(6) P. O. D. asks if there is an instrument or liquid that, by placing on the ground, will indicate where are mineral substances, such as iron, silver, or any mineral. A. There is no satisfactory method of determining mineral deposits except by having an examination by an expert mining engineer. The compass will indicate the presence of iron, but unless used by a competent individual would be unsatisfactory.

(7) M. E. E. writes: I am anxious to learn how to preserve natural flowers. Could you give me the process in this way? A. Dip the flowers in melted paraffine, withdrawing them quickly. The liquid should be only just hot enough to maintain its fluidity, and the flowers should be dipped one at a time, held by the stalks and moved about for an instant to get rid of the bubbles. Fresh cut flowers, free from moisture, make excellent specimens in this way.

(8) J. T. V. asks: What is Crême d'Argent? Please give formula. Would its application to stamp mill copper plates be advantageous before the first application of quicksilver, and prevent the rising of the oxide of copper through the quicksilver? A. Crême d'Argent is silver cyanide. Its application is to produce a silver coating in Hamerton's positive process of engraving or etching. We think it would be too expensive for your purpose.

(9) J. P. W. asks in what book he can get information concerning the method of analyzing phosphates and other commercial fertilizers. A. This information can readily be obtained from any text-book on analytical chemistry, such as Fresenius' Hand-Book of Quantitative Analysis or Cairns' Manual of Quantitative Analysis.

(10) B. B. S. writes: Will you please let me know if there is some cheaper copying process than the electric pen that will do good work? I wish something for examination papers in school, so I can take impressions from same. A. Use the hektograph, described in our SUPPLEMENT, No. 443.

(11) C. N. L. asks if there is any sulphurous odor at or near the locality where lightning strikes. A. There is an odor of ozone. There might be a sulphurous odor if the lightning should strike anything containing sulphur.

(12) J. B. asks if paper pulp can be run into moulds, and if it can be hardened, and to what extent, if so. A. It can be pressed into moulds, and if mixed with size will become hard when dry. Clay is sometimes added to the pulp.

(13) J. W.—We think the process you refer to is not nickel plating, but tinning. The knives are first thoroughly cleaned, then brushed with soldering fluid, then dipped in a bath of melted tin. The tin is covered with wax or tallow to prevent oxidation. We know of no practicable process of nickel plating without a battery.

(14) W. L.—London cement, for mending broken glassware, china, ivory, etc., is prepared by boiling Gloucester cheese three times in water, each time allowing the water to evaporate, and taking the paste thus left and thoroughly incorporating it with dry quicklime. It will mend glass, wood, china, etc., very effectually.

(15) T. L. G. says: I have heard stated that four persons could lift a heavy man from the floor without the least effort, by taking together a long, deep breath and putting their forefingers under the one to be lifted at the same time. If true, how can it be explained? A. If each of the four persons is able to lift one-fourth of the weight with his forefinger, there is no reason why four persons together could not lift the entire weight. There is nothing mysterious about it.

(16) C. C.—Coning the wheels is intended to prevent most or all of the sliding of wheels on average curves. If the curve and wheels are adapted to each other, there will be no slip.

(17) W. J. L. asks: What is a non-conductor to magnetism? I have tried a number of metals, but have not been successful; but I find loadstone will not attract brass, but it will attract through it. A. An insulator of magnetism has long been sought, but never found.

(18) E M.—Siemens said that electrical engineering is simply an adjunct of mechanical or civil engineering. As a profession, apart from these, it would hardly be desirable. You can take a course at one or the other of our technical schools, or you can gain the practical part by engaging yourself in some branch of manufacture, or both.

(19) I. W. R.—Probably the readiest way to blacken the inner surface of your telescope is to mix lampblack with very thin shellac varnish and apply with a small sponge on a stick. Use a liberal quantity of lampblack and very little shellac. Try your varnish on a piece of metal before applying it to your tube.

