(5) A. I. I. writes: We laid a common black gas pipe under the railroad where the track had been ballasted with slack coal, and within four weeks' time the pipe was full of holes eaten from the outside. What was it that caused it? Was it the water and leachings off of the coal standing in the trench? A. The coal slack contains sulphur, which soon eats through iron pipe. Lead pipe will be better, and last much longer if it is necessary to lay it in the coal slackor where the water from coal slack may come in contact with it.

(6) B. A. C.—New plated work, if not burnished, requires buffing with felt buff and rotten stone. Then brush or buff with a soft felt and rouge. This is not as good as burnishing, as the burnisher hardens the surface.

(7) T. W. writes: I wish to know if malleable iron is welded together or can be welded to wrought iron? A. Malleable iron may be welded to iron and low steel, as you may see by examining malleable shears with steel faces. Use borax melted with 10 per cent of salammoniac for a flux. Mix and cool, then powder, and use in the same manner as borax powder.

(8) J. H. V. and M. P. L.—For etching brands and marks on polished steel surfaces, such as saws, knife blades, and tools, where there are many pieces to be done alike, procure a rubber stamp with the required design made so that the letters and figure that are to be bitten by the acid shall be depressed in the stamp. Have a plain border around the design, large enough to allow a little border of common putty to be laid around the edge of the stamped design to receive the acid. For ink, use resin, lard, oil, turpentine, and lampblack. To ¼ pound of resin put 1 teaspoonful lard oil; melt, and stir in a tablespoonful of lampblack; thoroughly mix, and add enough turpentine to make it of the consistency of printer's ink when cold. Use this on the stamp in the same manner as when stamping with ink. When the plate is stamped, place a little border of common putty around and on the edge of the stamped ground. Then pour within the border enough acid mixture to cover the figure, and let it stand a few moments, according to the depth required, then pour the acid off. Rinse the surface with clean water; take off the putty border, and clean off the ink with turpentine. Use care not to spill the acid over the polished part of the article. For the acid, 1 part nitric acid, 1 part hydrochloric acid, to 10 parts water by measure. If the effervescence seems too active, add more water.

(9) M. & P. write: We have in contemplation the erection of a grist mill. The location necessitates a subterranean passage of water to the mill or a deep cut water way. Wood as a support of the earth would soon rot. We know where we can purchase two engine boilers second hand, and want to know how long they would probably last in such a position. A. We could not venture to give more than a general opinion. If the iron is ¼ inch thick all over, and well painted with coal tar outside and inside when laid, it might last a good many years.

(10) F. H. asks: Which of the following materials is the best for deafening for a skating rink located upstairs: Mortar, cement, asbestos felt, other felt, wool (prepared?) sawdust, and gravel? A. Mortar and cement are not used for deafening on the top of the floor on which the skating floor is laid. It is too hard, and is good only as a plaster between the beams in the usual way. Asbestos and wool are very expensive, but good. Common roofing felt laid upon the originalfloor, and covered with a mixture of about equal parts of fine clean sand and sawdust about 1 inch thick, upon which lay furring strips and skating floor, makes the best insulator that we can suggest.

(11) J. F. W. asks how long a box holding gasoline, made of wood, covered with No. 16 zinc, buried 8 feet underground, would last, and whether it would last longer than galvanized iron? A. The wood in the box would last many years. The zinc would corrode on the outside only, and if as thick as No. 18 or 20 wire gauge, should last five years in a favorable soil. There is a great difference in soils as to their oxidizing effects. The zinc should last longer than the galvanized iron.

(12) L. H.—If your "red nose" is caused by dramdrinking, nothing but abstinence therefrom will remedy the evil. If it comes from any other curable cause, you had better consult a physician.

(13) G. B.—The article on "Beer Stronger than Whiskey," which has been going the rounds of the papers lately, credited to the SCIENTIFIC AMERICAN, was copied by us several years ago from the *Inebriates' Journal*, and published as a clipping from that periodical.

