

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(1) C. G. desires (1) a formula for gilding sunk and raised letters in stone (marble). A. Apply first a coating of size and then several successive coats of size thickened with finely powdered whiting until a good face is produced. Let each coat become dry, and rub it down with fine glass paper before applying the next. Then go over it evenly and carefully with gold size and apply the gold leaf, burnishing with an agate; several coats of leaf will be required to give good effect. 2. Is there any gold liquid that can be applied which will give as good an appearance as the above way of gilding, and how is it made? A. There is a gold color stain for marble, consisting of equal parts of zinc sulphate, ammonium chloride, and copper acetate (verdigris), all in fine powder, carefully applied.

(2) H. R. T. writes: I have a 20 horse power engine running a 52 inch, saw direct from driving wheel, which is 60 inches, and runs on 18 inch pulley on saw mandrel; engine runs 170 revolutions per minute. Can I run a countershaft and increase the speed of the saw, and does much work as I can direct, without losing power? A. You may accomplish more speed with a countershaft, but no more work, unless the engine is in excess of power over the requirement of the saw. This you should observe by increasing the feed to the saw. If, in your judgment, the engine is capable of more power, you may put a smaller pulley, say of 12 inches diameter, on the saw mandrel, and, if necessary, place a light tightening pulley near the saw pulley upon the slack side, to increase the belt lap. We think this preferable to a countershaft and two belts.

(3) J. W. H. writes: If a wheel, say an undershot one, is placed in a stream running from a reservoir, what portion of the water that works it can it be made to pump back into the reservoir from a pool below, say at a depth of 15 feet from the surface of the water in the reservoir? A. From 40 to 50 per cent into its own reservoir.

(4) M. J. asks a cheap preparation to dip wrought iron articles in to prevent rusting (after being milled). A. Use hot soda water to clean from oil, then hot lime water, and dry.

(5) B. T. T. writes: Boat A and boat B are running in the same direction at bullet speed. A man standing on boat A, which is 25 feet behind boat B, shoots at the man on boat B. Can he hit him, or, in other words, will the bullet overtake boat B, when they are all going at bullet speed? A. Yes; substantially the same as if all parties were standing.

(6) M. K.—The gas governor referred to is a good regulator of pressure, and will save gas when the street pressure is higher than required for economical burning. Burners do best at from $\frac{1}{4}$ to $\frac{1}{2}$ inch water pressure. In most towns and cities the pressure in the service pipes is from $\frac{1}{4}$ to 2 inches. The governor regulates this to a uniform standard.

(7) S. Y. C. asks the difference, if any, between so-called chilled shot and regular patent shot. A. All shot are chilled by an air blast, and fall into water to prevent bruising. The patent is in the method of finishing.

(8) T. E. wants to know the ingredients, proportions used, and manner of preparing mucilage for wrapping papers and family use generally? A. For household purposes an article is prepared by mixing 3 ounces gum arabic, 3 ounces distilled vinegar, with 1 ounce white sugar. Instead of the distilled vinegar, 1 part acetic acid and 5 parts water may be substituted.

(9) F. T. asks: What solution is used for tinning cast iron by dipping? A. Cast iron is very difficult to tin. It cannot be tinned by dipping. Can be tinned with a soldering copper, if made clean.

(10) O. A. L. asks: 1. What college near central Illinois could I best study in as a Presbyterian minister? A. Blackburn University, Carlinville, Ill. 2. What is the usual time for a graduate of a common high school to graduate as such minister? A. Probably about four years. You can obtain this information by consulting the catalogue of the institution referred to, which will be sent you on application. 3. What is the salary of such ministers? A. From about \$400 upward. Your abilities may be such as to command a larger salary.

(11) W. J. C. asks: 1. What is the difference between crown glass and flint glass? A. The difference is in the composition, crown glass being composed of silica, potash, and lime, while to these ingredients is added about 40 per cent oxide of lead for flint glass. 2. Is there a book published on optics as applied to photography? A. There are many books on photography. We believe none on the optics of photography specially.

(12) E. S. writes: 1. There is a towboat here having an engine 17x17, working high pressure (100 pounds), non-condensing, and there is talk of putting in a surface condenser and independent air and circulating pump. If the change is made, will it make the

boiler steam any harder, or require a larger boiler? A. The surface condenser will add about 12 to 15 per cent to the power of your engine. The air and circulating pump may absorb $\frac{1}{4}$ to $\frac{1}{2}$ the gain, so that you will still be a gainer. 2. Would it be practical to compound the cylinders in an engine for a boat of this size? A. We do not think an ordinary propeller engine of that size can be compounded to advantage.