(20) W. M. C. asks: Will a ship sink to the bottom of the sea, the depth being 5 miles, and the reason? A. If it would sink at all, it would go to the bottom. The reason is that water is practically incompressible, and a given bulk of water at the bottom of the ocean weighs scarcely more than the same bulk at the surface; and any body having greater weight than the water can as easily displace its bulk of water at the bottom of the ocean as at the top.

(21) T. D. M.—We think your method of destroying weeds, etc., by means of a heated roller would be impracticable, as earth is a very poor conductor of heat, and you would require not only a very hot roller but a very slow movement.

(22) W. R. C.—We cannot suggest a remedy for your difficulty without knowing more about the construction. Are the magnets strong? Have you used fine wire on your bobbins? Are your pole extensions very near the diaphragms? Is your fence wire perfect throughout, or is there a break or a bad joint somewhere?

(23) R. J. O'R. asks the present condition of the Hudson River Tunnel. A. On the New York side one tunnel has been built about 200 feet, through the bulkhead of the pier. On the New Jersey side one tunnel has been built 1,600 feet and another 600 feet. There is no work now being done, construction having been stopped for about a year from want of funds.

(24) J. D. G. asks a simple rule to determine the amount of condensation per square foot of surface on steam pipes of different thickness and temperature. A. We do not know of any simple rule such as asked for, but the following is the result of experiment. Steam pipes used for heating a room and maintaining a temperature of 60°, with good circulation, will condense 0·357 pound of steam per square foot of surface, each hour; a coil under similar conditions will condense 0 29 pound of steam.

(25) P. W. W. asks: Would not a lathe in which the slide rest is made to travel by means of a rack and pinion, cut a perfect screw? A. Certainly, only have a rack and pinion without backlash, and easily reversible. The method is not impracticable, nor is it new.

(26) W. R. P. writes: Will you please give me the best formula for making ink for copying pad? A. Try the following: Dissolve one part methyl violet in seven parts distilled water on the water bath, and add, when cool, two parts of glycerine.

(27) J. W. writes: I wish to learn how to make the bluing used by washwomen and sold by all the grocers. A. The liquid bluings are as follows: 1. Dissolve indigo sulphate in water, and filter. 2 Dissolve good cotton blue such as aniline blue 6 B in cold water. 3. Dissolve Prussian blue with one-eighth part of oxalic acid in water. 4. Dissolve Tiemann's soluble blue in water with 2 per cent of oxalic acid.

(28) J. J. McV. asks: What are considered to be the best materials and proportion of ingredients, color, etc., for paint, for outside iron work, like bridges of iron, railway and highway? A. There is nothing that stands wear and weather so well as red oxide of iron and boiled linseed oil. This may be tempered with chrome yellow, white lead, and lampblack for shades. On the great East River Bridge white lead is used. The elevated railways in New York are painted with Prince's metallic paint and chrome yellow. If it is not desirable to have the paint dry quickly, a little raw linseed oil mixed with the boiled makes an easier spreading paint and adds to its durability.

(29) J. H. asks how to make a cheap steam whistle, one that is loud, but not shrill. I intend to use a globe valve, if possible, so it will start to whistle gradually and die out gradually. A. A tinsmith could make you a steam whistle upon the same plan as an ordinary mouth whistle or an organ pipe, only on a large scale. We do not think that you can make one cheaper than the regular article of the same caliber.

(30) J. M. F. asks the latest receipt for the manufacture of carbon paper for use on the type writer. A. We know of no more satisfactory method than that of rubbing the surface of thin post or tissue paper with black lead and a little oil, and carefully removing the excess of coloring substance by rubbing with a clean rag.

(31) F. C. C. asks: In regard to the power of a small boat engine and boiler of the following dimensions: Boiler 11 inches diameter, 24 inches high, sixteen 1 inch flues, fire box 10 inches diameter, 14 inches high, engine cylinder 2x4 inches, 3 inch stroke, 40 or 50 pounds steam, half an inch feed. A. Your boiler, with good strong draught, would give you from 1¼ to 1½ horse power. The engine can furnish no more than the boiler is sufficient to supply.

