or potassium carbonate. Bluing may be made by treating 1 ounce pure Prussian blue with 2 ounces concentrated hydrochloric acid. Effervescence ensues, and the mixture soon assumes the consistence of a thin paste. This can then be moulded in balls or dried and powdered, or else left for 24 hours, and then dilute with 8 or 9 ounces water and bottle it.

(3) E. L. N.—The paste sent consists of rouge (red chalk) mixed with some oil or tallow, probably boiled linseed oil. Powdered tripoli is likewise used in combination with boiled linseed oil as a paste for polishing. The difference in quality found in various samples is probably due to the different degree of fineness to which the rouge or tripoli is ground. A sit is more finely ground, so does it increase in efficiency. Liquid oxygen is not suitable for the production of the oxyhydrogen light.

(4) A. W. G. asks how the polishing paste for cleaning and restoring tarnished nickel is made? A. Use chalk or rouge mixed with tallow.

(5) S. S. asks: How many "Bunsen" cells of 1 gallon capacity will it require to produce an arc light of one-eighth inch carbon candle, length of conducting wires 20 feet? A. Fifteen to twenty.

(6) J. C. W. asks: What substance can be used as a conductor of electricity, and yet have but little or no spring? A. Comminuted metals, acidulated water, powdered carbon, lead, soft copper, soft iron, mercury.

(7) J. H. D. asks: Is there any substance which can be mixed with ground talc, so as to form a paste which will harden in moulds, and yet be fireproof? A. It can be mixed with hydraulic cement or plaster of Paris, both of which would crack when exposed to heat. Perhaps it would be more desirable to incorporate the talc with kaolin or some clay, satisfactory to you, and bake the product. There would result a sort of earthenware.

(8) G. S. B. asks: 1. Can magnetic force be transformed into electric force (the force of permanent steel magnets, I mean)? If so, how? A. Yes, by revolving an electro magnet before or between the poles of the permanent magnet, and taking the current from the terminals of the electro magnet by means of a suitable commutator, as in the magneto-electric machine. The telephone magneto call and the magneto-electric medical machines are examples of machines producing an electric current from permanent magnets. 2. Having read in SCIENTIFIC AMERICAN Reference Book that ice boats on the Hudson River travel faster than the wind, I would like to have the philosophy of it explained. A. See SUPPLEMENT, No. 214.

(9) W. A. asks: 1. What is the thickness of the carbon used in the Blake transmitter, and how is it made? I have an electric light carbon seven-sixteenths inch diameter, coppered; will it answer to make buttons for transmitter? A. Your carbon is about the right diameter. The thickness of the button is immaterial, from one-eighth to one-quarter inch thick will do. The face of the button must be well polished to secure good results. The hard French carbons are best for the purpose. 2. I have several ounces of silk insulated copper wire (I inclosed sample). I think that it is No. 30; will it answer to wind the spools of telephone described in SUPPLEMENT No. 142, or had I better use a smaller size? A. Your sample of wire is No. 30 Am. W. G. It will answer a purpose, but is not so good as No. 36. 3. Should the end of a steel bar in telephone upon which the coil is placed be tempered and hardened, or should the whole of the bar be hardened and tempered? A. They will work well either way. Perhaps merely hardening the ends is quite as good a plan as any.

(10) B. V. F. asks: Will two Leclanche batteries of good size heat fine wire so as to be practicable for lighting gas? If not, how many batteries should be used, and what kind and size of wire should be used in either case? A. No. One small cell of plunging bichromate battery will do it. Use half-inch of No. 36 platinum wire. By employing a helix with a magnetic core, your two Leclanche cells may be used to produce a spark that will light gas. See any work on physics for the manner of producing the extra current and spark.

(11) S. J. B. asks what he can use to preserve paste or starch for mounting photographs? A. Carbolic acid, salicylic acid, and oil of cloves are all used for this purpose. The amount to be used must be very small, probably not over one per cent; frequently a much smaller quantity is used.

(12) S. T. asks how to make solution for cast iron, so it would have coppered surface? A. Make a solution of 2 oz. copper sulphate in 1 qt. water, add 1 oz. of sulphuric acid. Clean the iron by pickling it in dilute sulphuric acid, and washing and scrubbing it with a wire brush before immersing it in the coppering solution. After removing it from the solution, wash thoroughly with water.

