Notes & Queries

J. G. B. ought not to remove the canceling ink from postage stamps, as it may lead to fraud. —G. S. can cleanse his iron for galvanizing by using the dip described on p. 107, vol. 31.—J. P. McC. can clean shells by following the directions on p. 122, vol. 27.—J. M. C. will find directions for casehardening on p. 202, vol. 31.—F. E. can deodorize butter by following the directions on p. 119, vol. 30.—F. W. K. can use rubber varnish for making waterproof cloth. See p. 11, vol. 32.—D. H. can separate silver from lead by the method described on p. 138, vol. 32.—G. M. will find a formula for thickness of a boiler on p. 155, vol. 32. Read Camus on the "Teeth of Wheels."—R. R. B. ought to know that no instrument can possibly point out where gold, silver, lead, etc., lie buried in the earth.—J. T. C. can dissolve pure rubber in benzine, naphtha, or carbon bisulphide.—D. can remove stains of iron rust from fabrics by the method given on p. 170, vol. 27.—H. B. can fasten leather to wood with marine glue. See p. 232, vol. 31.—J. A. W. can fasten chromos on thin canvas by following the directions on p. 91, vol. 31.—A. A. will find directions for separating aluminum on pp. 91, 116, vol. 32.—R. McA. can exterminate cockroaches by using the recipe on p. 43, vol. 31.—A. K. should consult Küstel on the "Nevada and California Processes for Gold and Silver Extraction."—W. A. P. can galvanize his iron articles by the method described on p. 346, vol. 31.—I. G. will find a recipe for a hair stimulant on p. 363, vol. 31.—G. E. K. Jr. will find directions for making a black walnut stain on p. 90, vol. 32—G. C. H. can make windowglass opaque by the method described on p. 264, vol. 30.—T. H. L. can utilize old rubber by the process described on p. 349, vol. 26.—J. S. F. can fill and polish his black walnut furniture by the method described on p. 315, vol. 30, and 347, vol. 31. —W. C. can render wood fireproof by the process detailed on p. 280, vol. 28.

(1) P. C. asks: What is the chemical reaction resulting from the adding of tartaric acid after bicarbonate of potash is added to butter? A. Carbonate of potash, being an alkali, neutralizes the lactic and butyric and other acids in the rancid butter, but the excess of alkali used has a burning taste. The tartaric acid added decomposes the potash salt, liberating carbonic acid, and the resulting tartrate of potash does not offend the sense of taste.

(2) S. R. asks: 1. For what particular purpose are lime and chalk used in the composition of soda glass? A. The addition of lime to glass diminishes its fusibility, while it increases its luster, but the addition of an excess of lime is apt to make the glass milky when cold, although it may be perfectly clear while hot. 2. What is the process that has been patented by a French gentleman for adding strength and elasticity to the glass? A. The agent of M. Bastie, the inventor, lately exhibited specimens of the glass at the office of the SCIENTIFIC AMERICAN, New York, and subjected the same successfully to the most remarkable tests. The process for treating the glass has not yet been made public.

(3) H. B. W. asks: How is rubber melted so that it can be run into molds? A. The rubber is simply rendered soft by passing between rollers heated by steam, in which state it is pressed into the molds.

(4) M. H. K. asks: What are the cheapest and best chemicals known, to be mixed together for use as a freezing mixture? To what degree Fah. will they descend, and what are the proper proportions to mix and use? A. One of the best, and one of the most economical, is the solution of sulphate of soda in commercial hydrochloric acid. Pour 5 parts of the acid upon 8 parts of the salt reduced to powder; the temperature may thus be reduced from 50° to 0°.

(5) G. E. K. Jr. asks: How can I remove oil stains from marble? A. First rub with benzine or turpentine, and then cover with powdered chalk or pipe clay and keep in a warm place for some time.

(6) E. M. D. asks: What kind of clay should I use to make crucibles? A. You do not state for what purpose you intend to use your crucibles. We cannot give definite directions unless we know. In order to render crucibles capable of withstanding great variation of temperature, several substances are used: sand, flint, fragments of old crucibles, black lead, and coke are used for this purpose. The most refractory crucibles are those made with pure clay, or such as contains little or no oxide of iron and is free from calcareous matter. The best clays contain the most silica, yet crucibles of pure clay are not absolutely infusible; and in the high temperature of a blast furnace, they sometimes soften so much as actually to fall into a shapeless mass. This defect can be somewhat remedied by mixing the clay with graphite or coke; either of these substances form a kind of solid skeleton, which retains the softened clay and prevents its falling out of shape.

(7) S. F. H. & Co. say: We have some leather lined with blue cloth, such as is used for carriage curtains. The color of the cloth is blue, and it rubs off. Can the color be made so as not to come off by applying a solution to it? A. Try dipping it into a solution of india rubber in naphtha.

(8) A. C. J. asks: Are the numerals and punctuation marks commonly used in telegraphy? A. The numerals are, but punctuation marks are not very generally used, except the full stop.

