a right to sell to a man who lives in another county? A. Yes.

H. R. asks: 1. What distance will a well proportioned steamboat make, compared with the travel of her wheels at ten miles per hour in dead water? A. Deduct about 10 per cent. 2. Does the same rule apply to steamboats as to a train of railway cars on a dead level? A. No.

A. O. P. says: I recently found, among the entrails of a prairie chicken, a snake nearly two feet in length. I discovered also that the liver of the chicken had been destroyed by being literally cut to pieces. How could the snake in entering the chicken pass through the gizzard? Could the chicken live without a liver? A. We cannot explain the phenomenon from this statement.

D. H. T. asks: How large a piece of soft castiron, flanged at right angles, would have the same strength as a piece of white oak 3x4 inches square, and of any length? A. Cast iron has nearly twice as great tensile strength as white oak; it offers about ten times as much resistance to a crushing force, and between three and four times as much to a strain applied transversely.

G. F. J. asks: What is the best work on mechanical drawing for a machinist who wishes to begin with first principles? A. "The Practical Draftsman's Text Book of Industrial Design" will be a good book for you to have. 2. What number of wood screws can be cut in one hour by the most improved machinery? A. Will some of our readers who manufacture wood screws answer this?

S. S. S. asks: 1. How can I cut a large glass bottle across the middle? A. Take a good three cornered file, file a circular notch around the middle of bottle; let the notch be at least 1-16th of an inch deep, and, if the glass is very thick, 1/4 of an inch. Into this circular notch fasten a soft small lampwick or thread of tow, well moistened with alcohol, taking care not to wet the surrounding glass surface. Light the thread, which should be large enough to fill the notch and not wound too tight, and while burning revolve the bottle in the hands, taking hold of the ends, and holding it horizontally so as to confine the flame to one particular part. When burnt out, plunge the bottle at once into cold water. If necessary, repeat the heating and cooling suddenly. 2. Will a porous cup made of plaster of Paris be as good for a battery as one made of earthenware? A. No. The plaster will crumble away in time, and is not sufficiently porous.

T. C. asks: What is used for white writing fluid on colored envelopes? A. A solution of oxalic acid, or indeed almost any acid, when used as an ink on blue paper, will appear white by discharging the color of the paper. White crayons are also used for the purpose.

J. P. asks: 1. With a propeller 50 feet long, 8 feet beam, with direct acting engine 8x8 inches, fitted with plain slide valve cutting of a little more than 1/2 stroke, and boiler with 200 feet heating surface, 10 feet grate surface, and 20 inches of chimney section, to burn wood: a screw with three arms, of 3 feet diameter and 6 feet pitch, one third out of the water: What speed am I likely to get? A. Probably from 5 to 5 miles an hour. 2. Will the slip of a screw so slightly submerged occasion a great loss of power? A. Yes. In reply to your other questions, we do not think the boiler will give a very satisfactory result.

N. H. asks: 1. How can I cut and polish agate? A. The lapidary's cutting plates are arranged as follows: 1. Soft iron (very thin) with diamond dust in oil; 2. pewter with coarse emery and water; 3. ditto with fine emery and water; 4. wood, with sand and water; 5. pewter, with rottenstone and water; 6. leather with putty powder, slightly wet. 2. How shall I imprint gold lettering on leather book backs? A. Attach gold leaf to the leather with white of egg, and impress the letters on. The letters are made of brass, and should be hot, but not enough to sputter when wetted. Slightly oil the gold and the face of the letter with a greasy rag. 3. Is the so-called poppet valve of a locomotive arranged differently from an ordinary safety valve, other than in being held down by a spring instead of weights? A. The poppet valve is conical, and fits into the aperture, instead of being tight on the face. 4. Where is the Di Cesnola collection of antiquities to be seen? A. At the Metropolitan Museum of Art, in the Kruger Mansion, 40th street, New York city.

R. R. C. asks: What is a good book on railroad construction, from laying out and leveling to putting down the rails, for the use of beginners and students? A. Vose's "Handbook of Railroad Construction" will be useful to you, but you cannot find it in any book. See our advertising columns for booksellers' addresses.

C. C. H. asks: Can I construct a rifle telescope by using one double convex lens of 28 inches focus for object glass, and one double concave of 1 inch focus for the eyepiece? What should be the sizes, respectively, of the two glasses, to insure a clear field of view? A. You can make a Galilean telescope in the way you propose. The field of view, however, in this telescope is not very large. An adjustment is made when a telescope is used with a rifle by raising the end near the eye. For ordinary purposes, as a terrestrial telescope or spy glass, at least 4 or 5 glasses are used, one for the object glass, and the others for the eyepiece. The object glass can only be well made by a skillful optician, so that it would probably be much cheaper for you to buy a small glass than to attempt to make one. For particulars as to the construction of the telescope see any good work on optics.

