Notes & Queries

M. E. W. can remove fruit stains by using the means described on p. 283, vol. 31.—E. G. F. will find full directions for mounting maps on p. 91, vol. 31.—T. A. R. must send a sample of the paint, before we can tell him what it contains.—W. S. V. will find directions for polishing shells on p. 122, vol. 27.—W. L. will find that we published a recipe for a copper dip on p. 90, vol. 31.—G. W. E. Jr. will find the formula for safety valves on p. 107, vol. 31. For information on small boilers, see the same page.—Y. will find directions for mitering frames on p. 342, vol. 30. For polish for walnut wood, see p. 315, vol. 30. For filling, see p. 347, vol. 31.—E. M. will find a recipe for coloring gold on p. 43, vol. 30.—M. will find the needed information as to removing superfluous hair on p. 229, vol. 28.—G. R. will find recipes for colored fires on p. 219, vol. 31.—J. C. S. will find directions for making marine glue on p. 43, vol. 32.—G. G. will find descriptions of Puscher's and other methods for painting on zinc on p. 116, *Science Record* for 1874.—A. P. will find a recipe for boot blacking on p. 45, vol. 31.—W. L. D. will find directions for making cement for joining glass on p. 379, vol. 31, and p. 90, vol. 30.—E. A. N. will find directions for making molds for plaster casts on p. 58, vol. 24.—P. W. will find a formula for calculating the size of a cylindrical vessel on p. 281, vol. 25.—G. W. R. will find a recipe for metal for models on p. 11, vol. 31.—R. V. T. will find a recipe for waterproof shoe grease on p. 155, vol. 26.—C. A. K. will find directions for nickel plating with a battery on p. 171, vol. 30. Mucilage is described on p. 202, vol. 31.

(1) C. W. M. asks: How can I make varnish for gilt work? A. Take gum lac 125, dragon's blood 125, annatto 125, saffron 32 parts. Dissolve each resin in 1,000 parts absolute alcohol; two separate mixtures must be made with the dragon's blood and annatto, in 1,000 parts of such alcohol; and a proper portion of each should be added with the gamboge to the varnish.

(2) M. H. K. says: I am putting up a short line of telegraph wire; on account of difficulty in getting a good ground connection, I think of using two wires. Can you tell me how to join them, cable fashion, in some simple and inexpensive way, so as to get the benefit of their united strength for some long stretches? I must secure insulation properly. A. Use steel wire covered with kerite for your wires, and you will have both strength and insulation. 2. My battery consists of carbons, porous cups, zincs, and containing vessels. What is the best and most lasting solution to use in them? A. For your battery, use nitric acid in the porous cups, and sulphuric acid diluted with ten parts of water for the solution containing the zinc.

(3) A. F. asks: What metal would answer best for covering the frame of a bread-delivering wagon, to carry the warm bread and leave it unaffected? A. Metal would be unsuitable. Painted cloth is usually employed for the tops of bread wagons.

(4) J. C. C. asks: 1. If I start from New York at noon of May 25, and travel westward, keeping exact pace with the sun, and I meet a man every ten miles, where will I meet the first man who will tell me it is noon of May 26? A. In longitude 180° west from the place in which time or longitude is reckoned.

How is the diurnal revolution of the earth demonstrated by the vibration of a pendulum? A. If a pendulum is set swinging in a north and south plane, at any place other than the equator, the plane of swing will be shifted.

(5) J. W. asks: When were surnames first used? A. Among the Romans, date unknown. They were used about A. D. 900 in France; and in England in the time of Edward II.

Why does plunging red hot steel into water make it harder, when the same process makes copper softer? A. It has never been satisfactorily explained.

What would be the length of the longest board, 3 feet wide and square on the ends, that could be placed diagonally across the floor of a room 12x16 feet? A. In general, a problem of this kind can best be solved by approximation. The solution would occupy too much space for insertion here.

(6) I. Z. asks: Can very thin sheet iron scraps be used for making iron bars by the usual process for making bars with the common scrap? A. Yes.

(7) T. A. G. says: 1. I have a small engine, ¾x2 inches stroke. Can it be made to run a sewing machine? A. Yes. 2. How large a boiler would it take to run it for 5 hours at a time, the boiler to be made like a kettle and hang down in a small arch made on purpose? A. It should hold from 15 to 20 gallons of water. 3. What would be the best metal for such a boiler? A. Copper.

(8) S. J. says: I have a plan for the purpose of propelling a balloon. How much weight will a cubic foot of gas, such as is used for the purpose, raise? A. A cubic foot of gas will not raise any weight; but if it weighs less than the air, the latter will exert a lifting force equal to the difference of weight between equal bulks of the air and gas.

(9) R. A. B. says: In No. 18 you recommend a good heater and frequent blowing. What do you consider frequent blowing? A. It will depend upon the quality of the water, and the way the boiler steams. In ordinary cases, twice a day will answer.

In No. 59, same date, the last equation is: $v = 8 \cdot 025 \times \sqrt{\frac{h}{F}}$. I cannot read the fraction with certainty; please put it in words. A. Divide the light by the friction, take the square root of the quotient, and multiply it by 8·025.

(10) G. S. asks: What is power? A. The amount of work done in a given time.

(11) J. G. A. asks: What is a good method for curing and drying figs to be put up in boxes? A. In the East, they are dried in the sun, or occasionally in ovens.