(9) S. S. W. asks: How long should locust seeds be boiled before planting? A. Take three times as much water as you have seed, by measure. Boil the water, and pour it boiling hot over the seeds and let them soak till the next day: then plant them. The plants are as tender as melons, and the least frost will kill them, so do not plant too early. Some of the plants will have thorns, and some not; save the thornless ones to plant for shade trees; the rest you can use for hedges or throw away, for they are too disagreeable to keep in a civilized community. Both the thorny and thornless plants are perfectly hardy, require no shelter after the first start, and are about the safest tree to transplant (at any age) that grows in this latitude; while their foliage and peculiar growth render them almost indispensable where variety is desirable.—H. H.

(10) W. Y. asks: What tools does a man need to run a small engine with? A. A hammer, an assortment of files, a flat chisel, a cape chisel, scrapers (¼ round and flat), a straight edge, an assortment of wrenches, a screw driver, and a belt punch.

(11) F. W. asks: In manufacturing our common red brick, is there any way of coloring them, either by glazing or mixing, to produce some pleasing tint, without adding materially to the expense? A. This can be done by facing them with a coloring preparation, as is now done in the case of encaustic floor tiles, but not without considerably enhancing the price.

(12) W. R. H. asks: How much greater is the resistance of the ordinary railroad rail, made of wrought iron, than that of a rail of the same size and length of Bessemer steel and of malleable cast iron, respectively, in respect to resisting the shocks or strains of locomotive or car wheels when in motion? A. The steel rail is about 1·5 times as strong as the wrought iron one, within the limit of elasticity. Malleable cast iron is not well suited to resist shocks.

(13) H. R. T. asks: Which is correct, "buhr stone" or "burr stone?" A. Both are correct, but "buhr stone" is the more usual way of writing it.

(14) R. C. M. says: I am putting in two 8x10 engines, to run together, and I wish to use cistern water. If I exhaust into a four inch pipe, extending from the cistern upward, and keep a small stream of cold water running through it from the second story, 10 feet above the engines, will it condense the most of the steam? A. This plan will not answer. Your best plan would be to use a proper condenser. 2. How will I get most power out of two 8x10 cylinders, coupled rigidly together or run independently and connected with one line shaft with belts? Part of the time I shall use only one cylinder for light work. A. It would no doubt be better to run them independently.

How can I ascertain the number and claims of a patent? A. Either by making a search of the records, or engaging some one to do it for you.

(15) A. A. asks: I have a steam heater of the following capacity, and desire to know what pressure it will stand without bursting. It is 18 inches long, 14 inches wide, 2½ inches deep and ½ inch thickness of the iron. The boiler pressure is 45 lbs. The pipe that connects with the heater is ⅜ of an inch in diameter, and is about 60 feet in length. The exhaust pipe is ½ inch in diameter, and is not quite free. A. Under the conditions stated, the heater will have sufficient strength.

(16) D. asks: Can the area of an octagon inside of a circle be ascertained with mathematical exactitude, if the diameter of the circle be known? A. Yes. It is composed of eight equal isosceles triangles, of which two sides and the included angle are known. The two equal sides are each equal to the radius of the circumscribing circle, and the included angle is ⅛ of 360°, or 45°.

(17) C. C. asks: In your issue of April 17, 1875, in answer to the following question: "At what power would you rate an engine that is 8 inches bore and 15 inches stroke, running at a speed of 20 revolutions with 80 lbs. steam": you say: At about 12 horse power. By what formula do you calculate this? Do you mean that thereal effective power of an engine under these conditions is 12 horse power? According to Roper's formula, as well as Haswell's, I should figure it at 36 horse power, with (say) 10 per cent off for friction, making about 32 horse power. A. We do not consider that either of these rules gives very correct results. Our answer was based on a personal knowledge of the actual performance of such engines. The answer referred to effective horse power. It is quite true that the rules you mention will give you true results, if they represent the conditions of actual practice; but in general they do not.

(18) J. W. asks: How many inches from the fulcrum must a ball of 12½ lbs. weight hang to give 30 lbs. pressure on the square inch on a safety valve $1\frac{3}{16}$ inches in diameter, the valve being between the fulcrum and the ball, with its center 15½ inches from the fulcrum? A. You can work it out for yourself by the aid of the following rule: Multiply together: (1) The pressure of steam, the area of valve, and the distance of center of valve from fulcrum. (2) The weight of the valve, and the distance of its center from the fulcrum. (3) The weight of the lever, and the distance of its center of gravity from the fulcrum. (4) Add together the products obtained by (2) and (3), and subtract the sum from the product obtained by (1). (5) Divide the difference by the weight of the ball.

(19) C. H. D. asks: I enclose you a photograph of a windmill which is erected on an eminence near York, Pa. It was built in 1870 by an ingenious German, and has been regarded as a curiosity, being the only windmill for many miles around. The sails are not constructed on the principle put forth in your recent article on windmills, but have a uniform inclination to the plane of revolution. They seem, however, to be very efficient, and I am informed that the power varies from 5 to 10 horse power, according to the velocity of the wind, the sails being 3 feet wide, and the diameter of the wheel 25 feet. The shaft is inclined to the plane of the horizon at an angle of about 6° and is arranged to swing around a vertical shaft, when the wheel is shifted to face the wind. The power is transmitted by a pair of bevel wheels, and is utilized for crunching bones. This windmill is a model of workmanship and utilizes a power which is certainly cheap. A. We have no doubt our readers will be interested in this account; for while it is probable that a wheel constructed with the proportions noted in our recent article would be somewhat more efficient, this is a little simpler to construct.

