

the tank, with small holes, and place on top of the bottom 3 or 4 inches thickness of clean gravel; then discharge the steam below the bottom.

(8) A. S. asks: Will 12 spokes 6 inches wide, $\frac{1}{2}$ inch thick, wheel 7 feet in diameter, sustain the weight of a traction engine weighing 7,000 pounds? 6 spokes are placed crosswise of the tire, 6 are placed with the tire, with a 14 inch tire. Will it be strong so as to drive the engine? A. We suppose you mean 12 spokes in each wheel; if so, we think they would be quite sufficient for the weight.

(9) T. D. B. asks: 1. How can I get the silver out of a gelatino-bromide emulsion which is turned sour and become as thin as water? A. Treat as described on page 4898 of SCIENTIFIC AMERICAN SUPPLEMENT, No. 307. That is, add salt solution, thereby obtaining silver chloride, this can be fused in a crucible with borax, giving rise to metallic silver. 2. Can the bichromate of potash solution which has been used in a battery, and of course contains a quantity of zinc, be put to any use, or can any salts be crystallized out, and if so what salts? A. Evaporate your solution till it becomes quite concentrated, when the potassium bichromate will crystallize out. 3. Can you explain how the current in a medical electric machine is produced when you connect one end of primary wire with one end of secondary? A. Your query is not quite specific enough. You may get only the extra current of primary, or both the current and the induced current from the secondary. 4. What use can old pyrogalllic acid and ammonia developer be put to which has been used to develop plates and has not been kept in air tight bottle? A. They are of no further value; the ammonia has all volatilized, and it would hardly pay to attempt to work over the pyrogalllic acid. 5. How can a dry plate be saved which has been exposed but not developed? I have heard they can be used by putting in a bath of something. A. We are not familiar with any process by means of which this object can be obtained. See the Photographic Notes, on page 275 of THE SCIENTIFIC AMERICAN for November 3, 1883.

(10) R. P. asks: 1. Which is the most constant, has the greatest electromotive force and least internal resistance—the Bunsen nitric or Bunsen chromic acid battery? A. Bunsen's nitric acid battery yields a current of 1.964 volts and Bunsen's chromic acid battery a current of 2.038 volts. The chromic acid battery is preferred on all accounts. 2. How many feet of No. 28 German silver wire would have a resistance of one ohm? A. You do not say whether your wire is measured by the American or English wire gauge. Probably about 15 inches of No. 28 by American wire gauge would measure 1 ohm, but a great deal depends upon the quality of the German silver. You should have a sample of your wire measured.

(11) B. S. asks: 1. What size boat and propeller wheel for an engine $2\frac{1}{4}$ bore and 4 inches stroke to obtain the best results? A. Boat 15 to 16 feet long by 3 feet wide and 16 to 18 inches deep. Screw 18 inches diameter by 27 inches or 28 inches pitch. 2. Speed I should get with 80 pounds of steam. A. If good model and plenty of steam, about $6\frac{1}{2}$ miles to 7 per hour. Boiler should have 55 to 60 feet fire surface. 3. I would like to know the size wire that is used on spark coils such as are used for electric gas lighting. A. It depends something on the amount of work you intend to do with your coil. Probably No. 18 would answer your purpose.

(12) H. R. W. asks: 1. How much weight will an ordinary watch spring hold up when it is pulled out full length? A. Watch springs are tempered in coil, so on straightening out they would bear much less than the weight they would hold if tempered straight. It would probably be safe to estimate their breaking strain so straightened out as equal to at least 100,000 pounds per square inch of sectional area, but there are no figures as to this point. 2. Where can eucalyptus seed be obtained? A. For eucalyptus seed, address Department of Agriculture, Washington, D. C.

(13) C. C. H. asks if a sample of serpentine inclosed would have any value, and the dimension of blocks that would be most desirable. A. Serpentine has been used occasionally for building purposes. We know of several churches built of this material that are much admired for their peculiar color and contrast. You might make arrangements through our architects for furnishing the serpentine for special work. A visit among architects with large samples would no doubt bring business to you. It is too soft for ornamental work except where it might take the place of gypsum or alabaster, with which it would make a fine contrast, as in polished vase work.