With what can I varnish a paper balloon, so that it will hold hydrogen gas? A. Boiled linseed oil.

(12) E. P. C. says: I am running a high pressure propeller with a cylinder 20x20 inches. The main valve has ⅛ inch lead and ⅝ inch lap on the steam side; but when the valve is in the center of its stroke, the exhaust port opens into both steam ports ⅛ of an inch. Do you think that, if I put two strips in the exhaust port of the valve to fill up the clearance, it would be an improvement to the engine? If so, how much would you advise me to put in? The engine makes 106 revolutions with 80 lbs. of steam, following half stroke. A. Put in enough to keep the exhaust open for about ¾ of the stroke.

(13) G. B. asks: 1. How is roofing tar prepared, to be used with paper and gravel? A. See the specifications of patented processes. 2. For what purpose is the gravel put on? A. To give consistence.

(14) E. A. asks: Would the draft of a street car be increased by connecting the whiffletree at 24 inches from the front of the car, instead of at 12? A. If the line of draft were parallel to the plane of the rails, in the two cases, there would be no difference. If this line were oblique to the plane of the rails, the draft would be easier for that position which had the greatest component of force resolved in a direction parallel to the plane.

(15) D. N. asks: How can I calculate the extra pressure of steam above the pressure in the water cylinder of a steam pump? I want a steam pump to throw water at 180 lbs. pressure per square inch; and if the water cylinder is 14 inches in diameter (area nearly 154 inches), 154×180=27,720, total pressure in pump; and if the steam cylinder is 24 inches in diameter, and the steam 62 lbs., the area is 45·2×62=2803,024, which is a little over the total pressure in the pump. If they were both alike, the pump would stand still. How can I calculate how much extra pressure it will require to drive it at 50 or 100 strokes per minute? A. It is a matter that can only be determined by experiment, and the constants will vary for different kinds of pumps. The simplest way to make the experiment is to take indicator diagrams from the steam and water cylinders of the pump.

(16) G. A. M. says: We bought an engine, and it is claimed that it gives 3 horse power without using steam power high enough to make it dangerous. The boiler is upright, with one flue 7 inches in diameter; while the diameter of the shell is 23 inches, and hight 5 feet from ash pan to top of dome. The thickness of shell is 3-16, and the shell is of very pure iron. The boiler leaks with 80 lbs. steam. The engine is vertical, standing on separate base. The cylinder is of 3 inches diameter×4 inches stroke, making 200 revolutions per minute, with a plain slide valve, cutting off at about ⅞ stroke. Engine exhausts into smoke pipe. I cannot make this nearly 3 horse power by any rule you have ever given. A. We scarcely think that the engine is working up to 3 horse power.

(17) D. K. says: D. S. T. says that he has been running for 18 months an engine with 10x16 inches cylinder, and some of the bolts that hold the face plate to the steam chest and the cylinder head are being cut away as if by acid. You reply that it was probably caused by water being carried over with the steam. I have been running 8 and 10 inch engines for the last 12 years. I have had considerable trouble of the same kind, but I do not think that it is caused altogether by wet steam. I am now running two engines from one boiler; the first engine is in the same house as the boiler, and has a short steam connection. About 18 months ago, I commenced using tallow as a lubricant in the cylinder; and after using it about six months, the pistons began to leak steam. On taking off the cylinder head, I found that the rings on the piston did not fill the cylinder, being too small in diameter. On taking the follower off the piston, I found that the bolts were half eaten away on the part that passed through the follower; and the whole surface of the inside arm, and inside surface of the outside ring, together with the whole inside surface of the piston head, which was exposed to the action of the tallow, were eaten away very badly. The surface of the metal seemed to be dissolved, so that I could scrape a portion of it away with my thumb nail. I then cleaned all the dirt off the piston, and packed between the rings with tin until the outside ring was large enough to fill the cylinder, put them to their places, and put a ring of tin against the edge of the rings so that the followers would press against them. Then I put the follower on, with new bolts, and started the engine, using lard oil as a lubricant for about six months. Then I examined the piston again, and found that it had not been eaten away at all. A. This is very useful information on a subject to which we have frequently called attention before, namely, the evil effects of the acid and other deleterious ingredients in impure tallow. Good tallow, so far as our experience goes, does not injure an engine; but it is so difficult to obtain the pure article, that many engineers prefer (as our correspondent does) to use oil, and we think that their precaution is a wise one.

(18) D. I. F. says, in reply to J. C. & Co., who asks how much should the tail end of a 20 foot bolt be lower than the head: All first class millers claim that ¼ inch full to each foot in length is enough. A. We are much obliged for this information, which will doubtless be useful to many of our readers. We would be glad to hear from other millers.