(20) P. F. asks: In a cylinder 6 feet high containing 6 cubic feet of air, how many lbs. pressure on the piston will be required to compress the air into 1, 2, 3, 4, 5 feet of volume respectively? A, If the temperature is constant, the pressure varies inversely as the volume.

(21) L. H. R. asks: 1. Can you explain the principle of the gyroscope? A: It may be explained generally on the principle that, though the force of gravity is constantly acting downwards, there are other forces with which the force of gravity is resolved. See p. 91, vol. 31. 2. Was there a marine governor built some time ago upon that principle? A. There have been several.

If a locomotive engineer be called upon to stop his engine as soon as possible, would it be advisable to shift the eccentric, thereby causing great resistance at every stroke, until the engine has stopped? A. It would be better to shut off the steam, and apply the brakes.

(22) J. W. H. asks: What is the difference in strength between an iron and a steel shaft, 4⅞ inches in diameter? How far will it spring without breaking, being 3 feet long between boxes? A. The steel axle will be about twice as strong. It would not be advisable to strain the shaft so as to spring it sensibly; and, though it might not break at once, it would take a constantly increasing set.

(23) M. P. S. says: We have a 60 horse power horizontal return tubular boiler, set in brick in the usual way. Length is 15 feet, diameter 54 inches, and there are 56 three inch tubes. At rear of boiler is a combustion chamber, 3x5 feet, and the chimney is on one side, at front of boiler. The heat passes under the boiler, returns through tubes, and passes through a square flue, 12x12 inches, into the round iron stack, 48 inches in diameter and 36 feet high. This stack is lined with brick for about 20 feet up, reducing the area to about 40 inches. The draft is sluggish, and the cast iron covering of the rear combustion chamber has given way with the excessive heat. A. We think the stack is too large, and you might improve matters by contracting it at the bottom.

(24) P. A. asks: What is the correct rule for getting an engine into line and squaring the shaft? A. Set up two lines, one parallel to the axis of the cylinder or through the cylinder, if possible, and the other perpendicular to the first, in the same plane. These are reference lines to measure from, to bring the shaft and guide into line.

(25) B. & C. say: 1. We are building a boat about 60 feet long and 20 feet wide, with a flat bottom and a light top, to be used as a trading boat on a small river. What engine power will be necessary? A, The boat is of a very bad model, and will probably require an engine of from 15 to 20 horse power. 2. Can the motion of a vertical engine be reversed? A. A vertical engine can be reversed by being fitted with a link, or with two eccentrics and hooks. 3. Can a propeller be used on a flat-bottomed boat to advantage? A. If you build such a boat, it would be better to propel it with a stem wheel.

(26) R. B. W. asks: Would a 12 horse power engine be sufficient to run a 65 saw cotton gin and a 30 inch grist mill? A. Not if they were driven up to their full capacity.

(27) D. S. S. says: I have a steel spring, 4 feet long, 1½ inches wide, and ⅜ inch thick, which was bent to its utmost for a period of 1 week, at the rate of 100 times a day. I find that it now retains a bend which weakens it. Is it impossible to make one that will always retain its natural straight position when left alone? A. All springs, however good, take a set in time.

(28) J. B. K. says: I claim that a balance wheel on an engine does not give additional power to the engine, but only regulates it and gives a steady motion. My opponent claims that the balance wheel gives the engine additional power. Who wins? A. You do. Your opponent appears to assert that the fly wheel has more power than the machine which moves it. If this were the case, it would be a very desirable kind of perpetual motion.

(29) R. H. McI. asks: What is the best cement or packing to use under a soft patch on boiler or in a steam joint? A. Red and white lead, to which fine iron filings may be added.

In a low pressure boiler, with mercury gage showing 15 lbs., is the actual pressure upon the piston 15 lbs. to the square inch or 15 lbs.+14¾ (the atmosphere) which (with the vacuum) is about 45 lbs. per square inch actual working pressure? A. The actual effective pressure is the total pressure above a vacuum on one side of the piston, diminished by the total pressure above a vacuum on the other side.

(30) B. B. B. asks: Will two hydraulic rams, with the same fall, with separate feed pipes, playing into the same landing pipe, work? If so, will they force up more water than one ram with the same fall? A. They would work satisfactorily, and, under favorable conditions, the two would deliver about twice as much water as one.

(31) F. A. C. says: 1. I have an upright boiler, 30 inches high above firebox, 15 inches in diameter, with shell and heads of wrought iron ⅜ inch thick, with 40 flues each ¾ inch in diameter. How great a pressure will it safely stand? A. If well made. you can carry from 150 to 175 lbs. of steam. 2. Of what power ought an engine for this boiler to be? A. From 1 to 1¼ effective horse power.

(32) J. N. C. asks: What is your opinion about the use of compressed air for street car locomotion in lieu of steam (or horse) power? What is to prevent the compressing of air into suitable receivers, attached to each car and made to contain air to last long enough for one trip? A. There are numerous difficulties in the way; but they may be overcome, as many inventors are turning their attention to the subject.