(14) H. P. T. asks: What is the cause of and remedy for discoloration of slate roof? The roof is something on the French style, topped out with a tin roof. Can it be rust or the paint used in painting the tin? It gives the slate an extremely bad appearance. Thinking it was iron rust, as the roof had been previously neglected, I tried acetic acid, etc., on the slate, but it had no apparent effect on it. A. Try oxalic acid 1 part, crystallized water 6 parts, by weight. Wash the slate with a swab and the acid, then wash with clean water. Oxalic acid is poison, and a powerful eradicator of stains.

(15) G. B. F. asks: Can you give some statistics regarding domestic and foreign manufacture of umbrellas and parasols, annual production, exports and imports? A. Umbrellas and canes were manufactured in 1880, in the United States, according to the census, to the value of \$6,917,463. The exports of umbrellas, parasols and sunshades for 1883 were \$3,562. The value of imports in this line is not stated separately in the customs returns.

(16) H. R. W. writes: I have a small row boat, flat bottom and pointed at both ends, which I wish to run by steam. The boat is 18 feet long, $3\frac{1}{2}$ wide, and about $2\frac{1}{2}$ high. 1. What kind and size of engine do I need? A. Vertical inverted engine, $2\frac{1}{4}$ to $3\frac{1}{4}$ inch cylinder by 3 inch stroke. 2. How high a rate of speed can be attained by screw, and size of screw for such a boat? A. Probably about 6 miles an hour, with good boiler; screw 15 inches to 16 inches diameter. 3. Would coal or oil be the best fuel? A. Coal is the best.

(17) C. F. H. asks: What would be the cheapest and simplest plan to pump water into a tank, and if there is a hot air pump that is cheap and durable, also whether there is a windmill that lies down flat and can be covered with a roof? A. A hot air pump will probably be as cheap as and easier to manage than any other device except the windmill. We know of no windmills in the market that have a roof, or what are called horizontal mills. The best mills are those that stand square up to the breeze.

(18) E. A. H. says: The inside walls to the basement of my house are rough brick, and dampness from the earth outside comes through. Is there anything I can put on the walls to prevent it? A. Rake out all the joints and clean the wall thoroughly; then plaster it carefully half an inch thick with a mortar made of Portland cement one part, sand one part. To be applied in a dry time, when no water is coming through the wall. The mortar is held up by the wall, and any considerable thickness of mortar tends to drag itself off by its own weight. The more the mortar is worked into the joints, the better. The cellar bottom may be covered with same material, but should be two inches thick.

(19) W. R. C. writes: I have a small double engine with two 5 inch by 5 inch cylinders, with 24 inch driving pulley and 12 inch pulley on shafting. Will you give me the horse power, at 150 revolutions per minute, 80 pounds steam pressure? A. About $7\frac{1}{2}$ horse power, allowing 60 pounds average pressure on the pistons. If there is an average pressure on the pistons of 80 pounds, the power will be about 10 horse power.

(20) J. G. J. asks: Please let me know through your correspondence column what speed could be attained from engine of the following dimensions, namely: 4 driving wheels, diameter 4 feet 10 inches, cylinder 15 inches, length of stroke 24 inches, steam pressure 140 pounds, pulling three coaches? A. Too many important particulars affecting the speed are omitted; an answer to the question as stated would be largely hypothetical.

(21) M. G. asks if there is a solution by which flies can be kept away from show windows and mirrors. A. Not that will have any permanent effect; their number can be reduced by using fly paper and various kinds of traps.

(22) J. M. J. asks: How can paint be removed from a boiler? I have tried muriatic acid, but it don't seem to have any effect. A. Take 1 pound American pearl ash, 3 pounds quick stone lime; slake the lime in water, then add the pearl ash, and make the whole about the consistency of paint. Apply this to the boiler, and allow it to remain on the paint for twelve hours. Three pounds of common washing soda dissolved in boiling water and applied hot by means of a common paint brush is said to soften paint in a very short while, so that it can be removed with a stiff scrubbing brush. A few ounces of potash added to the solution is said to increase its efficiency.