(32) B. E. G.—The vessel from which the air is exhausted is tighter in consideration of the air extracted, therefore it will float easier than one containing air. The floating of a vacuum inclosed by a metallic case depends entirely upon the weight of the envelope.

(33) T. E. G. asks what he should use to paint a boiler with. Something that will not burn off. A. A coal tar varnish is very good, or the Norwood "smoke pipe paint;" the coal tar varnish can be obtained from gas works.

(34) W. S.—The reversal of the valves makes the cylinders act as pumps driven by the momentum of the engine and train, cushioning the steam before the pistons and driving it back into the steam chest and to the boiler, drawing steam and smoke from the exhaust pipe to follow after the piston.

(35) S. P. B. says: I use a two flued boiler 24 feet long, and use coal for fuel. I thought of making an experiment with coal oil to increase the heat in the flues by combustion of coal oil in atoms. I would conduct the coal oil to the flues through a quarter or half inch pipe. Would there be any danger in exposing the pipe, say a quarter or half an inch diameter, to a red heat? A. Not if of wrought iron. But a better way would be to send the oil into the furnace on a "spray" by a jet of steam, an operation similar to that of an injector.

(36) C. L. B. says: I am a machinist; have been oiler on several steamships, and wish to become an engineer. I am studying the indicator, and have learned to work up a card to a certain extent, but cannot understand the true curve, or theoretical curve, as it is termed. What I do not clearly understand is getting the cubic capacity of the cylinders. A. The length to be added to the length of the card is such a fraction of the working stroke of the piston as shall be equal to the cubic contents of clearance passages and openings from the valve to the piston when the latter is on its center, or extreme end of the stroke. If for instance the clearance was 1 inch and the stroke 40 inches, then the clearance alone would equal one-fortieth the contents of the cylinder, and if the cubic contents of the passages and openings, from the valve to the cylinder was equal to 1 inch length of the cylinder, then the clearance and passages would be equal to 2 inches length of the cylinder, or one-twentieth the capacity of the cylinder. It will be very difficult for you to understand the cards from a compound engine, except you make the subject a severe study or obtain instruction from some one familiar with taking, reading, and calculating such cards.

(37) J. W. R. asks: Does the crosshead of a locomotive engine move backward when the engine is moving ahead, and *vice versa*? A. The crosshead never moves backward upon the rail except when the wheels slip.

(38) H. W. B.—You may make a fusible alloy of tin 12 parts, lead 25, bismuth 50, cadmium 13, parts by weight, that melts at from 150° to 160°. A fusible alloy may be made of tin 1 part, lead 1 part, bismuth 2 parts, that melts at 200°. This may be tempered by adding mercury so as to bring the fusing point down to 150° or less. The alloys are conductors.

(39) J. L. H. asks how dry scale can be best separated from steam boilers. A. For removing scale Caustic soda dissolved in the feed water, about an eighth of a pound per horse power, and fed to the boiler one day each week, allowing it to remain all day and then blow off often during the next day, will soon remove the scale. After two or three applications the boiler should be thoroughly cleaned out, and examine angles or corners where deposits might accumulate and clean such deposits out.

(40) J. H. S. says: I want to get a tank to pickel beef in, either of zinc or galvanized iron, and would like to know which of them is preferable? Would such a tank be injurious to the meat? A. Zinc and galvanized iron are not as good for corning or pickling beef in as oak barrels or casks. Whichever is used, frequent cleaning is necessary. People are frequently made sick from eating corned beef, who are totally ignorant of the cause. Stale meat, saltpeter, and want of cleanliness in the pickle vat are at the bottom of this trouble; we recommend an oak tank.

(41) E. D. C. asks: 1. Can I drain a pond by means of a siphon made of 3 inch gas pipe 1,500 feet long with an 8 foot fall? A. You can drain the pond, provided the inflow is not as great as the outflow, by your siphon, which will deliver at best only about 40 gallons per minute. With a siphon the decreasing level in the pond would gradually lessen the flow. 2. Is there any rule by which a person can determine the distance that a pond can be drained under a given fall with a siphon? A. Rule for flow: Divide the constant for the diameter of pipe under one foot head by the square root of rate of inclination; the quotient will give the volume in cubic feet per minute. The constant for 3 inch pipe=73·5; the constant for 4 inch pipe=151. The rate of inclination is the length divided by the height.