(13) L. M. G. asks how to rig up an anvil in the rear of a store, so that it will make as little noise as possible. A. Set the anvil on a block of lead; or make a putty ledge around the anvil upon the wooden block, $\frac{1}{2}$ inch clear all round, 1 inch high. Raise the anvil clear of the block $\frac{1}{2}$ an inch, by any means available, pour in the lead until it rises above the bottom of the anvil; or set the anvil on a good bed of sand held in a box.

(14) W. D. G. writes: How fast should a sheet iron disk run to cut steel? I have made one 28 inches in diameter and run it 5,000 revolutions per minute, and it will not cut nearly as fast as a thin emery wheel would do it. The disk is made of Russia iron, and run on a small saw arbor, first at about 3,000 revolutions and afterward at 5,000. A. The saw should have teeth, and the steel made red hot to cut fast. If not practicable to heat the steel, better use the emery wheel.

(15) G. B. asks whether the base of a mountain is at the level of the surrounding country or at the sea level. A. The base of a mountain is the plain or valley from which it rises. It has no relation to the sea only when washed by the sea.

(16) W. H. L.—You are right. In our formula for solutions for blue prints on paper, in the SCIENTIFIC AMERICAN of October 31 last, the constituents for the second solution were reversed, and should have read ammonia citrate of iron 140 grains, water 2 ounces. It was a printer's error, which even the most inexperienced photographer ought at once to see.

(17) C. E. F. asks how to mix sulphur for making joints under engine beds. A. Melt the sulphur in an iron ladle in the same manner as with lead; only, cover the ladle while melting with a piece of iron to prevent fire.

(18) F. R. writes: I notice that a condenser of a steam pump is attached to the suction pipe below the valves. Would it not work as well to be attached to discharge pipe above the valves? A. No. It requires a suction to clear the water from the condenser. The force would stop the pump.

(19) R. H. asks: Is the gold and silver plate now in use electro-plate, or is it made by some chemical process science has lately developed? A. The plate is made by electro deposition. See "Galvanoplastic Manipulations," by W. H. Wahl, price \$7.50; also, "Electrolysis," by Fontaine, \$3.50, which we can mail you on receipt of price.

(20) J. N. O. asks: 1. How is the gilding done on china and glassware? How is the amalgam prepared so as to be painted on with a brush? A. See the "Method of Gilding and Painting on Glass and Porcelain," contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 86. 2. How can I make an amalgam of copper? A. Copper amalgam may be formed by immersing a piece of copper foil in a solution of nitrate of mercury. See Watts' Dictionary for this method.

(21) H. D. P. asks how rubber boots can be mended. The patches stuck or glued on are poor affairs. A. Rubber cement is the only means that we can recommend for the purpose of repairing rubber articles. Several recipes for such cements are given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 158.

(22) M. D. writes: In the manufacture of koumiss, a certain amount of alcohol is generated by fermentation. How can the alcohol be afterward removed, when its use even in small quantities is objectionable, without impairing its virtue as a food? A. It is not likely that the alcohol can be removed unless a lactic fermentation is allowed to occur, but this would produce a sour mixture, which would be unpalatable. We would suggest that a simple mixture of milk and a suitable carbonated water be used in lieu of the koumiss.

(23) I. W. asks for a fire kindler, something that can be smeared on small pieces of wood or mixed with sawdust. A. The addition of a little sulphur, or impregnating the wood with kerosene or bitumen, would cause it to burn readily when once ignited.

(24) N. G. asks: What will cure scab on sheep, especially what could be done in cold weather, or what would be better in warmer weather? You said, in a recent paper, turpentine is a remedy against various insects; might it not be good for scab? A. Take quicksilver 1 pound, Venice turpentine $\frac{1}{2}$ pound, rub them together until the globules are no longer visible. Then add $\frac{1}{2}$ pint oil of turpentine and 4 pounds of lard. In summer, resin may be substituted for the lard. The germicidal properties of turpentine are not sufficient for it to be used alone.

(25) G. H. B. asks if it would be very dangerous or foolhardy to coast from New York Bay to St. John's River bar in a steamer of 6 or 8 tons, 4 $\frac{1}{2}$ ft. draught, and trust, for safety in storms, to running into river mouths and creeks, said boat (propeller) to be manned by three plucky, tolerably well experienced persons, but who might want to anchor and sleep a little every night? A. This question, as well as the handwriting in which it comes to us, indicates that the "plucky persons" referred to are boys. In reply we would say that, as much smaller boats have crossed the Atlantic, the thing proposed is entirely feasible, if sufficient care and good seamanship accompany the pluck. A season of the year when good, steady weather is the rule should be chosen, and we trust our boys will also take along with them a pilot familiar with the coast.