(33) R. A. K. asks: Of what dimensions should a boiler, engine, and propeller be, to draw a yawl 22 feet long and 5 feet beam, drawing 20 inches, at a speed of 6 miles an hour? A. Engine, 3x5; propeller, 2 feet in diameter and 8 feet pitch; boiler, 2 to 2½ feet in diameter, and 3 or 4 feet high.

(34) C. R. H asks: If I take a boiler, fill it full of water, and seal it up so as to have it properly airtight, and place a fire under the same, what will cause the boiler to burst? Will it be the expansion of the water, or the steam? A. As water expands rapidly by heat, it is probable that the boiler would be torn open long before the boiling point of water was reached.

(35) W. S. B. says: We have a machine called a cool air slasher, situated in a small room in the attic of our mill. The room is so small that, when the atmosphere outside is damp and heavy, we cannot dry our yarn. The air in the room is so moist that the beams and plaster overhead become wet. A ventilator on the roof, with a fan inside, is a benefit; but as moist air remains low and does not rise, I am thinking of putting a fan to one of the windows at the end of the room, the windows coming down to the floor. I will box in the window on bottom, put in a suction fan, and open the window at the bottom opposite the fan, more or less. Am I right? A. Your general idea is right: for if you cannot get a natural draft, you must create one, either by a heated flue or a revolving fan. It is probable that you might get over the trouble by the use of a well devised flue.

(36) J. B. S. asks: How is it that the wheels of a car are stationary on the axle while the wheels (of the same size) are going round a curve, the outside track of which is of course longer than the inside? A. One of the wheels slips in such a case.

(37) A. F. & Co. say: We have been thinking of using our exhaust steam by turning it into a tank containing cold spring water, thereby heating our supply water and saving fuel. We have been advised by experienced men not do so, as they say we should burn out our boiler in a short time; they claim that the grease contained in the exhaust steam would form into globules, which would sink to the bottom of the boiler and prevent the water from touching the plates, thereby burning them out, and that they know this by actual experience with lake water in Chicago. With hard water or water containing much lime, it might be feasible; but with spring or soft water, it would be disastrous. Are these opinions sound? A. There would not be much danger unless you use a very large amount of grease in the cylinder. In nearly all ocean steamers the condensed steam is used for feed water. With a proper oil cup, the amount of lubricant used in the cylinder is very small, and is as effective as a much larger quantity admitted carelessly. It is not well to use tallow in such a case.

(38) F. S. L. asks: Are not the cubic contents of a stick of timber, 12 inches square at one end and 18 inches square at the other, of a uniform taper, equal to one of the same length, 15 inches square throughout? And is not the answer No. 49, p. 251, vol. 32, incorrect? A. The answer is correct. The rule is as follows: Multiply together the area of the two bases, take the square root of the product, add the areas of the two bases; and multiply by ⅓ of the hight. If A=area of lower base, a=area of upper base, and h=altitude, then solidity $=\frac{(A+a+\sqrt{Aa})\times h}{3}$. Applying the rule to the given example, solidity $=\frac{2{\cdot}25+1+\sqrt{2{\cdot}25\times 1}\times 20}{3}$ $=31{\cdot}66+$.

(39) A. W. asks: What horse power are we using with an engine, diameter of cylinder being 15¼ inches, stroke 32 inches, revolutions 73 per minute, average pressure throughout stroke being $46\frac{1}{16}$ lbs.? A. Do you and many others who continually write to inquire the horse power of engines ever read our replies on the subject? We have published the rule in a dozen different forms, and have explained that, with the mean pressure as ascertained by the indicator, the indicated horse power can be calculated; but that the effective horse power can only be found with precision by a test with the friction brake or dynamometer. Once more: Multiply together the area of the piston in square inches, the mean pressure throughout the stroke diminished by the mean back pressure in pounds per square inch, and the speed of the piston in feet per minute, and divide the product by 33,000. If you can ascertain the pressure in lbs. per square inch required to overcome the friction of the engine—by subtracting this from the mean effective pressure, as determined by the indicator, and using the remainder for the effective pressure—you can calculate the useful horse power by the aid of the above rule.

(40) G. W. G. says: We have buried here (Galena, Ill.) one Lyttoa, whose friends claim that he was the original inventor of the paddle wheel, and the first to put it in practice. Is this so? A. No. The paddle wheel was used by the ancient Egyptians, and later by the Romans.

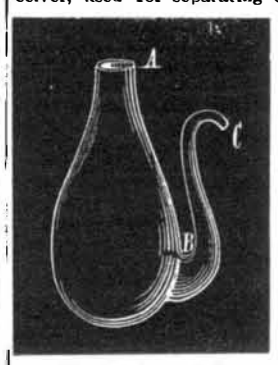
(41) L. K. Y. asks: Please give me a recipe to make a varnish to put on the outside of a silver plated cup, that I am going to gold plate on the inside; it must be thin and easily taken off. The object is to prevent the outside from being gold plated. A. Coat it with wax.

(42) G. M. H. asks: 1 Can a strong electric current be sent through successive coils of fine platinum wire for gas-lighting purposes? A. No. Can the current be divided at each platinum coil by some simple means, so that a part only may pass through the coil? A. Yes, by shunting the coil.