(19) H. B. I. says: On p. 10, vol. 31, J. G. H. says: "To run a saw mill, we have an engine 14x36 inches stroke with an 8 feet driving wheel, belting to a pulley on the main countershaft of only 3½ feet diameter, surface 15 inches. This pulley is so small (in order to give the necessary speed) that the belt will slip. Can we (by putting in another countershaft) improve the mill by belting from the engine and then to the present countershaft, thereby giving an opportunity to increase the pulleys to a size that will prevent slip? The engine is said to be 60 horse power. It is argued that this extra shaft would take so much more power that the engine would not drive the mill. Can you tell us about how much power it would consume to drive this extra countershaft, it being about 8 feet long?" To which you answer that the change would be a decided improvement, and, instead of a loss, more of the power of the engine would be utilized than at present. For this I cannot see any reason. The difficulty seems to be that the transmitting power of his main belt is not sufficient either for the strength of his engine or the work he has to do. How is he to increase the transmitting power of his belt by only enlarging his leading pulley, or by adding two wheels and a shaft to his already overloaded belt? In my practice, I have found that a 15 inch belt will sometimes slip when driven by a 14x18 engine and 8 feet driving wheel, which, with twice the number of strokes per minute, would transmit double the power that his arrangement will. I would recommend, therefore, that, if he must use a 36 inch stroke engine, and cannot get a 16 foot driving wheel in, he put on two fifteen inch belts side by side, if he has room to increase the width of his pulleys sufficiently. For a circular mill, I use a 14x18 engine and 8 feet driving wheel, or 14x13 and 6 feet driving wheel, with a 15 inch belt. For some years past I have recommended these dimensions, preferring the latter, and with no countershaft at all for either of them. They make a cheap, simple, and powerful mill. A. The reason for the advantage would be that he could use larger pulleys. If you run a large pulley at the same number of revolutions per minute as a small one, the velocity of the belt is greatest in the first case; and as the same power is transmitted as before, the tension of the belt does not need to be so great.

(20) G. M. B. asks: How can I construct a receptacle in a garret for water from the roof of a house? It must not let the water be frozen in winter or spoiled in summer. A. Make your garret tight; and the water in an ordinary tank of 2 inch plank, grooved, dowelled, and lined with sheet lead, will not freeze in an occupied house, nor spoil in summer, if well ventilated and occasionally used. Make the tank broad on the floor and not very high, and place it where there may be some support beneath the floor.

(21) N. C. P. asks: If I take two screw-drivers with similar points and handles, and one of them is 6 inches longer than the other, I have more power with the longer, and can turn a screw with it that I cannot with the short one? Why is this? A. It is because a screw driver is generally inclined somewhat, when in use, so that, in the case of the long screw driver, the force acts at the end of a longer lever arm. If both tools were secured so that they had to be held at right angles to the plane of the work, one would be as efficient as the other.

(22) G. B. asks: How is roofing tar prepared for use, with paper and gravel? A. Spread the paper upon the roof and secure the edges with large tacks; heat the tar in an iron vessel and spread it upon the paper when in a fluid state; before the tar cools, apply the gravel, the coarser size first and then the finer. The gravel must be washed clean before being used.

I propose to construct a henery, which I wish to ventilate. The uprights are to be ceiled on both sides, and the roof also. There is to be no plate on the uprights; there will be a space between the uprights connected with a cupola, through space between rafters, which I wish to use for the ventilating shaft. Where should the openings in said shaft be? A. Make small openings both at top and at bottom, and be careful to have openings to admit fresh air direct from the outside, which openings may be at bottom. You will require some plank ties across the building at the eaves to prevent the roof from spreading.

(23) J. M. H. says: Our city reservoir is situated at a distance of 2½ miles from my office; there is a fall of 250 feet. The water enters the building through a 1½ inch (inside) pipe, but escapes through a short nozzle (⅝ inch) opening, turning an enclosed water wheel, escaping thence through a 5 inch pipe. Now under the most favorable conditions, namely, a perfectly straight pipe or connections from reservoir, how much water can pass through this ⅝ inch opening per hour? The city meter charges me 15,000 gallons daily. The 1½ inch pipe connects with street mains, distant about 100 feet. A. You omit to state two of the most important elements required in a calculation of this kind; first, the size of the main pipe, which is 2½ miles long, and second, the extent to which it is tapped to supply other buildings before it reaches yours. Friction in pipes is a very material impediment to the flow of water, and increases inversely to their size; and of course every tap reduces the pressure. But none of these conditions would have to be regarded, provided the flow of water at the nozzle was determined by experiment. Note the quantity discharged, say for the first fifteen minutes of each hour of the day, and divide the

sum by the number of hours taken; the quotient will be the average flow per quarter hour, and from this the discharge per day may be correctly ascertained.

(24) R. R. S. asks: How can I join the facia and crown at the foot of the rake and side rafter, where they are in line, and the foot of the rafter is cut square? A. We presume the difficulty arises from the fact that the facia or corona of your raking cornice is vertical on the face, and that of your level cornice is inclined on the face at a right angle to the pitch of the roof. Where the upper line of your crown molding on the rake meets that of the crown molding on the level cornice, commence a regular miter, returning the raking cornice in toward the building on a level, but with the facia set at right angles to pitch of roof; then let the level cornice of the building die against this return, which it can do, leaving a small triangular piece of the return exposed, and still have the upper line of its crown molding on a line with that of the raking cornice. If we have rightly comprehended your difficulty, this will be a solution of it.