(26) A. B. C. asks if it is proper, in building a horizontal engine, about 24, to balance in the flywheel the weight of the piston, piston rod, crosshead, and connecting rod, or should I balance only

one-third of the weight of the connecting rod. A. If there is a journal between the flywheel and crank, it only makes matters worse by attempting any balance by the flywheel. You can only balance the crank by making it a disk and balancing the rod on the disk, or as much of the piston as the construction will allow. For low speed engines no balancing is required.

(27) T. N. writes: If a bell is rung, say by electricity, in a town or city in which there are no inhabitants within hearing distance, would there be any sound? A. Webster defines sound as the perceived object occasioned by the impulse or vibration of a material substance affecting the ear; a sensation or perception of the mind received through the ear. But there is a secondary meaning in which the occasion is sometimes called sound, in which sense sounds are spoken of as audible or inaudible.

(28) S. A. L.—The freezing of an exposed whistle pipe in very cold weather is reasonable if it is so arranged that the steam does not readily circulate within the pipe. A horizontal pipe at the lower end of the whistle pipe might partially close communication, by holding the water of condensation; then the vapor in the upper part of the pipe would begin to freeze to the surface until the pipe is closed.

(29) N. P. M.—Imitation water marks may be made in paper by pressure upon a marked plate in which the water mark is raised. They cannot be as permanent as the real mark, because in the real mark the paper is thin under the mark.—All systems of mnemonics require a good memory to start with. We have found nothing as yet beneficial in their practical operation. Any system of mnemonics, as applied to figures, is absolutely useless and mind entangling. Let your figures be written; keep algebraical symbols for their legitimate use, and the mind clear for relational conception.

(30) H. C. asks if there is at present any practical plan for heating house furnaces by crude coal oil. A. Experiments and trials have been made in this line, but so far the odor has been a most objectionable feature, while the management and watchfulness required is more than an offset to any supposed economy.

(31) J. J. F.—The U. S. Government has not offered a reward for the discovery of perpetual motion.

(32) J. E. S.—If a fan blows across a boat against a sail inclined to the axis of the boat, a small effect might be expected. If the fan blows forward against the sail, the effect will be much like the man that tried to lift himself in a basket. An auger will not lift water as stated. Propeller pumps for small heights are in common use.

(33) C. H. P. asks: 1. Is a compositor supposed to shoulder the blame for mistakes which appear in a newspaper, or is it the proofreader? A. It is the proofreader's duty to mark all errors plainly on the margin of the proof, and he is to this extent responsible for the final correctness of the printed matter; should the compositor fail to properly make the corrections marked, and the proof is not revised, then the blame for any errors rests with the compositor. 2. Which of the following is written correctly: "Side- and foot-sticks," or "Side and foot-sticks," the question being, Should the hyphen be placed after the word "side"? A. The first quotation is undoubtedly correct, although such use of the hyphen has always seemed to us rather an affectation of purism. In the second quotation, there should be no hyphen at all, as the noun there belongs equally to two adjectives, although it would form a compound word with either one as ordinarily used.

(34) An Inquirer will find many valuable papers on tempering steel mentioned in our SUPPLEMENT Catalogue, notably in Nos. 95, 103, and 105. The steel manufacture is also treated of in many numbers. One of the best recent works on different processes is W. H. Greenwood's "Steel and Iron," which we can mail for \$2.00.

(35) F. G. B. asks what is a good polish to put on rubber boots that are nearly new, but no shine on them? A. There is no polish in the market for this.

(36) A. H. D. writes: Is there any particular quality of sheet rubber suitable to tie over top of dropping tube, the tube acting as a stopper to the bottle in which I keep nitric acid, C. P.? The rubber is continually exposed to the fumes from the acid from below, and becomes worthless in a few days. On similar bottles containing hydrochloric, sulphuric, and acetic acid, C. P., I have had the same rubber for over a year, and all are in good condition. A. A thin coat of paraffine on the exposed side would probably prevent the fumes from attacking the rubber.

(37) J. R. desires a formula for furniture polish, having previously bought from a peddler a receipt for which \$10 was paid, but which proved unsatisfactory. A. Try the following polish instead. Melt three or four pieces sandarac, each of the size of a walnut, add one pint of boiled oil, and boil together for one hour. While cooling add one drachm of Venice turpentine, and if too thick a little oil of turpentine too. Apply this all over the furniture, and after some hours, rub it off; rub the furniture daily, without applying fresh varnish, except about once in two months. Water does not injure this polish, and any stain or scratch may be again covered, which cannot be done with French polish. See also the recipe given on page 193 of SCIENTIFIC AMERICAN for March 23, 1885.