(23) F. A. K. asks: Can you tell us of any method by which the rust on the inner surface of tin cans can be covered up? We have had several things recommended, the latest of which is silicate of soda with an admixture of tin, but this does not give the exact color we want; it gives the cans the appearance of having been painted, which is the very thing we wish to avoid. A. We do not think that any method sufficiently cheap can be obtained. By dipping the cans in a bath of hydrochloric acid possibly some of the iron rust would be dissolved off, and at the same time a bright surface imparted to the cans. It would be most efficient if heated.

(24) G. W. C. asks: What is the sticky stuff called piping which is put in rubber overshoes? A. We presume you refer to the rubber cement used to close up openings. This consists of fine shreds of native India rubber, dissolved in good benzine free from oil.

(25) J. C. H. asks: Is there any cheap method by which asbestos felt can be made waterproof? That is, saturated completely and thus rendered impervious to water? Can this be done and the material still be at all pliable, or will it be rendered stiff? If the felt can be made waterproof in sheets, and boxes or tanks are desired to be made of it, what material should be used to cement the joint seams or corners? A. We think the following would accomplish your purpose: A mixture is prepared consisting of 60 parts of resin, 80 parts of tallow, 5 parts of wax, and 5 parts of turpentine. Soak the asbestos felt in this mixture, and it will become waterproof. Several processes for waterproofing cloth may be found in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 317, which will afford you some information on this subject. This lining cannot be cemented, but only joined by same or similar material; we should think asbestos not a very suitable material for tank lining.

(26) J. H. N. says: It is stated that there is a process for eliminating the methyl from the alcohol in methylated alcohol, but it is very expensive. Can you give me that process? I have already tried a great many processes, but they have not been attended with sufficiently satisfactory results. A. For the purification of impure alcohols there are principally three methods. First, that of L. Naudin by electrolyzation. This process is described with illustrations in SCIENTIFIC AMERICAN SUPPLEMENT, No. 343. Secondly the method of Raoul Pictet by cold and by vacuum, which with illustrations can be found in SCIENTIFIC AMERICAN SUPPLEMENT No. 299; and finally the method by Eiseman. A report descriptive of these methods is given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 323. Alcohol can sometimes be purified by rectifying over fused acetate of soda; from four to six drachms are sufficient for every gallon. The salt can easily be used over again after being purified by solution in water, filtering through charcoal, evaporating, and fusing.

(27) W. J. C. asks: Does the glazing of the granite ware which is now so extensively used for tea-pots, water pails, etc., contain lead? And if so, is there any danger of lead poison from it? A. Certain of the enamels contain arsenic, others lead, some tin, etc., so

that some may be considered safe while others are dangerous. Lead poisoning is somewhat a matter of personal constitution.

(28) C. M. Co. ask the recipe for Lea & Perrin's sauce. A. The following is said to be the recipe. Mix together $1\frac{1}{2}$ gallons white wine vinegar, 1 gallon walnut catsup, 1 gallon mushroom catsup, $\frac{1}{2}$ gallon Maderia wine, $\frac{1}{2}$ gallon Canton soy, $2\frac{1}{2}$ pounds moist sugar, 19 ounces salt, 3 ounces powdered capsicum, $1\frac{1}{2}$ ounces each of pimento and coriander, $1\frac{1}{2}$ ounces chutney, $\frac{1}{4}$ ounce each of cloves, mace, and cinnamon, and $6\frac{1}{2}$ drachms assafoetida dissolved in one pint brandy, 20 above proof. Boil 2 pounds hogs' liver for twelve hours in 1 gallon water, adding water as required to keep up the quantity; then mix the boiled liver thoroughly with the water; strain it through a coarse sieve. Add this to the sauce.

(29) G. P. asks about the process of printing in gold leaf or metal in practice among the manufacturers of gentlemen's neck wear. A. Brass stamps of suitable device are used. The spots to be impressed are coated with the white of eggs and gold leaf spread over the locality, then the stamps are heated and pressed on the material; after which the surplus gold leaf is evenly rubbed off.

(30) A. T. McI. asks: Can you inform me of any liquid chemical preparation that after having been applied to paper will remain invisible for a period limited from about three to four minutes, and then become visible and remain so? A. By writing with a solution of silver nitrate and then exposing the same to the ordinary action of light, that is sunlight, it will become dark and remain so. The silver nitrate must be preserved in a dark place, and it is kept in a colored bottle as a usual thing.