(42) J. A. B. asks: Has the sulphur in the gas any influence on the bath in an open hearth furnace? Have there been any experiments made to investigate the matter, and if so, by whom, and where are the results published? A. The aim of iron makers is to keep the furnace as free from sulphur as possible, although probably a small percentage may not affect the iron. This can be ascertained by a trial, the visible effect of which is to make the iron *hot short*, or brittle at a red heat. The latest and best practice in iron making is described in various technical journals. For interesting details you may do well to examine articles published in SCIENTIFIC AMERICAN SUPPLEMENT—No. 24, Little's process; No. 55, Rees' process; No. 70 and 71, paper by Dr. Siemens; No. 157, direct process; No. 362, Sulphur in Iron and Steel; No. 282, Hay process; No. 364, Bromfield process; No. 380, Bull's process.

(43) J. H. L. asks about the process for the manufacture of picture mouldings, gilt and other plaster covered mouldings. And what book or in what way a person can procure practical instruction for the carrying on of such work. A. We have no knowledge of any work upon the manufacture of the ornamental or composition work upon picture frames. They are made by pressing a composition of oil and whiting in carved hardwood moulds or moulds cast in type metal.

(44) T. M. C. asks who or what is the best authority on the capacity of pipes for delivering water. Also, what quantity will an 8 inch pipe deliver, under 150 feet head, the pipe being half a mile long, and without much curvature? Also, what will a 12 inch pipe deliver under same conditions? A. Neville's Hydraulic Tables and Formulæ is high authority. Your 8 inch pipe will deliver 48 cubic feet per minute; 12 inch pipe will deliver 133 cubic feet per minute.

(45) W. S. V.—If it is a real fireproof paint about which you ask, the material constituting the fireproof qualities is probably composed of mineral or incombustible substances such as asbestos, clay, or pulverized slate or other cheap mineral colors, the resin and coal tar being only used in sufficient quantity to cement the real fireproof material.

(46) S. & D. write: We propose erecting tank for windmill pump; tank is to hold 50 barrels, and is to be elevated 30 or 40 feet. Will you be kind enough to tell us what pressure the tank will supply for water motor, size of connecting pipe 1 inch or 1¼ inch? A. For 30 feet elevation, 13 pounds pressure; for 40 feet elevation, 17¾ pounds pressure.

(47) F. J. S.—For carpenters' tonnage the rule is: Multiply together length, breadth, and depth, and divide the product by 95. You will find the various rules for tonnage in Haswell's Engineer's Pocket Book.

(48) B. R. N. asks for the mode of rendering horn transparent amber color, like tortoise shell. A. The imitation of tortoise shell with horn is as follows: Mix up an equal quantity of quick lime and red lead with soap lees; lay it on the horn with a small brush in imitation of the mottle of the tortoise shell; when it is dry, repeat it two or three times; or grind 1 ounce of litharge and half an ounce of quick lime together with a sufficient quantity of liquid salts of tartar to make it of the consistence of paint. Put it on the horn with a brush in imitation of tortoise shell, and in three or four hours it will have produced the desired effect. It may then be washed off with clean water; if not deep enough, it may be repeated. The original preparation consists in roasting the horn over a fire made of the stalks of furze; when rendered soft it is slit on one side, and kept expanded flat between a pair of tongs; it is then placed between iron plates, which are greased. The horns are suffered to remain until they are cooled; they are then soaked in water enough to be pared down to the required thinness, with a large knife worked horizontally on a block. Their transparency is thus acquired; and after being immersed in lye, they are polished with whiting and the coal of burnt willow.

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

H. J. L.—The specimen is a hornblendic rock containing pyrites or iron sulphide, a mineral which frequently, if not always, carries gold with it. The amount of the latter, if any, can only be determined by assay. —L. D. B.—The specimen appears to be feldspar; it is so small that it cannot be easily determined without analysis.

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