(14) S. M. S.—The difference between charcoal and coke tin only shows in working; charcoal tin is the toughest. The best tin for roofing is called tern plate or roofing tin. It is covered with an alloy of tin and lead.

(15) H. W. P. sends a plant for identification. A. It is the milk thistle (*Carduus Marianus*). It has no remedial qualities. Its use as a remedy for snake bite was probably suggested by the variegated leaves, the ancient "doctrine of signatures" being still believed in by the ignorant.

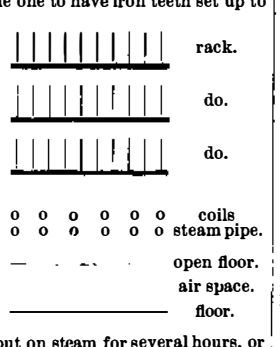
(16) W. P. L. asks whether lead lining is injurious to brass, silver, or gold solutions; if so, what is best for lining tanks? A. Lead is not good. Glass, asphaltum, or paraffine is good. A wooden tank covered on inside with paraffine, by melting and spreading over the surface of the wood with a hot iron, is cheap and quickly done.

(17) H. B. writes: In the barometer described in SCIENTIFIC AMERICAN of August 22, does the compressed air force the liquid to the top of the tube in changing weather, or what causes it? A. Variations in atmospheric pressure act upon the surface of the liquid in a barometer tube; increased pressure sending the liquid down (in the open end), and *vice versa*. Variation in temperature also varies the column. Heat makes the column rise, and cold makes it fall, the compressed air in the bottle keeping the liquid column at its normal height; the bottle being sealed airtight.

(18) S. A. C.—There is no evidence, to our knowledge, of the use of iron by the early inhabitants of Central America; nor is there any evidence that it was not used, as iron utensils or tools might lose their identity by oxidation and absorption in the period which has since elapsed.

(19) T. H. De L. writes: We are using as fuel in boiler furnaces (return tubular) Georgia pine and bituminous coal, first throwing in a "fire" of the wood and then from ten to fifteen shovelfuls of the coal. Is there any objection to this, looking at it from an economic (or any other) point of view? A. Not knowing the value of Georgia pine wood and Cumberland coal in your place, we cannot estimate their relative economy as fuel. It seems to us rather strange and eccentric to fire boilers in the manner you describe. Both of the materials of combustion being of a soot producing nature, we should judge that the flues would foul very rapidly. An engineer that understands firing with Cumberland coal alone so manages the fire as produce the least amount of unconsumed carbon in the escaping products of combustion. We cannot see any advantage in using wood and coal alternately. It seems impossible to keep a bright back fire for consuming the smoke.

(20) C. H. S. writes: I wish to construct a kiln drier, of about 7,000 superficial feet capacity, in connection with my steam saw mill—steam capacity, 90 H. P.—for drying hard and soft wood, taking it for granted the exhaust will afford sufficient heat for kiln when working. A. Build your drying room a little longer than the longest lumber to be dried; make it 8 ft. high, and about 7 ft. wide for a thousand feet of boards, or about 800 cubic feet capacity. Such a room with exhaust steam will require a coil of 1 in. pipe, two pipes high, 3 inches center to center of pipes, to cover the entire floor—say 750 ft. of 1 in. pipe. The headers into which the 1 in. pipes connect should be, for above coil, made of 4 in. pipe drilled and tapped. The connecting pipe should be 2½ in., or proportional for larger coils. So arrange outlets as to drip all the water and give free vent to steam; you will need not more than ½ pound back pressure on engine; if well planned, much less. A gate valve in the exhaust connection with a live steam inlet to coil ¾ in. will enable you to keep steam in coil when engine is not running. The floor boards of room should be narrow, and laid with ½ in. openings between the boards, and a space below floor that can be closed or opened to control the ventilation. There should also be several openings at top of room, with dampers. The best way to pile the lumber for effective and uniform drying is to place it on edge in racks, as in the room above indicated, three racks high, of hard wood scantling, and for boards three racks in the length of the room, the middle one to have iron teeth set up to keep the boards on edge, as shownherewith. The greatest trouble arises in many drying rooms from the piling of the lumber too close, which obstructs circulation of air among the pieces, and hence no drying. The operation should be as follows: After filling the room with lumber *close it tight;* put on steam for several hours, or until the lumber becomes heated through, then ventilate slowly to carry off the moisture. This saves much cracking by surface drying.