(43) B. R. H. says: 1. I have a mirror for a reflecting telescope, 14 inches in diameter, with a focal length of 12 feet 2 inches. I wish to construct a telescope on the Cassegrainian plan. 1. What ought the diameter of the small mirror to be? A. Two inches. 2. What focal length should it have? A. Sixteen inches. 3. What should be the size of the hole in the large mirror? A. Two inches. 4. How can I test the accuracy of the curvature of the mirrors? A. By trial on a drop of mercury in the sun. 5. Is there any other method than Draper's of silvering the surface of the mirrors? A. English method of silvering glass: Solution A: Nitrate of silver crystals 90 grains, distilled water 4 ozs. Solution B: Potassa, pure, by alcohol, 1 oz., distilled water 25 ozs. Solution C: Powdered milk sugar ½ oz., distilled water 5 ozs. A and B will keep in stoppered bottles; C must be made fresh and filtered. To silver an 8 inch glass speculum: Pour 2 ounces of solution, A, into a glass vessel capable of holding 35 fluid ozs. Add drop by drop, stirring with glass rod, as much ammonia as is just necessary to obtain a clear solution of the gray precipitate first thrown down. Add 4 ozs. of solution B. The brown-black precipitate formed must be just redissolved by the addition of more ammonia as before. Add distilled water until the bulk reaches 15 ozs., and add drop by drop some of solution, A, until a gray precipitate, which does not re-dissolve after stirring three minutes, is obtained; then add 15 ozs. more distilled water. Set aside to settle without filtering. Finally add 2 ozs. of solution C; stir gently and thoroughly in a round disk 3 inches deep and 2 inches larger than the speculum. Suspend the speculum face downward in the liquid, which should rise ¼ inch up the side. The mirror is attached to a wooden block by pitch at the back after wetting the back with turpentine.

(44) J. H. asks: Could a galvanic battery be made of sufficient current to stun birds, so as to catch them if they were to alight upon the wire? A. No.

(45) S. H. asks: What is a Florentine receiver, used for separating essential and other oils? A. A Florentine receiver is conical in form, and at the side is a spout, B C, communicating with the bottom, the orifice, C, of the spout being much lower than the mouth, A, of the receiver. The distilled product being poured into this vessel, the oil separates from the water, and occupies the upper part of the vessel. The water, as it rises above the bend of the spout, flows off at C, while the oil may be from time to time removed by means of a pipette.



(46) W. P. J. says: In the report of the Hartford Boiler Insurance Company, it is stated that common soda is as good an absorbent as anything. Does this mean sal soda, or carbonate of soda, or some other kind? A. Common washing soda.

(47) A. L. asks: Will a blowpipe drill a hole in the best safes manufactured? A. No.

(48) C. F R. asks: Can you give me a recipe for mixing dry pigment, as water colors, for painting on paper? A. Mix the pigment with water to a thin paste. Add pure gum arabic (heavy) sufficient, when dry, to make a soft dry cake, which may be used as a body color.

What can I put on drawing paper to make it transparent and still retain its smoothness and toughness? A. See p. 208, vol. 32.

What is the heaviest metal? A. Platinum is (with the exception of iridium and osmium, which are equally dense) the heaviest form of matter yet known.

I often hear people say it is too cold to snow; is it ever too cold to snow? A. Yes. An extremely cold, dry air is one from which the moisture in great part must have previously precipitated.

If an ice house be built on the side of a hill, the walls being of stone 12 inches thick and two stories high, and the ice packed in the upper story, and the lower one used for a sort of refrigerator, would the temperature be sufficiently low to preserve fresh meat and other perishable articles? A. We do not think that this arrangement would be satisfactory.

(49) R. D. asks: 1. What distance apart should the lenses for a celestial eyepiece be placed, their diameters and focal lengths being as follows? 1. ½ inch focus, $\frac{3}{16}$ diameter, plane. 2. 1¼ inches focus, $\frac{11}{16}$ diameter, plane. A. Lenses ¾ inches apart. 2. Where should the diaphragm be placed, and of what size should the aperture be? A. Diaphragm aperture 5⁄8″, distant ½ inch from eye lens at its inside focus. 3. What distance apart should the lenses for a terrestrial eyepiece be placed, their focal length and diameters being (1) 2 inches focus, $\frac{13}{16}$ diameter, plane; (2) 2¼ inches focus, $\frac{11}{16}$ diameter, double; (3) 2½ inches focus, 1¼ diameter, plane; (4) 1½ inches focus, $\frac{9}{16}$ diameter, plane? A. A or front lens to B=2·8″, B to C=3·5″, C to D=2·7″. 4. Where should the diaphragm be placed, and what the size of the aperture? A. Diaphragm aperture 5⁄8″, 1·5″ in front of D, also diaphragm aperture 0·23″, distant 1·64″ from A. 5. What will be the power of these eyepieces with a 3 inch achromatic of 48 inches focal length? A. Equivalent focus 1·75″, power 27.