(25) H. E. E. says: A neighbor has a water mill, with brick walling. I think common mortar was used, and the walls leak. What kind of cement is used in cementing cisterns, and how can I mix and apply it to this wall? Must we turn off the head of water and wait till the wall is dry, or can it be applied while wet? A. Sylvester's method for expelling moisture from external walls consists in using two washes or solutions for covering the surface of brick walls; one is composed of Castile soap and water, and the other of alum and water. The proportions are: Three quarters of a pound of soap to one gallon of water, and half a pound of alum to four gallons of water; both substances to be perfectly dissolved in the water before being used. The wall should be clean and dry, and the temperature of the air should not be below 50° Fah. when the compositions are applied. The first, or soap wash, should be laid on when at boiling heat with a flat brush, taking care not to form a froth on the brickwork. This wash should remain twenty-four hours, so as to become dry and hard before the second (alum) wash is applied, which should be done in the same manner as the first. The temperature of this wash may be 60° or 70°, and it should also remain twenty-four hours before a second coat of the soap wash is put on; and these coats are to be repeated alternately until the wall is made impervious to water. This process was adopted by William L. Dearborn, C. E., on the brick face walls of the gate house of the 86th street reservoir, in Central Park, New York, where an infiltration had shown itself; the application was successful, the walls proving impervious to the entrance of water under a pressure of 36 feet head, and they remained so for 6½ years when reported by him in 1870. In an experiment, four coatings rendered the bricks impermeable under the pressure of 40 feet head.

(26) W. B. C. asks: What is the simplest method of smelting lead ore, containing some silver and copper? A. The galena is smelted in a reverberatory furnace and the pig lead is remelted and refined, the silver being extracted from the pig lead and not from the ore.

(27) J. J. K. asks: How can I polish tinware? A. Rub with rottenstone and sweet oil, and then with soft leather.

(28) G. T. L. asks: What makes corn pop, that is, burst open and swell up to a white, spongy mass? A. The conversion of the water (contained in grain) into steam.

(29) J. S. asks: How can I make soluble blue, for laundry use? A. Grind indigo into an impalpable powder, and make into a paste with powdered starch.

(30) P. L. V. H. asks: Which was the first steamship that crossed the Atlantic? A. The Savannah, in 1819 built by Crocker and Fickitt, of New York city.

(31) M. D. H. asks: 1. What do scene painters use for sizing canvas? A. Try a thin glue size. 2. With what are the colors mixed? A. Water, size, and turpentine. Use the ordinary pigments. 3. What is a good work on the art of painting in water colors? A. Rowbotham's.

(32) C. K. asks: What substance is used to harden lithographic crayons? A. Melt them up and add a little shellac.

(33) L. K. Y. asks: Of what shape is the Leclanché battery, and of what metals and chemicals is it composed? A. See p. 362, vol. 31.

How can I make a fine powder to give burnishers a high polish without scratching them? A. If you refer to agate burnishers, use putty powder or tripoli.

Please give me a recipe for solder for white metal. A. See p. 251, vol. 28.

(34) C. D. B. asks: How can I make gunpowder? A. Take crystalline flour of saltpeter, free from chlorine, 75 parts, refined sulphur in rolls 6 parts, willow charcoal 15 parts. Grind the sulphur and charcoal together, add the saltpeter, mix, damp, press into cakes, dry, and granulate.

(35) G. B. M. asks: Why do various text books give different melting points for the metals? A. The melting points of the various metals have not been satisfactorily determined, for which reasm there are several authorities. Wagner's "Technology" is a recent work, and is probably as good an authority on the subject as can be consulted. Watt's "Chemical Dictionary" will give you several melting points for each metal without specifying the most reliable. In such case each person must satisfy himself, by the estimation he holds of the several experimentors and the general character of their work.

(36) A. B. C. says: I have a thick coat of a blue color, which has gone quite rusty in places. What shall I do to get it to its proper hue? A. The best method would probably be to have it dyed.

(37) P. B. P. asks: How can I make an ormolu dip? A. Brush on a thin paste of nitrate of potassa, alum, and oxide of iron, colored with any soluble pigment.

How can I make a solution of sal ammoniac? A. Sal ammoniac (chloride of ammonium) is quite soluble in water.

What is gray iron? A. The lower grades of cast iron are so called from their grayish color.

(38) E. S. V. asks: 1. What is a good method of keeping ink from freezing? I have tried placing alcohol one quarter inch thick all around the bottle, but it freezes through it. Is there any substance known, either in a liquid or a dry state, that is a perfect non-conductor of heat? If so, would it, if placed around a bottle of ink, keep it from freezing? A. There are no perfect non-conductors, but the loss of heat may be retarded by surrounding the bodies to be protected by wrappings of such excellent non-conductors as cotton, woolen, or similar fabrics. All such bodies of a light and porous character, including in their cavities air in a state of rest, are among the best non-conductors. 2. Why does not alcohol itself freeze? It certainly is not a non-conductor of heat, else it would not let ink freeze through it. If it be a conductor of heat, why does it not part with its own heat, and freeze up? A. Because its freezing point is lower than the temperatures to which it can be exposed. At a temperature of —166° Fah. it thickens, and at a still lower temperature would freeze.

(39) J. A. C. asks: How is copperas made? A. Protosulphate of iron (copperas, or green vitriol) is prepared by dissolving 1 part of pure iron (or 1½ parts of its sulphide) by the aid of heat in 1½ parts of oil of vitriol diluted with 4 parts of water. On filtering the solution quickly, it deposits beautiful, transparent, bluish green crystals on cooling. These effloresce in a dry air, and form a white crust, which soon becomes of a rusty brown color, owing to their absorption of oxygen.