(21) C. R. C. asks: Will you please inform me through the SCIENTIFIC AMERICAN how large a surface I will need, to attach a ground wire to, for a telegraph line about half a mile in length, also how deep it will need to be buried? A. A good groundplate should be made of copper, having a surface of about fifteen square feet. Larger would be better. This plate should be buried in earth that is constantly moist. Water and gas pipes form a good electrical ground.

(22) W. E. asks whether boards ever swell and shrink lengthwise, *i. e.*, with the grain, or not. A. The effect of moisture upon the length of boards is the reverse of its effect upon their width. That is, when the board is wet, it is shorter than when it is dry.

(23) C. D. D. asks: 1. Is the difference between a permanent magnet and an electro magnet, this: The former is magnetized at any and all times, and the latter only when acted upon by a current of electricity and demagnetized as soon as or soon after the current is broken? A. Yes. 2. Is the current of electricity, in an electric light machine caused by the revolving of the armature between the field magnets, or by the brushes in contact with the commutator? A. It is caused by the revolving of the armature. The brushes simply take off the current.

(24) E. A. C. writes: Where can I find working drawings and description of a small dynamo? Also of electric motor capable of running a small fan or toy boat? I wish the dynamo to give an electromotive force sufficient to light three Edison 6 candle power lamps. Thinking that you may have previous papers relating to them. A. You will find a full description of a small dynamo in SUPPLEMENT, No. 161. If you desire to run three six candle power lamps, you should make a dynamo of double the size given in the article referred to.

(25) H. W. asks: Do you know of a furnace that will volatilize gold, silver, etc., from the ore or from the metal? If so, will you kindly give me the name and address. A. The only furnace we know of that will volatilize gold and silver is the electric arc furnace, made by Siemens, of London.

(26) A. H. M. writes: I have been trying to make some permanent bar magnets by making a spool of No. 18 insulated copper wire 3 inches long, the wire being wound half an inch thick on spool and then placing the spool in circuit of an electric light dynamo, then passing a ¾ inch by .6 inch round steel bar back and forth in the spool. I stop the spool on the center of the bar, and stop the dynamo before taking it out. This magnetizes the bar, but it is not very strong; is there any other method for making it stronger with the use of the dynamo? A. The trouble probably lies in your steel. Try ordinary machinery steel hardened only at the ends.

(27) B. F. T. asks: Will you please inform me what substance (cement or other) is used for sticking the emery to the "rifles" or hones used for sharpening scythes? A. A good quality of common glue.

(28) G. K. asks: What is needed for making nickel solution plate a good white color? My solution is plating a kind of cream color; my work is principally stove work. Also a receipt for making lime cake for buffing stove plates. A. Consult SUPPLEMENT, Nos. 152, 192, and 425, in which the subject of nickel plating is treated.

(29) J. W. M. asks: 1. Have you a good book on electricity for a beginner? One that explains the term used by electricians and others. A. Consult Ganot's Physics. Thompson's "Electricity and Magnetism" is a good book for beginners. 2. Do you know of any experiments tried by Mr. Wise, of St. Louis, in ballooning? It is said he has an airship (Chambers's Encyclopedia) in which he can cross the ocean in 48 hours. A. The experiment has not been tried, and considerable improvement in aerial navigation will be needed before it can be successfully accomplished.

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