(31) A. T. S. asks how to make the magnesium wire or sheet. A. Commercial magnesium is prepared by reducing magnesium chloride, or the double chloride of magnesium and sodium or potassium with sodium. The double chloride is prepared by dissolving magnesium carbonate in hydrochloric acid, adding an equivalent quantity of sodium or potassium chloride, evaporating to dryness, and fusing the residue. This product, heated with sodium in a wrought iron crucible, yields metallic magnesium containing certain impurities from which it may be freed by distillation. This process is now carried out on a manufacturing scale, and the magnesium is drawn out into wire or formed into ribbon for burning.

(32) G. R. L. asks for a receipt for transparent cement, such as used to repair glass and fine china. A. Canada balsam thinned with a little turpentine, benzol, or ether is the cement used in joining transparent glass, such as lenses, etc. See also SCIENTIFIC AMERICAN SUPPLEMENT, No. 153, for various kinds of cement.

(33) L. W. W. asks: How can tar be separated from the water coming from a tower scrubber at a gas works? The tar is of a very light quality, it being so light that some of it floats on top of the water and is lost. A. Most of the tar will sink, and that which floats is so slight in quantity that we do not think it will pay to attempt to save it; possibly, however, by stirring it with heavier tar from the hydraulic main it will be collected and sink with it.

(34) J. F. L. asks for a receipt for removing the gloss of diagonal cloth. A. We do not suppose this can be satisfactorily accomplished on a hard finished cloth; steaming is sometimes tried, but the effect is only slight and not permanent.

(35) L. S. asks for a formula for a stain, and method of applying same, that will make a good imitation of red cedar, on elm or other light colored woods. A. Either of the following will probably answer: 1. Boil $\frac{1}{4}$ pound madder and $\frac{1}{4}$ pound fustic in 1 gallon water; brush over the work, when boiling hot, until properly stained. 2. The surface of the wood being quite smooth, brush over with a weak solution of aquafortis, $\frac{1}{2}$ ounce to the pint, then finish with the following: Put $4\frac{1}{2}$ ounces dragon's blood and 1 ounce soda, both well bruised, to 3 pints spirits of wine, let it stand in a warm place, shake frequently, strain, and lay on with a soft brush, repeating until of proper color; polish with linseed oil or varnish.

(36) A. F. L. asks for the cost of the St. Louis Bridge, and also of the Brooklyn Bridge. A. The St. Louis Bridge cost \$6,537,000. Brooklyn Bridge cost in round numbers, \$15,500,000. These amounts include the approaches, but do not include interest. With interest added up to date of completion, the cost of the Brooklyn Bridge was about \$21,000,000.

(37) C. W. G. asks (1) for a No. 1 polish for wood. One that will remove specks, and fill up to some extent scratches, etc., and that would polish and dry quickly. A. Gum shellac 3 ounces, gum mastic 1 ounce, gum sandarac 3 ounces, alcohol 40 ounces. Dissolve the last two in the alcohol, then dissolve the shellac and pour off the clear for use. Filling composition consists of size and whiting brought to the consistency of putty. 2. A good zinc polish (fluid), one that will clean and polish quickly and is lasting. A. Use glycerine or creosote mixed with dilute sulphuric acid; hydrochloric acid diluted may also be used. 3. A good fluid for polishing and cleaning the copper drains for glasses used in saloons, they being wet continually, and hard to keep bright. A. Copper can be cleaned by using old nitric acid diluted, or use soft stone and rotten stone, made into a stiff paste with water and dissolved by gently simmering in a water bath. Rub on with a woollen rag and polish with dry whiting and rotten stone. 4. The best plating fluid for silver and nickel, without the battery. A. See answer to query No. 28, in the SCIENTIFIC AMERICAN for May 24, 1884.

(38) H. G. asks if there is any simple way of treating cord and rope so they will not rot when exposed to the weather. A. Immerse the cordage in a solution of 50 or 60 parts water and one part mercuric chloride (corrosive sublimate). This is said to preserve it from decay. We believe that standing rope is frequently treated with tar for a similar purpose, and an application of tallow is said to be beneficial for running rope.

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