What acid will eat iron the fastest? A. Nitric.

(40) W. D. K. asks: How is the fulminate put into the common copper cartridge? A. The fulminate is made into a thick paste, and the requisite quantity forced into the cap, which is then carefully and thoroughly dried, and covered with a coat of varnish to protect it from the weather.

Please give me a good recipe for coloring woolen cloth a permanent black. A. Wool is dyed black by the following process: It is boiled for 2 hours in a decoction of nut galls, and afterwards kept for 2 hours more in a bath composed of logwood and sulphate of iron, kept during the whole time at a scalding heat but not boiling. During the operation it must be frequently exposed to the air, because the green oxide of iron of which the sulphate is composed must be converted into a red oxide by absorbing oxygen before the cloth can again acquire a proper color. The common proportions are 5 parts nut galls, 5 parts sulphate of iron (copperas), and 30 parts of logwood for every 100 of cloth. A little acetate of copper is commonly added to the sulphate of iron, to improve the color.

(41) C. V. asks: Is there any known solvent for mica? A. The different forms of mica are double silicates of alumina, which contain in addition a small quantity of water and some alkaline fluoride. It is soluble in a mixture of hydrofluoric and sulphuric acids.

(42) J. B. & B. ask: What is the best powder or composition to use for polishing or burnishing German silver moldings? A. Putty powder is much used for this purpose.

(43) W. B. asks: 1. Are pure hydrogen and oxygen gas, combined, explosive? A. Yes. 2. How can I produce and combine them on a small scale? I have a solid piece of steel about four feet square and three inches thick. I wish to make an aperture in it about four inches in diameter. Can I, with the above gases, bring heat to bear on the spot, intense enough to allow of cutting through with a bit? A. The hydrogen may be obtained by the action of dilute sulphuric acid upon zinc scraps, in a close vessel. The oxygen may conveniently be obtained by heating, in an iron or copper bottle, a quantity of chlorate of potash mixed with one quarter its weight of black oxide of manganese (powdered). Perhaps the best instrument for your purpose would be the ordinary concentric oxyhydrogen blowpipe, in which the oxygen is made to enter the center of the hydrogen flame, something on the principle of the argand burner, only on a very small scale. The action of this flame on your steel plate would be to speedily burn its way through the plate.

(44) F. P. L. asks: 1. What is used in giving canvas for oil painting the first coat? A. The filling or ground is generally made by painting the canvas with coats of thin oil color, which must completely cover the threads of the fabric, which latter must be free from projecting lines and knots. The color of the filling is a matter of great importance, as it is impossible to paint a richly colored picture on a dull, unsuitable ground. Upon the whole, a white filling is to be preferred, but inexperienced artists are apt to produce a cold and poor effect on a white ground by laying on the colors unskillfully. Pale cream and warm drab are other colors much used for filling canvas. 2. What will keep the canvas from wrinkling after the first coat is applied? A. The canvas must be strained on a wooden frame before any filling is put on.

(45) W. F. H. asks: How can I bleach or whiten leather that has been tanned in the ordinary way, without injury to the material? A. It is doubtful whether this can be accomplished, as the same agents which will preserve the coloring matter will affect the leather.

(46) F. C. R. asks: Will wine keep its natural flavor if shipped across the Atlantic Ocean? A. Wines are sometimes improved by an ocean voyage.

(47) J. G. M. & Co. ask: How can we lacquertin to a blue color? A. Use Prussian blue ground in pale shellac varnish.

(48) I. L. asks: What is the best flux for reducing photographer's waste? A. Carbonate of soda.

What is a good method of japanning tin, for use for outdoor signs? A. Grind the pigment of the required color in shellac varnish.

(49) J. C. asks: 1. Please give me a recipe for making stove polish. A. Use finely powdered graphite. 2. How can I make a stove polish which, applied with a brush, produces a gloss while drying? A. Fuse 2 lbs. asphalt in an iron pot, add 1 pint boiled oil; mix, remove from the fire, and add a little turpentine when cool. Some makers add dryers.

(50) R. K. says: I have a lot of leaves for making manure. Can you tell me of anything to mix with them, to make them rot faster than water and wood ashes? A. A certain degree of moisture and air is necessary; and hence the gardener should turn the heap over frequently and apply water when the process appears impeded, excluding rain when the heap is chilled with too much water.

(51) W. H. B. asks: What is meant by "proof," in connection with alcoholic liquids? A. Alcohol is said to be proof when, at 60° Fah., it has a specific gravity of 0·92. If above this gravity, it is said to be below proof.

(52) A. B. W. asks: What is a vinaigrette? A. A small box or bottle, used as a smelling bottle, for holding aromatic vinegar contained in a sponge, or smelling salts.

1. Would not the drinking of vinegar (cider or wood) act as a disinfectant to the disagreeable odor given off with the breath? A. No. 2. Would such a remedy be healthy? A. If excessively used, no. 3. Would the effect be only temporary; and if so, about how long would it last? A. The effect would be temporary upon the breath; the period of its effect upon the stomach would vary with different constitutions. Bad breath is generally due to one of two causes, unclean teeth or imperfect digestion (dyspepsia). Cider vinegar certainly would not remove the first cause, and the second would not be improved by it.