(13) C. O. R. asks: 1. Is there any diamagnetic substance known that is quite or nearly perfect? A. Bismuth is the most diamagnetic substance known. 2. Is there any known substance that would allow a permanent bar magnet to act only in one direction, and not permanently neutralize or prevent its action in opposite direction? A. No. 3. What will efficiently neutralize "damp," or carbonic acid in wells? Sometimes in digging wells it nearly overcomes me. I have used lime and lime water, but with unsatisfactory results. A Ventilation is the only efficient remedy. Drive out the foul gases by forcing in fresh air.

(14) G. H. asks: 1. How may eggs long preserved by cold storage or other methods be detected? Can they be told without breaking? A. Expert dealers have a way of looking through them at a light, and judge by the shade if they are sound, but it is very doubtful if any one can tell how long they have been stored.

(15) J. D. writes: For finding the nominal horse power of a compound engine we have the rule:

$$\frac{d^2 + D^2}{30} \text{ or } \frac{d^2 + D^2}{32}.$$

According to some makers, the divisor is 30 circular inches, with others 32. However, what I wish to know is, wishing to reckon the diameters of the high and low pressure cylinders from the nominal horse power, I would like to know whether there is, or which rule is generally used by builders. Say I have to give the exact diameters for an engine of 140 N.H.P. Which rule can I use? A. Of the two formulas submitted, we should prefer that which has 30 for denominator. For the nominal H.P., Seaton gives the following:

$$\text{N.H.P.} = \frac{d^2 + D^2}{n}, \text{ where}$$

d = dia. of H.P. cylinder.
D = " " L.P. "
n = circular inches, which may be 30 to 32 or 33, the lower denominator for the higher pressure, say of 90 or 100 lb.; and for the diameter of the H.P. cylinder:

$$\sqrt{\frac{\text{N.H.P.} \times n}{1 + r}},$$

where r is the ratio of capacity of the low to the high pressure cylinder, and the diameter of the low pressure cylinder = $d \sqrt{r}$. Example for an engine of 200 N.H.P., the ratio of low pressure to high pressure cylinders being 4 and n = 33, then

$$\text{dia. of H.P. cylinder} = \sqrt{\frac{200 \times 33}{1 + 4}} = 36{\cdot}3 \text{ inches.}$$

And dia. of L.P. cylinder = $36{\cdot}3 \times \sqrt{4} = 72{\cdot}6$ inches.

2. What relation do the diameters bear to each other, or do the dimensions of high and low pressure cylinders depend upon their areas? A. For steam pressures of, say 80 to 100 lb., the contents (or area of piston of the stroke of both pistons is the same) of the low pressure cylinder is usually 4 times the H.P. cylinder, and for pressures 60 to 80 lb. the ratio is 3·5 to 1.

(16) J. F. B. asks how to make a small incandescent electric lamp, or tell me the number of a SUPPLEMENT describing one, if there is one? I should like to know the material the lights burn on, and the size of it? A. It would be difficult for a novice to make a modern incandescent lamp. He would require a glass blower, or would have to learn the art of glass blowing. He would want carbonizing apparatus and the most perfect air pump, and added to all this, a long experience. Full descriptions of the manufacture of these lamps can be found in the back numbers of the SCIENTIFIC AMERICAN and SUPPLEMENT. An experimental incandescent lamp may be made from a coil No. 36 platinum wire, but it would not answer for continued use.

(17) W. S.—1. The painting and bronzing of radiators retards their heating qualities. 2. The horizontal pipes along the sides of the room are more efficient than when placed vertically, as in radiators, with the same amount of surface in both.

(18) J. D. P.—Ordinary moulding sand is used for zinc castings just as for iron. For heat the zinc should be melted until the vapor from the metal is visible.

(19) S. P. C. asks for a receipt for making a carbolic dip into which stock may be plunged for killing lice and mites? A. Use soft soap, 1 gallon; heat with 30 gallons of water up to a temperature of 140°, then add one quart of crude carbolic acid. Then cool down to 110° and dip the sheep or lambs; but for other animals, pour it along the back so that it runs down the sides. Great care must be taken that it is applied to the brisket, under the shoulders and thighs. For the sheep scab mites the temperature should be 120°, and the scabs should be completely broken up by a corn cob.