J. B. P. says: A friend having a threshing machine engine, with hind wheels of 1 foot diameter, wishes to make it a self-propeller. To do this he has taken off one of the 4 feet wheels and substituted an 8 feet driver, connecting to his engine with a chain, running his engine six revolutions to the drive wheels' one. I told him he would get much power and speed by connecting in the same way on to his 4 feet wheel and running his engine three revolutions to one of the drive wheel. Who is right? A. From the data sent you are right.

W. M. R. asks: Is the common red clover seed used for any purpose besides sowing? I hear that it is used for coloring prints. A. We have never heard of the red clover seed being used for the purpose mentioned.

S. A. T. says: 1. I wish to speak of what I call steam fuel. In the workshop of my factory (30x40 feet) we have a cast iron stove, 20 inches in diameter, in which we keep fire from 8 A. M. until 5 P. M. in the following manner: In the morning, the entire contents of the stove are let down into the ash pan which hangs and projects below the stove body. There is about 1 bucketful. Into the pan is poured enough water, generally 4 quarts, to knead the ashes into a thick dough; afterwards fire is started and the coals are all red hot, which is at 9 A. M. The contents of the ash pan are spread evenly all over the top of the fire. It remains red hot through the entire day; not only the stove gets red hot, but, on taking off the lid of the stove (which opens on top) and looking in, the contents present the appearance of molten iron. This becomes solidified into one cinder, which is lifted out next morning and the ashes under it let down for another dough mixture; there is but one coating, and that is at 12.15 A. M., the stove is thrown out an intense heat for 8 or 10 hours without raking. A stove can be arranged to keep fire for 10 or 12 hours, but then you get no heat. There are evidently 4 quarts of water burnt up in our stove every day. A. This is an interesting account of a system of economical firing which has frequently been recommended. 2. How can I get the tin off tin plate, so that it will hold black asphaltum varnish? I can burn it off, but our "ash dough fire" burns the iron to pieces. A. Cover the tin with a coat of ordinary paint. 3. How can I wash chamois skin which has become dirty, so that it will not be as dry and hard as a board? A. If it is washed perfectly clean, and well rinsed, it will not be hard, when dry. 4. Is there any method by which cheap photography can be accomplished for home amusement? A. You can get apparatus for home use at a moderate price from a manufacturer of photographic materials. 5. I have a sign in my store composed of red letters on blue ground. Every person who looks at it complains of its hurting their eyes, in fact it really does so; and if you look at it steadily for a few seconds, the letters appear to move or dance. A. A combination of red and blue, which are not complementary colors, is an improper arrangement with regard to producing the best effect upon the observer. 6. Some of my workmen have chapped hands, caused by having them wet a great deal and frequently immersed in strong caustic soda water. They crack open and the dirt will get under the skin or in the pores; and, if greased over night, will not wash clean next morning. A. It would be well to protect their hands with waterproof gloves. One of our correspondents recommends dipping the hands in vinegar or vinegar and water to neutralize the alkali. 7. I send a mineral specimen. What is it? A. The mineral sent is a quartz crystal of no pecuniary value.

B. H. asks: 1. Please give me a good rule for finding the pressure of steam pounds to the square inch in an engine boiler? A. You can best determine it by a gage. 2. How can I find the horse power of an engine? A. See article on "Indicating Steam Engines," in SCIENTIFIC AMERICAN for January 31, 1874. 3. To what railroad official had I best apply for a situation? A. It depends on the situation you desire. Probably the president would be the proper person to see. If you want a position on the engineer corps; the master mechanic, if you want a position on a locomotive; the superintendent, for appointment as brakeman or conductor and so on.

W. F. W. asks: Does the lever principle apply to a water wheel? For instance, in two overshot wheels, one 10, the other 20 feet in diameter, with buckets of equal size, if one bucket in each wheel be filled, will one give any more power than the other? Does the same principle hold good in turbine wheels? A. The principle of the lever applies in all such cases.

A. S. asks: Can a person obtain instruction in New York on proper use of instruments as used by the United States Signal Service Bureau? If so, where? A. You can obtain rules and instructions from the Bureau. You can obtain the prices of instruments from a reliable maker.

A. H. O. asks: 1. What material is best for an emery belt? A. Leather. 2. Is there anything better than glue to stick the emery on with? A. We think not.

P. H. R. asks: Can a clock be made to run without power from springs or electricity, and without requiring to be wound up, in fact, to receive a steady movement from itself? Is such a thing possible? Is there any company or society in the United States that would support a poor man in experimenting in such work? A. We must answer no to all your questions.