(50) J. D. W. says: I would like to know why the pile of my Léclanché battery bothers me as it does. The top of the pile swells up, and some kind of whitish stuff comes out. It smells somewhat like hartshorn, and after it appears the battery gets weaker. What is the cause of it? A. Probably it is owing to defective manufacture. The genuine Léclanché battery is cemented at the top with gutta percha, but an article has been made in this country in which paper is made to take the place of gutta percha. Now the paper absorbs the moisture from the solution and draws it out of the cell by capillary attraction, and hence the appearance of the whitish deposit. The smell of hartshorn is due to the action of the battery, ammonia being set free at the negative electrode.

(51) R. O. T. says: 1. I wish to make an induction coil, about 10 or 12 inches long, with a center bundle of iron wires of about ¾ inch diameter. The inducing coil consists of No. 18 wire, and the secondary coil, of No. 28, both American gage. The primary coil is to be about 35 yards long, and what I want to know is how much of the secondary wire ought I to wind on the primary to get a spark at least ⅛ inch long? A. It would be better to use finer wire for the secondary coil, say No. 36 wire. Your secondary coil should be at least thirty times as long as the primary. 2. How must I make the condenser? A. Condensers are made of alternate layers of tin foil and paper saturated with paraffin, arranged like the leaves of an interleaved book, the metal plates being the printed leaves and the paraffined paper the blank paper. Each alternate metal plate is connected so as to form two distinct series, insulated from each other, one of which is to be connected with each end of the primary coil. The spark of an induction coil cannot take the place of a battery for general purposes. 3. I tried to make a condenser of sheets of tin foil, glued on each side of a large sheet of common newspaper; and after doubling it up so that the two sides did not touch each other, I connected each sheet with each end of the inducing coil. Will this do? A. You cannot make a condenser by rolling the sheets up separately as proposed. 4. Why cannot I use the induced current of a small coil for the inducing one of a larger? A. The reason why you cannot use the induced current of a small coil for the inducing one of a larger is that the induced current is one of tension, whereas quantity is required. The effects produced by the secondary coil result from the transference of electric quantity in the primary to electric tension in the secondary.

(52) J. J. J. asks: 1. If I make a square copper box 8x6 inches deep, and suspend therein a square of zinc, I will have a sulphate of copper battery. How many such cells will I require to plate with nickel and silver? A. Two. 2. How many such will be required to make the electric light? A. 100. 3. If I make a silver solution by dissolving two silver dollars in acid, and put this solution into three quarts of water, contained in a one gallon stone jar, can I, by suspending the articles to be plated in this solution and connecting them to the negative pole of a battery, plate them? A. Use 100 parts of water, 10 parts cyanide of potassium, 1 part cyanide of silver.

(53) C. asks: Is there such a preparation as chemical ink, becoming invisible or fading after writing, to reappear on exposure to heat? A. Use a dilute solution of chloride of cobalt.

(54) R. W. W. asks: 1. What causes the liquid, commonly called smoke water, to form in stove pipes? A. A certain amount of water as well as smoke is formed in the combustion of fuels. As long as the temperature of the flue is kept high enough, this water is carried off in the form of vapor; but if the temperature is lowered, it is condensed and acquires an acid reaction from the sulphurous, sulphuric, and carbonic acids generated in the burning of the fuel. 2. What will effectually prevent the dripping nuisance? A. See that your flue is not chilled, has a good draft, and is free from elbows, etc., where vapors may be condensed and collected.

(55) B. H. A. says: I wish to procure a vat for boiling a solution of 1 part sulphuric acid and 11 parts water; I want it to hold about 60 or 70 gallons. Of what material should it be made, in order not to corrode? A. Porcelain lined iron pots have been used with advantage for this purpose.

(56) H. L. asks: What is the formula for a terrestrial ocular with plano-convex lenses, for an objective or speculum of 48 inches focus? A. Foci: A=1·58″; B=2·38″, C=2·65″, D=1·50″. Distances, A B=2·57″, B C=4·70″, C D=2·45″. Focal point, 0·713″ in front of A. Aperture of A=0·7″, B=0·7″, C=1·15″, D=0·7″. Diaphragm aperture, 0·2″, distant 1·29″ from A. Diaphragm aperture, 0·75, at inside focus of eye lens. Cap, 0·26, aperture distant 0·44 from D. Length of eyepiece=10 inches. Field of view=30 minutes. Power=57. A and B plane side to objective, C and D plane side to eye.