(20) H. E. H. asks: 1. Will two cylinders of same stroke, with different diameters and same sized ports, exert the same power? A. No. 2. Will two cylinders of same size exert the same power, if one has but one piston, and the other has two, traveling opposite directions, both having the same sized ports? A. No. 3. What is the average pressure of steam in passenger locomotives while running? A. One hundred and twenty to 140 pounds. 4. What distance could a locomotive pull a train, if its boiler was charged with steam to its average pressure, and the fire was drawn out, before starting, the atmosphere being about 70°? A. This cannot be answered except upon specific conditions—as to capacity of boiler, weight of train and locomotive, grade, condition of track, etc.

(21) A. B. N. asks how papier mache is made? A. Papiermache is made by pasting or gluing sheets of straw or other thick paper together when wet and pressing to the shape of the mould, or making a pulp of the paper material and pressing the pulp into the moulds.

(22) G. W. E. asks if there are any steam or electrical buggies in use? A. There have been several electrical and steam buggies and tricycles invented (mostly in Europe), but they are for the most part not in practical use.

(23) T. J. T. asks: 1. How long will cottonwood, Linn. (basswood) and red elm last in fence pickets? A. Basswood when well preserved and painted is very durable, and might last for pickets as long or longer than pine—perhaps twenty years. Cottonwood is almost as durable when painted and preserved from the weather. Red elm is not durable for this use. 2. What is the best and cheapest preservative for that kind of wood when exposed to the open air? A. Common paint, linseed oil, and the brownish red oxide of iron make one of best outdoor paints. 3. What is their value compared with yellow or white pine? A. Southern yellow pine would perhaps be better than basswood or cottonwood, but white pine would be no better for outdoor use.

(24) F. J. del C. asks how to make the so-called parchment paper. What strength of acid to use, and where to obtain or how to make it of the requisite strength? A. To make parchment paper dip ordinary unsized paper for 5 or 6 seconds into dilute sulphuric acid, and wash with weak ammonia water, acid 1 part, water 4 parts.

(25) J. K. asks: 1. What is the greatest speed that could be attained by a steamboat, a screw propeller, in smooth water, of the following dimensions, and what description of boiler or boilers and engines would be the most suitable, and the amount of power required: Length over all, 75 feet; breadth of beam, 14 feet; depth of hold, 6 feet; draught of water, not more than 4 feet? A. We think about 16 miles per hour, if of good model and very light. A plain, simple engine, 12 to 14 inch cylinder, and 12 inch stroke, with locomotive form of boiler of ample capacity to carry 120 to 140 pounds of steam, having not less than 600 feet heating surface.

(26) I. H. F. sends us a japanned buckle. A. The sample is dipped. String upon very small wires. Thin the japan with turpentine. Heat the work to above 200° F., then dip, and hang in oven. Turn the pieces over upon the wire 2 or 3 times while they are disposed to drip. This will make the japan even. If the japan is good, it will stand considerable thinning before it loses its gloss.

(27) L. H. D. writes: I am using water taken from a tank lined with ordinary sheet zinc, for greenhouse purposes. I notice, after the foliage of the plants has been regularly sprayed for a month or so, the leaves become spotted with a whitish stain, as though there was a sediment in the water which sticks to the foliage after drying. Do you think this spotting could come from the action of the water on the zinc? What kind of paint or varnish could I use to coat the zinc, which would have no effect on the water? The tank was built and lined about two years ago, and the zinc now shows a roughened surface. Before building the tank I used the same water, but did not notice any stain. The water is changed about once in three or four days. Tank holds about twelve hundred gallons. A. It is probable that the zinc is the cause of the spotting. Painting the inside of the tank with red oxide of iron and boiled linseed oil will no doubt be a remedy. The oxide of iron is called in trade "Prince's metallic paint." You can mix it yourself. Make it as thick as can be spread easily with a brush. Use no turpentine.

(28) W. F. H. asks: Can you inform me how the cement is made which gas fitters use on joints after they are put together and found to leak slightly? It is not the regular red lead and oil I have reference to, but a hard cement which looks like red sealing wax. A. This is called gas fitters' cement. Melt together 4½ parts resin (by weight), 1 part beeswax, then stir in 3 parts Venetian red and pour into moulds made of oiled paper or cold iron moulds.