(38) J. F.—The material of which you send a specimen is undoubtedly valuable for the making of fire brick and crucibles; but as similar clay can be purchased at \$1.65 a ton at Perth Amboy, N. J., you could not compete with the New York market. If it can be disposed of locally, then it is of value to you, otherwise not.

(39) T. H. asks what will prevent blood from clotting or curdling? A. An aqueous solution of neutral salts, such as sodium sulphate or sodium chloride.

(40) H. C. D. asks how to prepare paper that will disintegrate or become soluble in water more readily than if it were not so prepared? A. By omitting

the sizing during the process of manufacture, you will obtain a product that will be more readily disintegrated than the ordinary manufactured article.

(41) C. W. S. writes: 1. I have a lot of unbleached gum dextrine which I have tried to make up. I have been partly successful, that is, I make the solution all right, but it is too dark. Would you inform me how I can make it look white? A. By filtering the solution through a layer of charcoal, the amount of coloring matter will be greatly reduced. 2. If bleached dextrine is as good as the unbleached, if so, what proportion is used, that is, what quantity is used to a given quantity of water? A. The unbleached dextrine contains more gummy material than the bleached. The amount of water to be used depends upon the consistency of paste desired, and it varies in different uses.

(42) H. R. B. desires a description of the cheapest and quickest process of making oxygen gas and condensing it into a liquid form. A. See "How to make Oxygen," contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 313. Its condensation into liquid form requires very expensive apparatus, and liquefied oxygen has no commercial uses. See the "Liquefaction of Oxygen and Hydrogen," contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 123.

(43) D. B. H. asks: 1. I am building a steam engine, 2 $\frac{1}{2}$ x 4 cylinder; what size flue, boiler, supply and exhaust pipes will be required to develop $\frac{1}{2}$ horse power? A. $\frac{1}{2}$ inch steam pipe, $\frac{1}{2}$ inch exhaust, 8 square feet heating surface in boiler. 2. How is soft solder made to use without acid or resin? A. Add a little bismuth to common solder.

(44) C. W. asks how etching on silver is done. Is it possible to do the same on copper? A. Coat the metal with wax and bite in the design with dilute nitric acid, for both silver and copper.

(45) J. H. K. asks the name of a cheap metal or substance that will expand most at a temperature of from 50° to 200°, and that will be less injured by repeated heating. A. After mercury, try zinc.

(46) H. P. asks (1) further particulars about the uses to which spirit of turpentine can be put for medical purposes. A. The application consists in rubbing it upon the parts afflicted. The quantity depends upon the nature of the complaint. 2. How can I obtain or make the feathers which act as springs under the smaller teeth of the combs of musical boxes? A. An ordinary feather is used, properly clipped, placed between the teeth of the comb, then glued and finally trimmed. The operation is exceedingly simple, but a little experience is necessary for satisfactory results.

(47) C. W. B. asks: 1. Is there any varnish to place on the inside of flower pots to prevent the moisture from coming through without applying heat? A. Use melted paraffine or a shellac varnish. 2. What would be the best varnish to apply on the outside of the pots over water colors? I want a varnish that is brilliant, will wash, and not blister in the sun. A. We would recommend you to use French varnish. A white shellac varnish or a colorless lacquer can also be employed.

(48) M. W. K. asks: 1. Is dust which accumulates in coal mines where hydrogen largely predominates in the coal explosive? A. It is; see "Explosions from Combustible Dust," SCIENTIFIC AMERICAN SUPPLEMENT, No. 166. 2. Rule for computing horse power of engine, the pressure and number of revolutions being known. A. See many former answers.

(49) M. C. A. writes: I have before me the following recipe for making artificial dextrine: 2 parts nitric acid to 300 parts of water, and mixing this liquid with 1,000 parts of dry starch. This mixture is then subjected to heat, or it may be produced by heating starch with diastase. What is diastase? A. It is a peculiar azotized substance contained in malt, which effects the conversion of starch, first into dextrine, then into grape sugar. 2. What proportions (in weight or measure) of the ingredients named above would be proper to use in making say 30 gallons or 240 pounds of dextrine? A. Dissolve 6 ounces nitric acid in 8 gallons of water, and mix with 200 pounds dry starch.

(50) C. F. D. asks: Do all animal oils when used in a steam cylinder with surface condenser form a chemical action injurious to the boiler? What chemical action is formed? A. It is not a chemical action that is feared. The oil gathers the dirt and loose scale in the boiler into a cake or cakes, which come in contact with the fire sheets and burn fast, causing the iron to become red hot and bulge. There is now no doubt of this being a fruitful cause of many explosions.

(51) W. B. B. asks the process and ingredients used in tinning iron or steel on bits, common spoons, etc. Also how to prevent dross from forming on articles immersed. A. The process is the same as in galvanizing with zinc. See SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 176, 92. To prevent dross, draw the work out of the tin through a clear surface.