O. P. asks: What is the effect of excessive dampness on masonry constructed with ordinary mortar? My mill is built of brick with stone foundation. At its base in the rear, the stream flows, washing it somewhat, while the dripping from the race above creates some spray and much dampness. Is there any danger of the foundation or wall giving way? If so, what kind of mortar should have been used in the first instance? A. It is quite likely that your foundation is unsafe, but could not answer positively without knowing more particulars. Some kind of hydraulic cement is ordinarily used in such cases.

C. H. asks: Given the size of ports, exhaust and stroke of the valve, how large should the valve be? A. If the valve has no lap, it must be large enough to cover both ports, when in mid position, and the stroke is twice the width of the steam port.

F. C. C. says: 1. If I undertake to carry water in wooden pipes a mile under the ground, how much waste must I allow for absorption, evaporation, etc.? A. It will depend upon the material. You can readily determine the matter by experiment. 2. There is full enough to throw the water into a tank over a boiler and save the labor of a well pump. How much shall I save by this? A. About twice the theoretical power required to lift the water. 3. What would be the difference in cost between a wood pipe and a cast iron pipe, and which, upon the whole, had I better have? A. The wooden pipe would be much the cheapest in many localities. If you have facilities for making it, we think the wooden one may be the best for you. 4. What is the smallest sized pipe, wood or iron, that I could use, and what is the least fall the water needs have? A. You do not send enough data for us to answer this question. Your best course would be to have an effective condenser of your steam.

F. G. H. asks: Will a round chimney give a better draft than a square one, if the area and surface presented for friction are the same in both cases? A. In practice there is no essential difference in the draft of the two forms.

L. W. asks: Which is the most economical to heat a tank of water, using live steam or heating pipes in the water? Does it necessitate running the pipe to the bottom if done with live steam? Will not the pipes heat it quicker, and take less steam if there be an outlet into the water or elsewhere? A. The relative economy of the two systems will depend considerably upon the general arrangement.

H. G. B. asks: How can I alloy gold? A. Gold is alloyed with silver or copper, or with both. Melt the gold in a separate crucible; and if copper is to be added, this is also to be melted in another crucible and poured into the gold. To ensure a thorough combination, two red hot crucibles should be used, and the liquefied metals poured alternately from one into the other. To prevent oxidation from the air, put into each crucible a small quantity of a mixture of common salt and charcoal. The metallic alloy should also be occasionally stirred with a rod of pottery ware.

W. H. F. asks: Is the objection to steam propulsion on canals the washing away of the banks? Would a system which would propel the boat without disturbing the water be of any use? A. The difficulty about canal navigation by steam is not the washing of the banks. The trouble is to find a method of slow propulsion by steam that shall be as cheap and easy of management as to wage by animals.

R. T. asks: 1. Will a patent be granted to another person on an already patented mixture, if one or more ingredients be added or omitted? A. Not unless there is some essential difference in the compound produced, or in adapting it to another purpose. Merely adding to or taking away from a patented material compounded for a certain purpose, and use without substantially altering it for said purpose and use, is not patentable, unless as an improvement on the prior patent. 2. How is gas lime made? A. Gas lime is simply the refuse lime from the gas purifiers in gas works.

J. H. asks: What is the best method for mixing paints for painting on glass, to stand heat and cold, and to be exposed to all kinds of weather? A. Glass in which the colors are fixed by fluxing certain metallic substances on its surface, and known as "stained glass," is what we would recommend to fulfil the conditions required. This you can buy more cheaply than you can make.

P. C. C. asks: 1. Is it practicable to condense the exhaust of a small compound engine, the steam working 350 feet per minute? A. Yes. 2. Is it practicable to do so in a condenser constructed so that the steam exhausts into gas pipes with cold water running around them? A. This would be the best way of doing it. 3. How will I determine the area of condensing surface, the temperature of cold water, of course, being known? A. In practice, from 2 1/2 to 6 square feet of surface are allowed for each indicated horse power of the engine.

A. C. R. asks: How do engravers transfer pictures from paper to wood for re-engraving? A. By first soaking the print in a saturated solution of alcohol and white caustic potash to soften the ink, when the latter will readily transfer to the block under roller pressure. This also answers A. J. P.

A. L. C. asks: Why are objects pictured on the retina of the eye in an inverted position, always seen right side up? A. There are numerous theories. One is that the image formed on the retina of the eye conveys to the mind correct ideas of the relative positions of external objects. Another is that persons judge of the position of an object by the direction in which the rays come to the eyes.