(57) W. R. B. says: 1. In Dick's "Practical Astronomer" is a description of Rogers' plan of an achromatic telescope consisting of a small correcting lens of flint and crown glass to correct a large object glass of crown. I do not understand the formula for computing or constructing such a lens. I have a good double convex lens of crown glass, 5 inches in diameter and of 97 inches focus. Will you please give me the diameter and focus of both the convex crown and concave flint composing the correcting lens, for such an object glass? A. Professor H. L. Smith gives the following formula for a 6 inch dialyte telescope of 8¾ feet focus; Crown objective, outside radius, 76·396 inches, inside radius, 175·109″. Corrector composed of a plano-convex crown, radius 8·9915″, and a double concave flint lens, radii 161·14″ and 9·973″. Flat sides of the corrector together, and crown next to object glass. 2. What is the distance at which it should be placed from the object glass? Is there any great difficulty in obtaining a satisfactory effect in this manner? A. The corrector, 4 inches diameter, is placed about half the focus of crown objective from it, and moved until it corrects the chromatic aberration; and then the lenses of the corrector are separated more or less by 3 bits of card, about $\frac{1}{32}$ inch, more or less, until the spherical aberration is corrected. The correction is now perfect at center of field only; and the field lens of the Huyghenian eyepiece must be put in a sliding tube and slid out until the correction is complete throughout the field, except a slight aberration at the margin. 3. I desire to attempt the construction of an achromatic object glass for a telescope. Will you please give me the radius of the different curves of the crown and flint for an object glass 4 inches diameter, 60 inches focus? A. Tables for the curves of any pair of disks, given the index of refraction and dispersive power of the flint and crown, to the fourth place of decimals are to be found in Prechtl's "*Praktische Dioptrik*," being Barlow's extension of Herschel's tables. 4. Where can I obtain the flint and crown glass disks for the above? A. At Heroy & Marenner's (Chance's agents), Duane street, New York city. 5. Is there any work published which would aid an amateur in the making, (grinding, polishing, and testing) of lenses? A. Get Draper's book, and also Prechtl, to read with the help of some intelligent Teuton. You will then be on the road to success.

(58) H. W. W. says: In your most interesting article in No. 10, on solar chemistry, you say that the gaseous substances which constitute the photosphere contain lime, magnesia, and iron. Are we to infer that our sunshine contains these? What is the proof? A. The sunshine does not contain lime, magnesium, etc. Its spectrum, however, contains certain dark bands which, when compared with the spectra of the metals in the state of incandescent vapor, correspond with the bright spectral lines formed by these incandescent vapors. But it is a property of incandescent vapors to absorb light of the same refrangibility as they emit. Hence the dark bands in the solar spectrum are absorption bands, due to the absorption of certain portions of the sunlight by corresponding incandescent vapors.

(59) C. A. says, in reply to E. G., who asks what speed to give a foot power circular saw: I run mine at 4,500 revolutions per minute. My saws are five inch, of No. 26 gage. The balance wheel is about 75 lbs. in weight, and I increase motion with countershaft. I enclose sample of cuts made with a cut-off saw. Are they good work for a foot power saw? A. Yes, very good indeed, and give evidence that the sawyer is an expert. E G. and others will be much obliged for the information.

(60) R. H. H. says, in reply to J. S., "who asks if a belt would hug a smooth iron pulley closer than one covered with leather, and you say that you are not sure that a pulley covered with leather is better than one with a smooth iron face; I know it is better, for we put on a 10 inch iron pulley with a 4 inch face, and the belt would slip, no matter how tight it was. We changed it to a 10 inch wood pulley with 4 inch face covered with leather, and it does the work now without any slipping."

(61) G. B. says, in reply to A. B., who asks What is the material used in the manufacture of corduroy, which gives that fabric so disagreeable an odor when wet? Animal size, made chiefly of dead horses, put in to give the fabric more body.

(62) F. V. J. says, as to the needed improvements in the rail joints on street railroads: A piece of rubber put under the plate would prevent the evil to some degree. As the rails are now, they damage the cars; but rubber put under the rails would act as a spring and deaden the jar.

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

J. H. N. D.—The brilliant golden scales are films of muscovite, a variety of mica, which have acquired their color by the oxidation of a small percentage of iron which the mineral contains under the influence of heat in a current of air.—J. U. E.—You are mistaken in supposing that the sun's heat is attributed by scientists to combustion. A great many suns made up of coal would have been entirely consumed during the time the sun has been the source of heat to the solar system.—M. H.—It is sulphuret of lead or galena.—M. R. K.—We regret to say that the jewelers will not purchase these river pearls. We have had a pearl from

the Wabash river many times the size of the largest specimen, but it is not saleable.

B. M. asks: Which is the best way to bottle lager beer to avoid a second fermentation?—R. H. M. asks: If a heavy sphere, whose diameter is 4 inches, be dropped into a conical glass full of water, whose diameter is 5 inches and altitude 6 inches, how much water will run over?

COMMUNICATIONS RECEIVED.

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

On the Tides. By W. H. P., and by Z.
On Poetry and the Locomotive. By J. H. B.
On the Vital Principle of Organic Matter. By W. H. B.
On Lighting Tapers. By F. W. D.
On a Parasite of the House Fly. By D. V. D.
On Boiler Explosions. By S. N. B.

Also enquiries and answers from the following:
M.—F. C. R.—H. C.—O. C.—H. S. R.—W. S. D.—P. B.—H. H.—C. C. M.—M. W. H.—J. M. E.—H. J. D.—J. P.—J. C. R.—A. P. E.—E. W. P.—S.—A. W. P.—C. H. A.—J. M.—F. H. W.—S. T.—R.G.—J. R.D.—A.—L. F. M.—J. F. J.—J. B.—R. A. K.

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 the best steam trap? Who sells the best three horse engine? Who makes the latest improved steam cut-off? Who sells the best sewing machine motor? Whose is the best tool steel?" All such personal inquiries 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.]

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8,279.—HITCHING POSTS.—L. Schaefer, Cleveland, Ohio.
8,280.—PICTURE MOUNTS.—R. Trautmann, New York city.
8,281.—VASE.—W. Tweeddale, Brooklyn, N. Y.
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TRADE MARKS REGISTERED.