(53) B. H. S. says: You state that aqua ammonia will take nitric acid stains out of cloth. I think you are mistaken; as I have tried it as soon as the acid has touched the cloth. A. If the coloring matter is not destroyed, aqua ammonia will in all probability restore it, as we have tried it hundreds of times with success. In case the coloring matter is destroyed by the nitric acid, neither aqua ammonia nor anything else can restore what is not there.

(54) S. W. C. asks: Having an iron safe, the fireproof material of which has broken loose, I wish to know how to replace the filling? A. Mix plaster of Paris with a strong solution of alum water, and use quickly.

(55) N. L. C. asks: Can you tell me of any substance resembling flour or corn starch that will always remain white after being sifted into gum arabic and exposed to the air? A. If otherwise suitable, some unalterable body, like finely pulverized barytes, would keep better than organic bodies such as corn starch, etc.

(56) F. N. B. asks: 1. Please give me a test for sulphur in well or spring water. A. Saturate a slip of paper with sugar of lead (lead acetate), and expose it near the surface of the water for a short time. If the paper is discolored, it shows the presence of sulphuretted hydrogen. Another method is to take a small quantity of the water, into which pour a small quantity of a strong solution of sugar of lead: the darkening of the water is proof of the presence of sulphuretted hydrogen. 2. Can water and sulphur be united artificially, to form what is known as "sulphur water?" A. Yes; sulphuretted hydrogen gas is very soluble in water, and may be obtained by the action of dilute sulphuric acid on sulphide of iron.

(57) C. B. asks: What is the cause of the sound on a cold night, imitating explosions of a light nature? I suppose it to be from the freezing of the ground. A. It is probably due to the freezing of the sap in green wood, such as the trunks of trees, etc., and is attributed to the expansion of the liquid on freezing, causing a rupture of the fiber.

(58) L. N. L. says: In the Agricultural Report for the year 1868, I find the following statement: "Wheat contains some lime, one ounce in a bushel of grain (and a little more in the straw), while it contains rather more soda than lime, about five times as much magnesia, nearly nine times as much as potash, and more than thirteen times as much phosphoric acid." Is this correct? A. We find that 100 parts of the dried grain give 2 per cent of ashes, and 100 parts of the dried straw give 4 per cent of ashes. In the following table you can compare the amount of the inorganic matters of the grain and straw. 100 parts of the ashes contain:

	Grain.	Straw.
Potash	30·02	17·98
Soda	3·82	2·47
Lime	1·15	7·42
Magnesia	13·39	1·91
Phosphoric acid	46·79	2·75
Oxide of iron	0·91	·45
Sulphuric acid	——	3·09
Silica	3·89	63·89
	99·97	100·00

The composition of wheat (grain), organic and inorganic constituents included, is: Carbon 46·10, hydrogen 5·80, oxygen 43·40, nitrogen 2·29, ashes 2·41. In an ounce of phosphoric acid, there are about 210 grains of phosphorus.

(59) A. W. asks: Which is the best acid for etching on lead? A. Use dilute nitric acid.

(60) G. F. P. says: I have seen very fine specimens of etching on lithographic stone, the hollows being as regular and even as though cut with a chisel. How is this accomplished? A. The design is transferred to the stone, which must be previously perfectly clean; the surface of the stone is then moistened with dilute nitric acid, to which a small quantity of gum arabic has been added to prevent the roughening of the stone.

(61) J. E. W. asks: What should I do with a canary that has lost his voice? He seems in good health, except that at times he will sit and pant as though he had some difficulty about his breath. A. We know of no remedy. We judge, from your description, that the bird has the asthma.

(62) R. M. asks: Are there any chemicals that will produce gas in a boiler fast enough to run a ½ horse power engine? A. No.

(63) C. H. C. says: In Dick's "Practical Astronomer" there is an account of a telescope invented by Messrs. Wilson and Rogers of England. It contains an intermediate glass called a corrector, composed of a plano-convex lens of crown glass and a plano-concave lens of flint glass, placed in the cone of rays that come from the object glass; it lengthens the focus to six feet, where a perfectly achromatic image is formed. Could I obtain a patent on such telescopes, or make them to sell, without a patent? A. C. F. Gauss, in his "Dioptrische Untersuchungen," 1840, says: "The dialytic telescope has, instead of the flint lens, a combination of flint and crown placed close together. This combination is not achromatic, as the violet image, if in the same focus as the red, is larger than the red. This defect is unavoidable, but it may be compensated by proper calculation of the oculars. But the dialytic lenses being movable toward the crown objective, the requisite difference of focus for each ocular may be attained." As the eye is not achromatic, the secondary spectrum of a good object glass is of slight importance. We cannot recommend the dialytic telescope as an object of study, but the usual forms might be profitably constructed.

(64) A. H. T. asks: How long should the focus of an eight inch objective lens for a telescope be? A. One hundred and fifty feet.

(65) R. D. asks: Will grapes grown in New Jersey serve for making raisins, and what is the process? A. A monthly report of the Department of Agriculture, of 1872, says: Several grape growers of California have succeeded in producing raisins of fine quality. Growers sowing a vineyard, on the foot hills near Nevada City, have produced, from 450 lbs. grapes, 150 lbs. raisins of superior flavor, claimed to be equal to the best Malaga, and worth 24 cents per pound. This furnishes a fine margin for profit, as it secures 8 cents per pound for grapes, which is a very remunerative figure for California. We think that the climate in the vicinity of New York is entirely too cold for the production of raisins.