(52) H. W. L.—All steam launches or boats of 5 tons and over must be registered by the nearest U. S. Inspector. The fee is \$5.00.

(53) H. N. B. writes: 1. I have a nickel plated telegraph sander, and it seems as if dust had settled down on it, and the dampness in the air made it adhere, till now it don't want to come off. A. The nickel plating is an electrical deposit, and is porous. The oxidation of the metal beneath shows through the pores. When nickel plating is done on iron and not burnished, the iron will rust and show through. You may be able to clean it fairly bright with chalk and water, rotten stone, and oil or rouge. Apply with a soft leather buff. 2. What is a fox wedge bolt? A. A fox wedge bolt is one in which the inner end of the bolt is split to receive a thin taper wedge, which tightens as the bolt is driven home.

(54) H. B.—There are a few locomotives in the United States that can haul one or two passenger cars at 80 miles an hour on a short spurt, but 60 miles an hour is very high speed for straight runs, and out of the question for a continuous trip of a hundred miles or over.

(55) T. L. R. asks for a flux to use in aluminum. A. Clean the surfaces well, and use paraffine, stearine, or balsam copaiba.

(56) D. S. asks for a description of the king snake, or house snake, and the superstitious reason why the Germans and Swedes keep them in their houses. A. The snake you refer to is probably the one generally called the "milk snake" in this country. It is described on page 38 of vol. iii. of the Natural History of New York. Its food consists principally of mice, insects, and other house vermin, and hence the probable reason of its being called "house snake." It is not poisonous, and therefore its presence around the dwelling would be quite desirable without any superstitious reason.

(57) P. C.—To soften the surface of steel for engraving, put the piece in a wrought iron box with clean iron filings, covering the surface to be engraved; fill up the box with clean white sand or ashes to keep out the air, and heat red hot for two to three hours, allowing to cool slowly. For hardening files, rub a little hard soap across the teeth to keep from scaling. Heat to a cherry red, and dip endwise in salt water. Then dip in hot fresh water to remove any salt on the teeth, dry over the fire, and slightly wet with linseed oil on a rag. To recover floating gold from the surface of water, gather in a fine muslin net or on a filler of blotting paper.

(58) R. W. B. asks: 1. Is it best to coat new leather belts with castor oil or any other oil? A. New belts should have enough dressing in them to last several months, unless they are getting very hard treatment. 2. The weight a beam would support, and the formula for finding the weight; length of beam 47 feet between the walls; size of beam 14 inches deep, 12 inches thick, with a post in center, and a corbel 8 feet long on the post under the beam. A. A safe load at the center of each span, with a deflection of one-thirtieth of an inch to a foot, is 5,724 pounds for oak, varying a little for different kinds of wood. For distributed load, 60 per cent more. Formula is as follows:

$$\text{Safe load} = \frac{\text{Breadth} \times \text{cube of depth} \times E}{\text{Square of the length}}$$
 E is coefficient for a deflection one-thirtieth inch per foot. For yellow pine, E=137; for white oak, E=95. For distributed load add 60 per cent to answer as by above formula.

(59) J. F.—As we have before answered in this column, a boat of considerable draught will float down stream faster than the surface current, because the middle of the current has been found to be moving faster than top, bottom, or sides. Friction of bottom and sides is one assigned cause, and unequal pressure due to depth is another; probably both together cover the whole phenomena. Ice boats in certain positions sail faster than the wind; see SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 54 and 61, for a graphic description.

(60) K. W. G. asks: What liquid or combination of liquids is the most sensitive to heat and cold, or which will expand the most when subjected to heat? A. Use alcohol, and color it by adding a little aniline if it is desired to use as a thermometer.

(61) J. L. G. asks the best method for preserving split or sawed oak-shingles, when used for roofing? If solution is to be used, the simplest means of using it, with a view to economy. A. The dipping of the shingles in preserving fluids is the simplest plan to adopt. Various fluids are used, and we would refer you to the recent report on the "Preservation of Timber," published in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 512, 513, 514, and 517, as giving the latest and best information on the subject.

(62) M. A. writes: Where sulphur is used as a bleaching medium, what will remove its smell and taste? A. The bleaching is done entirely by burning sulphur, and allowing the fumes to go up through the evaporator. Only a small quantity of sulphur is used, and by care any contaminating taste or odor is prevented. No other means are taken.

(63) G. L. asks: What kind of white paint to use for bird cages. A. White zinc ground in oil.