2,383.—METAL CANS, ETC.—T. Burger, Plainfield, N. J.
2,384.—MEDICINE.—E. R. Burnham, Chicago, Ill.
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2,386.—MEDICINE.—W. M. Clarke & Co., Boston, Mass
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2,388.—WATCH MOVEMENTS.—L. & M. Kahn, N. Y. city
2,389.—LARD.—A. & J. M. Moses, New York city.
2,390.—LARD.—G. C. Napheys & Son, Philadelphia, Pa.
2,391.—PETROLEUM.—Power & Co., London, Eng., *et al.*
2,392.—MEDICINE.—J. H. Ruttley, San Francisco, Cal.
2,393.—JAMS, ETC.—P. J. Ritter, Philadelphia, Pa.
2,394 to 2,397.—TOBACCO.—J. Sarrazin, New Orleans, La.
2,398.—STOVES.—Summer King Co., Pittsburgh, Pa.
2,399.—COPYABLE INKS.—F. de B. Bertot, New York city
2,400.—SILKS.—A. De Greiff & Co., New York city.
2,401.—COFFEES, ETC.—Focht & Co., Philadelphia, Pa.
2,402.—SPIRITS.—Freiberg *et al.*, Cincinnati, Ohio.
2,403.—STARCH.—Glen Cove Starch Co., New York city.
2,404.—CORN FLOUR.—Glen Cove Starch Co., N. Y. city.
2,405.—RASPS AND FILES.—Heller *et al.*, Newark, N. J.
2,406.—SOAP.—Lincoln M'f'g Co., Providence, R. I.
2,407.—GLOVES, ETC.—Passavant & Co., New York city
2,408.—TOYS.—R. Jenkins, Brooklyn, N. Y.
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2,410.—FISH.—Eagle Fish Co., New York city.

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CANADIAN PATENTS.

LIST OF PATENTS GRANTED IN CANADA,
APRIL 16 to 21, 1875.

4,636.—Wm. T. Root *et al.*, Ingersoll, Ont. Radiator and steam heating apparatus. April 16, 1875.
4,637.—J. L. Adams, Montreal, P. Q. Tobacco cutter April 16, 1875.
4,638.—J. D. Stark, Brooklyn, N. Y., U. S. Elastic wheel lubricator. April 16, 1875.
4,639.—A. H. Swain, Winchester, Ind., U. S. Adjustable table and ironing board. April 16, 1875.
4,640.—R. F. Cooke, New York city, U. S. Elastic horse shoe. April 16, 1875.
4,641.—J. E. Wisner, Friendship, N. Y., U. S. Horse hay rake. April 16, 1875.
4,642.—M. D. Murray *et al.*, Johnstown, N. Y., U. S. Breast collars for harness. April 16, 1875.
4,643.—A. L. Carey *et al.*, Ypsilanti, Mich., U. S. Chain pump bucket. April 17, 1875.
4,644.—Wm. H. Gibbs, Oshawa, Ont. Middlings purifier. April 17, 1875.
4,645.—R. W. Jeffery, Woodbridge, Ont. Bolt lock for pitman box. April 17 1875.
4,646.—J. Currie, Toronto, Ont. Boiler foam preventer and fuel saver. April 17, 1875.
4,647.—J. F. Webster, Hamilton, Ont. Screw machine. April 17, 1875.
4,648.—L. W. Russell, Gananogue, Ont. Fence corner April 17, 1875.
4,649.—B. Sloper, Montreal, P. Q. Hydrogen generator and carbureter combined. April 17, 1875.
4,650.—S. R. Bailey, Boston, Mass., U. S. Wood-bending machine. April 17, 1875.
4,651.—W. G. Rawbone, Toronto, Ont. Cartridge creaser April 17, 1875.
4,652.—S. H. Hall, Belle Plaine, Iowa, U. S. Tan vat April 20, 1875.
4,653.—J. B. Porter, Yarmouth, N. S. Ironing machine. April 20, 1875.
4,654.—E. Tiffany, Bennington, Vt., U. S. Circular knitting machine. April 20, 1875.
4,655.—A. G. Gray, St. John, N. B. Mowing machine. April 20, 1875.
4,656.—S. Rydbeck, Red Wing, Minn., U. S. Mortising machine. April 20, 1875.
4,657.—I. Levy, Ellaville, Fla., U. S. Fence picket machine. April 20, 1875.
4,658.—Wm. Peaker *et al.*, Brampton, Ont. Hot air dumb stove. April 20, 1875.
4,659.—J. S. Kemp, Magog, P. Q. Manure-spreading machine. April 21, 1875.
4,660.—B. Curtis, Jr., Boston, Mass., U. S. Buckle attachment. April 21, 1875.
4,661.—Wm. Shea, Trenton, Ont. Milk and liquid cooler April 21, 1875.
4,662.—Wm. J. Mansell, Toronto, Ont. Self-acting car coupling. April 21, 1875.
4,663.—W. H. Landon, Princeton, Ont. Parlor cooking stove. April 21, 1875.
4,664.—W. J. Wauchope, Niddrie, Scotland *et al.* Gas manufacture. April 21, 1875.

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