(66) R. S. G. asks: 1. What is the latest and most approved method of generating oxygen gas? A. Heat together in a flask 1 part by weight of black oxide of manganese and 4 parts of chlorate of potash. 2. What is the proportion of carbonic acid gas to ordinary air, to produce asphyxia? A. Anything exceeding 4 per cent.

(67) H. D. asks. 1. Does the ordinary gun or rifle powder in use give perfect satisfaction? A. No. 2. Wherein is it defective? A. The principal objections are the large volume of smoke, and the incomplete combustion, which necessitates the frequent cleaning of the gun. 3. How does the white gunpowder injure the mechanism of guns, as it is claimed to do? A. Of this powder there are several grades, the highest and most powerful of which is not suitable for a gun or rifle powder; and if so used is injurious on the same principle that gun cotton, dynamite, or nitroglycerin would be if used for the same purpose.

(68) A. M. says: While viewing a drop of water, the size of a pin's point, through a microscope, the animalculæ gradually became motionless and dim, and upon examination I found that the water had evaporated and left a stain on the object glass, which I wiped away. 1. I would like to know what became of the animalculæ that I had seen in the drop. A. The animalculæ could not have evaporated; they undoubtedly remained upon the glass. 2. Did any remain in the little dry stain? A. We should say so. 3. Did I terminate their existence by wiping away that stain? A. Yes. You had only to examine the glass again with the microscope to prove the presence or absence of the animalculæ. 4. What book is best suited for an amateur microscopist? A. Beale's "How to Work with the Microscope" is one of the standard authorities, being plain, simple, and easy to understand. It fully explains all the requisite details.

(69) S. N. M. says, in answer to R. O. B., who asked: Is there any rule by which a person can find the radius when the arc and chord are given? There is no formulated rule, but I can tell how to find the diameter from the given data, if the arc is not greater than a semicircle. By taking pains and a day or two of time, a table can be calculated, showing the lengths of the arcs of any number of degrees and parts of a quadrant, corresponding to the natural sines in the common tables, when R=100,000, and also the ratio of a sine to the arc. Thus: 360°: 2Rπ:: any number of degrees and parts: length of the arc. Divide the length of the arc so found by the natural sine (of the tables); it gives the ratio of the sine to the arc. Example.—Given the length of arc=2·6; length of chord=2, to find diameter. Having made my table, I find this ratio, 1:1·3, to be the sine and arc of 70°. By the formula above: 360°: 6·2832(2Rπ) :: 70°: 1·22173, length of the arc, when R=1. Then $\frac{1{\cdot}22173}{{\cdot}93979}$=1·3=½ the given arc. Then 70°: 1·3:: 360° 6·6857=circumference of the required circle, and 2·128 its diameter. If the ratio of the sine to arc is

greater than 1:1·5708, the arc is greater than a semicircle, and indeterminate by this means. As the ratio of the arc to the sine increases slower in the first half of the quadrant than in the last half, the number of degrees may be approximately estimated by the given lengths of the ½ arc and ½chord; and by a few trials, the ratio can be found without going through the long process of making out a full table of the quadrant. A. This is not a new method, but is worth investigation.

(70) J. N. McC. says, in reply to several correspondents, who ask as to burning slack: "My experience is that slack requires the grate bars to be very open. I have always used the widest I could get, not less than an inch between the bars; I have used bars with openings of 1½ inches. The only secret in using it with any kind of a furnace is to have the grate bars open enough, so that the fire can be kept open from the underside of the grates, with the poker. Some coal, of course, will go through at first; but coarse coal or wood can be used to start with, and you must rake out what falls through the grate, and put it in again. The coal will soon take so that it will not waste. To build a furnace for the purpose, I would make it wider than usual, with doors in the side of the front, similar to furnaces for burning sawdust. For some varieties of coal, it will be found beneficial to wet the coal before throwing it into the furnace; it helps it to run together. Then put in the coal at the side doors, and let it alone till it cakes; then take your poker and roll it into the center of the fire. It will then be in large lumps and will not waste; and you will always have a good fire in the center. Never smother it with fresh coal."

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

R. B.—A very highly silliceous slate, perfectly compact and homogencous.—J. E. E.—Your specimen does not contain silver.

J. E. D. asks: How can I make cream candy for feeding weak colonies of bees during the winter? How is the granular condition of the sugar overcome?—E. W. H. asks: How are honey locust seeds prepared for sowing?—N. N. asks: Can you tell me how to color coral after it has been burned? —P. W. says: I have a tame frog which in summer lives on flies. What shall I give it in winter?

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On Steam Boiler Explosions. By C. R. C. and by S. G. H.
On Brass Bearings. By T. J. B.
On Utilizing Water Power. By H. C. K.
On a Cheap Locomotive. By F. G. W.
On Springs and Wells of Water. By ——.
On Tunneling. By J. H. S.
On a Flying Machine. By M. B. E. and by L. S.
On Phosphorus. By ——.
On Multiplication and Division. By G. B. G.