(29) J. E. E. asks: Does sound travel a greater distance north and south and more rapidly than it does east and west, wind currents being equal? And if so, have electrical currents anything to do with it? A. Experiments upon the velocity and conditions of sound in the atmosphere during the past 150 years have not developed any difference in the velocity or distance of sound as regards the points of the compass. There is a decided difference in velocity and distance, as with or against the wind, as well also with the temperature and humidity of the atmosphere. The velocity increases with the temperature at the rate of 1·14 feet for each degree above 32° Fahr. The velocity assigned at 32° in dry air is 1089 feet per second, and at 62° 1125 feet per second. There are no experiments known to us in regard to the velocity of sound in different electrical conditions of the atmosphere. We think the electrical influence is imperceptible.

(30) E. G. C. asks regarding the modern method of rendering glass articles iridescent. A. Some information is given in regard to the process as practiced abroad on page 1800 of SCIENTIFIC AMERICAN SUPPLEMENT, No. 113. It is also said to be produced by volatilizing tin chloride in the furnace.

(31) N. S. H. asks: 1. For receipts for mucilage and glue combined, called Egyptian Tenexine? A. We are not familiar with the composition of the article mentioned. 2. How is impression paper made? A. Take some thin post or tissue paper, rub the surface well with black lead, vermilion, red chalk, or any coloring matter; wipe this preparation well off with a piece of clean rag, and it will be ready for use. 3. How are luminous match safes made? A. See "How to make luminous paint," SCIENTIFIC AMERICAN SUPPLEMENT, No. 249. 4. What are pocket lights made of? A. See "Fire work formulæ," SCIENTIFIC AMERICAN for July 16, 1881, page 42.

(32) R. H. H. asks: What is the best thing to clean buckskin mittens, and also what will clean a bronze plate lamp hanger? A. The following, which is used to clean chamois skins, will probably be satisfactory: Make a solution of weak soda and warm water, rub plenty of soft soap in to the leather, and let remain in soak for two hours, then rub well until quite clean. Rinse well in a weak solution of soda and yellow soap in warm water, but *not* in water only, else it dries hard. After rinsing, wring it well in a rough towel and dry quickly, then pull it about and crush it well until soft. Cleansing with naphtha will perhaps answer. For the bronze plate, if real, use oxalic acid; if imitation, soap and water will answer.

(33) A. W. B. asks: 1. If borax renders shellac soluble in water, will not the compound after being used as varnish or cement be then soluble and easily injured by being washed, etc.? A. Yes; although as it dries up it is less likely to be dissolved off. 2. If shellac is dissolved in spirits, camphor or other resinous gum may be added to give the varnish a gloss or luster. Can anything be added to produce this effect when water is used as a solvent? A. We would suggest the use of gum arabic for the purpose.

(34) J. J. D. asks: How sulphocyanide of ammonia is prepared? A. This salt may be prepared by mixing hydrocyanic (prussic) acid with ammonium polysulphide (a solution of sulphur in ammonium sulphide), and separating the resulting ammonium sulphocyanide from the precipitated sulphur by filtering. The salt thus produced is in solution, and may then be obtained in the dry state by evaporation to crystallization. In any case it is cheaper and preferable to purchase the sulphocyanide from a wholesale druggist or dealer in chemicals.

(35) D. P. S. asks: Will you tell me through Notes and Queries why it is that certain salts or acids when dissolved or mixed with water produce heat, while others produce cold? A. Bodies having a great chemical affinity for each other produce heat when brought together, while such bodies as have but little chemical affinity produce cold, as the heat is rendered latent by liquefaction.

(36) E. K. B. writes: 1. Will you please give me the candle power of the calcium light, say the light used by Mr. Stoddard in throwing his pictures upon the screen? A. From 100 to 125 candle power. 2. What are the limes used made of, and how? A. The best lime cylinders are made of calcined marble; but they are usually cut out of selected pieces of common unslaked lime, which answers very well.

(37) S. J. D. asks: 1. What power is exerted by a screw one-eighth pitch, 1 in. diameter. Pointed angle of 30° working between 2 pins, angle to suit screw; in other words, what weight will they lift? A. What is the length of your lever working the screw, and what pressure do you apply to the end of the lever? 2. What is correct method of finding the pressure on a slide valve? A. There is great difference of opinion as to the *correct* method—some say it is only that due to the area of all the openings; others that it is that due to the whole surface of the valve when not moving, but less the area of one port when working.

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