(64) J. G. writes: I have a quantity of cider which is through fermentation. I wish to bottle it, but it is not clear. Is there anything I can put in it to clarify it? A. To clear impure cider generally, take 2 quarts of ground horseradish and 1 pound of thick gray filtering paper to the barrel, and either shake or stir until the paper has separated into small shreds, and let it stand for twenty-four hours, when the cider may be drawn off by means of a siphon or a stop cock.

(65) J. S. desires some information of the new method of constructing artificial dentures that will hold firmly in the mouth without a plate at the palate. A. By a patented invention consisting of a thin metallic form, upon which may be made an upper or lower denture of any kind, size, or shape. The surface of the form has minute papilliform prominences, which, by displacement of mucus at the points of gum contact, effect surface cohesion as if the denture were glued to the gums, yet cause no irritation, and leave no marked indentations. By this device strong cohesion may be had with a narrow plate, and thus the sense of taste be left unimpaired. For vulcanite work proceed as usual until the flask is parted and rubber packed in the tooth part. Then cut a form to size and shape. Coat the cast with rubber cement.

(66) J. H. asks how to make safety matches. A. Dip the splints in a paste composed of chlorate of potash 6 parts, sulphate of antimony 2 to 3, glue, weighed dry, 1. The paste for the rubbing surface is amorphous phosphorus 10 parts, oxide of manganese or sulphide of antimony 8, glue 3 to 6, weighed dry. The ingredients must be thoroughly mixed, and care must be taken not to mix the chlorate of potash in the dry state with the other materials; it should be mixed first with glue dissolved in warm water. The paste for the rubbing surface may be spread with a brush or spatula on the side of the box. 2. How to make rye whisky? A. To 40 gallons proof spirit add 2 gallons peach flavoring, 1 pint white vinegar, and 12

drops oil of cognac in 95 per cent alcohol. Color with caramel.

(67) W. N. McA. writes: I have a steam launch 32 feet long, 6 feet 3 inches wide, and 30 inches draught of water. I have a 5 by 6 engine of first class make, and an upright boiler 30 by 50 inches. I am using 24 inch 2 flange wheel, made by the New York Safety Steam Power Company. I can make 250 revolutions per minute with 30 pounds of steam. This is of course no pressure for a boiler of that size, but with the wheel I have it is all the pressure I need for 250 revolutions, which I suppose is as high speed as is prudent. The hull is of white cedar and a most excellent model for speed, having been built for use in the navy to be pulled with oars. At 250 revolutions I make about 7 miles an hour. 1. Is it prudent to turn my 24 inch wheel over 250 revolutions, or had I better get a larger wheel, and one with more flanges, and would a 3 flange be better than a 2 or 4, and what pitch should I use in either case? A. You may increase your speed slightly by increasing the speed of the wheel to 300, but you will do better by using a 3 flange wheel of 26 or 28 inches diameter, with a pitch of 3 times the diameter, at the speed named. As you do not give the pitch of your wheel, we cannot decide as to its economy, only that a 3 blade of the same size would do better service. We do not recommend 4 flanges on wheel. 2. I am using salt water part of the time; can I use anything to prevent its injury to the boiler, and is it better to blow out while not in use, or had I better leave water in boiler? A. Leave the salt water in boiler, with as low salinometer indication as possible. When you lie up, blow out and pump up, so as to leave the water as fresh as possible while steam is on. This discharges the air from the water and lessens oxidation. 3. What is best application for outside of boiler to prevent rust? A. Rub the outside of the boiler often with oily waste. In a short time it will have an oil coat baked on, or paint with linseed oil and blacklead. 4. I wish to make hull 18 inches wider; can I "spon-sel" it without danger of dry rot, and would you advise that method of getting more beam? A. Would not recommend you to widen or spon-sel hull; you cannot better the lines, and may make a very clumsy, slow boat. 5. Which would give greater speed, a wheel of extra high pitch or one of a lighter pitch, provided both were turned same number of revolutions? A. There is a medium pitch, best suited to the ordinary form of launches. A high pitch is suitable for very slim, light boats designed for high speed only. A low pitch is better for boats of burden having full lines. If the size and pitch of wheel were conformable to the practical requirement for midship section and displacement in both cases, the high pitch wheel will give the best speed.

(68) O. W. asks the distance traveled by a column of mercury weighing one pound, contained in a tube one inch in diameter, between 0° (zero) and 90° Fah. A. By expansion a column 1 inch in length at zero becomes 1.008 inches, at 90° Fah.

(69) "Several Students."—In the table of saturated steam on page 708 of Haswell, you will find 147 as the atmospheric pressure corresponding with 212° temperature. To this add 15.3, the pressure above the atmosphere, giving you 30 pounds absolute pressure, opposite to which you will find in the table 250.4°, the next figure in the equation, which is the temperature at 15.3 pounds pressure by gauge. 100° means the temperature of feed. We think this will set you right in your problem. We have no information of the action of molasses on boiler scale, any further than the possible chemical interchange of elements between the vegetable acid of the molasses and the carbonates in the scale. If this is true, the lime will be disengaged as a powdered hydrate. Any other vegetable acid would be an equivalent.