Also enquiries and answers from the following:

E. S. V.—K.—M.—J. B.—L. R. C.—W. H, L.—T. A. J. —P. B. S.—L. W.—I. E. N.—C. O'B.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Enquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of enquiries analogous to the following are sent: "Who makes balloons? Who sells machines for hulling barley, and also for grinding oatmeal? Where can machines for marking boxwood rules be obtained? Are there any makers of railway ticket printing machines in the United States?" All such personal enquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

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December 29, 1874,

AND EACH BEARING THAT DATE.

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DESIGNS PATENTED.

7,957 & 7,958.—SODA WATER APPARATUS.—G. F. Meacham, Newton, Mass.
7,959.—BUCKLES.—V. Price, Woodside, N. Y.
7,960.—STATUARY.—J. Rogers, New York city.
7,961.—MARTINGALE RINGS.—H. F. Corning, Hartford, Ct.
7,962.—PAPER, ETC.—B. Lawrence, New York city.
7,963.—STOCKING FABRIC.—W. Martin, Philadelphia, Pa.
7,964.—COAL SCUTTLE.—C. H. Morse, Rochester, N. Y.
7,965.—HEATING STOVES.—N. S. Vedder, Troy, N. Y.
7,966.—HANDLE TIPS.—H. W. Wright, Glastonbury, Ct.
7,967.—SAD IRON HANDLES.—W. J. Reagan, Royer's Ford, Pa.
7,968.—PEN.—R. F. Cannon, Lexington, Ky.

TRADE MARKS REGISTERED.

2,140.—LABELS.—Allen, Lane & Scott, Philadelphia, Pa.
2,141.—CIGARS.—Goldsmith & Newhurgh, Cincinnati, O.
2,142.—JET.—Holzinger & Bruckheimer, New York city.
2,143.—BITTERS.—V. Keck, New York city.
2,144.—CLOTHING.—A. Nicoll, Brooklyn, N. Y.
2,145.—CIGARS.—W. H. Romerman, Jacksonville, Ill.
2,146.—SHIRT BOSOMS.—S. Sibley, Boston, Mass.
2,147.—ROOFING.—A. H. Soden, Newton, Mass.
2,148.—CORSETS.—Comfort Corset Co., Boston, Mass.
2,149.—VARNISHES.—Hyatt & Co., Newark, N. J.

SCHEDULE OF PATENT FEES.

On each Caveat $10
On each Trade mark $25
On filing each application for a Patent (17 years) $15
On issuing each original Patent $20
On appeal to Examiners-in-Chief $10
On appeal to Commissioner of Patents $20
On application for Reissue $30
On filing a Disclaimer $10
On an application for Design (3½ years) $10
On application for Design (7 years) $15
On application for Design (14 years) $30

CANADIAN PATENTS.

LIST OF PATENTS GRANTED IN CANADA, DECEMBER 28 to DECEMBER 29, 1874.

4,205.—H. Smith, Hamburg, Waterloo county, Ont. Improvements in wind wheels, called "Smith's Improved Wind Power Wheel." Dec. 28, 1874.
4,206.—J. Tesseman and P. Smith, Dayton, Montgomery county, Ohio, U. S. Improvements in valve gear for steam engines and pumps, called "Improvements in Steam Pump Valve Gear." Dec. 28, 1874.
4,207.—F. P. Mackelcan, Montreal, P. Q. Improvement on a machine for pulling stumps, called "The Farmer's Stump Machine." Dec. 28, 1874.
4,208.—W. G. P. Cassels, Toronto City, Ont. Improvements in stoves, called "The Improved Water Evaporator." Dec. 28, 1874
4,209.—M. G. Wilson and J. H. L. Wilson, Sherbrooke, P. Q. Improvements in hollers, called "Wilson's Vegetable Boiler." Dec. 28, 1874.
4,210.—H. D. Gibbs, Batavia, Genesee county, N. Y., U. S. Improvements in devices for connecting the neck yoke with the draft poles of vehicles, called "Gibbs' Improved Neck Yoke Clasp." Dec. 29, 1874.
4,211.—F. H. C. Mey, Buffalo, Erie county, N. Y., U. S. Improvements on grain and malt dryers, called "Mey's Grain and Malt Dryer." Dec. 29, 1874.
4,212.—G. White, London Township, Middlesex county, Ont. Improvements on parts of carriages, called "White's Improvements on Carriage Axles, Springs, Shaft Couplings, and Tyres." Dec. 29, 1874.
4,213.—T. Gavin, Montreal, P. Q. "Ameliorationseaux boites a tamiser les cendres de charbon de terre, par Thomas Gavin," called "Improvements in Sifters for Sifting Coal Ashes." Dec. 29, 1874.
4,214.—D. W. Siprell, Rivière du Loup, Temiscouata county, P. Q. Improvements on rack reamers, called "Siprell's Improved Reamer." Dec. 29, 1874.
4,215.—F. H. Date, Niagara, Lincoln county, Ont. Improvements on the manufacture of illuminating gas, called "Date's Manufacture of Illuminating Gas." Dec. 29, 1864.
4,216.—C. M. Clinton and L. Wood, both of Itbaca, Tompkins county, N. Y., E. C. Gregg and C. P. Gregg, Trumansburg, Tompkins county, N. Y., U. S. Improvements in wheeled horse rakes, called "Clinton and Wood's Improved Horse Rake." Dec. 29, 1874.