(70) F. A. writes: With an alloy of tin and aluminum for the purpose of soldering aluminum, what flux should be used? One that will prevent oxidation of the aluminum. A. With soft aluminum solders, alloy of tin and bismuth, to be used with a soldering iron, or at a heat of from 300° to 400° Fah., use paraffine, stearine, Canada balsam, or vaseline. For the blowpipe solders of the alloys of silver, aluminum, and tin, use common salt in the same manner as jewelers use borax rubbed up on a slate.

(71) H. G. V. writes: I am running an engine 10x20 inches, 80 revolutions per minute, 75 pounds steam pressure. How much more steam will the engine require to run 160 revolutions per minute and do the same work? A. For increased friction and waste in clearance, probably 25 per cent.

(72) A. E. asks information as to the prospects of a machinist getting work in South America. A. There has lately been started a machine shop for repairing of river and ocean steamers at Para, Brazil; otherwise, Chili is the only State in South America that appreciates mechanics. Write to the Chilean minister at Washington.

(73) G. C. wants to know whether there is more weight on a brick at the bottom of a wall than there is on one half way up? A. Yes; every brick lends its weight to the one below it.

(74) T. H. B. writes: I want to raise stumps straight out of the ground by hitching a span of mules to end of rope passing over pulleys. How many and what size pulleys are needed to raise an oak stump 15 inches in diameter, and what size rope? A. Rope 1 inch diameter in a pair of 4 and 5 pulley blocks.

(75) W. L. C. asks: Will a wheel of 3 feet in diameter traverse an inclined plane in less time than one 1 foot in diameter? A. There should be no difference, except as from the friction of air or unequal density and surface exposed. The law of falling bodies covers this case.

(76) F. C. D. writes: I have a boiler two feet in diameter, four feet six inches high, with 39 1/4 inch tubes, and carrying about 80 pounds of steam; keep fire night and day, and use soft water well filtered. How often ought it to be blown off, and is blowing off sufficient to clean it, as it has no hand hole? I blow it a little every two days, and allow it to cool

off and blow it every two weeks. A. The boiler should have two hand holes, near bottom; you do not right to blow off often. Drawing the water off when the boiler is cold does not clear out the sediment. Better draw out the fire entirely when steam is up, and then blow out all the water as soon as possible. This tends to stir up the sediment and carry it out.

(77) G. A. M.—For brass bath: Dissolve together, in 2 gallons of water, 8 ounces sulphate of copper and 8 to 10 ounces of sulphate of zinc, to which add 90 ounces carbonate of soda and 15 ounces bisulphite of soda in solution of water. Stir with a glass rod and add cyanide of potassium until the liquor is clear. Settle and decant. Then add an excess of cyanide, 1 ounce, to improve conductivity of bath. For copper coating on embossed cards for matrix: Saturate the card with paraffine or beeswax, and cover the surface with blacklead, using a fine brush.

(78) E.—There are patented anti-friction boxes which are claimed to run dry at very high speeds. They are liable to become clogged with dust and abraded metal, when they lose their anti-friction qualities. Better use hard metal boxes with good oil, which is well tried and reliable.

(79) T. McM. asks: What is the largest engine in the world, for pumping purposes, and its capacity? A. Probably the one at the Lehigh zinc works, Friedensville, Pa. Its cylinder is 110 1/2 inches in diameter, with 10 foot stroke. It has raised 19,000 gallons of water a minute from a depth of 350 feet.

(80) J. W. H.—The best form of chimney is round, and about 20 times the diameter in height for large chimneys, and from 30 to 40 times the diameter for small chimneys. Chimneys should be adapted in size and height to correspond with the volume of heated products of combustion. There is a little work by Armstrong that will give you the figures, "Chimneys for Furnaces, Fireplaces, and Steam Boilers," 50 cents, which we can furnish.

(81) D. H. W.—We have answered similar questions many times. All parts of the periphery of a wagon wheel move with the same velocity around the axle. The top moves over the ground twice as fast as the axle; the bottom does not move. You may make it look rational by close inspection with both eyes and mind.

(82) W. D. P. writes: Given a locomotive traveling, does her piston head move backward as well as forward? A. Only in relation to the locomotive and its parts. Never goes backward in relation to the track, except when the wheels slip.

(83) O. B. desires some simple way to change the voice temporarily at a mask party. A. We know of no means other than practice. Sometimes removal of teeth or keeping something in the mouth will effect a slight change.

(84) G. S. B.—The pressure of gravity is the supposed cause of the condensation of the elements of planetary matter. In this gradual process the latent heat of the original gaseous and liquid matters is supposed to be developed and gradually radiated away into space. In mechanics, compression develops latent heat into sensible heat. This may be due to both decrease of bulk and molecular change.

(85) S. R. W. desires a receipt for dandruff on the head. A. Use a lotion consisting of two drachms borax dissolved in a pint of camphor water. Use once or twice a week. A solution of two drachms salts of tartar dissolved in a pint of tepid water is likewise recommended.

(86) W. B. J. asks how to make a canvas strop such as used by the barbers. A. Take levigated oxide of tin, prepared putty powder, 1 ounce, powdered oxalic acid 1/4 ounce, powdered gum 20 grains; make into a stiff paste with water, and evenly and thinly spread it over the strop. Another method consists of mixing fine emery intimately with fat and wax until the proper consistence is obtained in the parts, and then rub it well into the rubber strap.

(87) W. S. asks the best means to dissolve gum copal and amber to a varnish. And is there any vermilion made that is permanent in color? A. Fuse the desired proportions of the two gums until perfectly fluid, then pour in hot oil; let it boil until it will string very strong, and in about 15 minutes add turpentine. The best vermilion is the quicksilver vermilion, which can be procured from any dealer in dry colors.

(88) J. D. McC. asks if there is anything which will prevent a strong solution of potash alum from crystallizing. A. Dilute by the addition of water.

(89) L. M. K. writes: I made a pickle or brine in which I placed a quantity of well selected butter of splendid flavor, and covered the same in earthen vessels, leaving the brine at least 2 inches over all the butter. The brine I made as follows: Of clean water, Ashton salt, and a small quantity of saltpeter and white sugar; and on taking out the butter, it has a noxious, bitter taste. Will you be so kind as to tell me the cause, also the preventive? A. The bitter taste is due to the addition of saltpeter and sugar, which were not necessary. They can probably be washed out by the process described in answer to query 32, in SCIENTIFIC AMERICAN for September 12, 1885.

(90) L. W.—You may save from 5 to 10 per cent of the fuel in your heating arrangements by thoroughly protecting boiler and pipes with felt. Your self-feeder having taper sides allows the coal to wedge and form an arch. A straight magazine is better. A damper in the stove pipe is proper and safe if it has a hole in it, or is cut away on the outer edge so as not to shut tight and discharge gas into the house. The check door is also in common use, with automatic regulator, and is considered good.

(91) W. E. D.—Milk weighs so very little more than water that it requires a careful measurement to judge it by weighing a quart. It seldom weighs as much as 35-1000 more than water.

(92) C. F. S. writes: I have two Reis tele-phones, but can't make them work. A. To make the

Reis telephone operate successfully, you will need a heavy battery and a very careful adjustment. By substituting the point or block of platinum for the carbon, you will be able to succeed better with your telephone.

(93) J. A. G. writes: 1. Is it true that moist air is lighter than dry air at all temperatures? A. Moist air is always heavier than dry air at the same temperature. 2. Is not moist air that is cooled to the dew point heavier than unsaturated air at the same temperature? A. Yes.

(94) T. F. T. asks: In improvements in electromagnets, what is the object of having hollow tube? Why is there more power than a solid core? A. The principal object in making electro magnets hollow is to avoid the Foucault currents. We doubt if a magnet with a hollow core has more power than a properly constructed magnet with a solid core.

(95) O. W. asks: Will you please inform me how to make a cheap electric battery? I have three glass jars about seven inches high and the same number of inches in width. A. Consult SUPPLEMENT, 157, 158, and 159, for information on the construction of batteries.

(96) H. E. H. asks: 1. Can a spring motor like those described in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 142, 146, 147, 148, and 150, be made to propel a small boat (a Barnegat sneak boat, about 10 or 12 feet long)? A. Probably a spring motor could be arranged to drive a small boat for a short distance; but we think it would be easier to row the boat than to wind the motor. 2. Can you give me the address of any one that could make the motor for me? We do not know of any one regularly engaged in the manufacture of spring motors. 3. Do you think the motor advertised by the Electro Dynamic Co., of Philadelphia, in SCIENTIFIC AMERICAN EXPORT EDITION for September, 1885, page 206, would do? I want to use this boat for fishing and hunting. A. It is hardly large enough for your purpose, but possibly the same company can provide you with an electric motor which would answer.

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

F. H.—The specimen sent has the appearance of being a piece of clay iron ore, whose surface has been worn by glacial action in past geological ages.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted February 23, 1886, AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

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Amalgamating pans, attachment for, J. A. Bidwell.....	336,692
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