Notes & Queries

C. G. V. D. B. will find full information as to the manufacture of bicarbonate of soda on p. 125, *Science Record* for 1875.—T. L. R. will find directions for tempering steel on p. 235, vol. 32.—J. M. L. and J. W. L. will find a full description of the paper process of stereotyping on p. 393, vol. 30.—J. T. H. will find directions for making clay crucibles on p. 330, vol. 32.—H. B. and many others should read Auchincloss on "Valve and Link Motions."—J. H. can transfer pictures to wood by the process described on p. 138, vol. 30. For method of transferring to glass, see p. 123, vol. 30.—A. B. will find an explanation of the floating iron mystery on p. 133, vol. 31.—J. G. will find a recipe for a hair stimulant on pp. 267, 363, vol. 31.—C. H. can polish walnut by the method described on p. 315, vol. 30.—J. F. A. will find a rule for finding the strength of cylinders on p. 186, vol. 32.—E. C. F.'s queries on water supply through pipes have been answered on p. 48, vol. 29.—H. E. N. will find a description of salicylic acid on p. 324, vol. 32.—W. R. B. can silverglass by the methods described on pp. 177, 203, 267, 331, vol. 31, and p. 234, vol. 30.—I. will find directions for painting boilers on p. 379, vol. 31.—J. H. M. will find directions for a black enamel on iron on p. 208, vol. 26.—J. H. J. will find directions for making a frost-proof pavement on p. 187, vol. 32.—J. M. W. will find a recipe for marking ink on p. 251, vol. 29.—A. B. will find directions for plastering a cistern on p. 203, vol. 32.—R. S. B. and many others are once more assured that there is no rule for ascertaining the horse power of a boiler.—H. B. will find full instructions as to lap, lead, and cut-off in our papers on "Practical Mechanism."—S. B. C. can make glass windows opaque by the method given on p. 264, vol. 30.—A. S. S. and G. F. D. must go at once to a physician, or to the clinic of a hospital.—C. D. J. can make white writing ink by following the directions on p. 75, vol. 31.—J. A. H. will find an explanation as to white being a color on p. 379, vol. 31.—S. B. will find a description of the madstone on p. 265, vol. 26. It is a vulgar superstition.—L. M. N. and T. H. G. will find a rule for determining the diameters of pulleys on pp. 26, 73, vol. 25.

(1) A. J. R. asks: What is the best plan of preventing dampness striking through a brick wall? A. You do not say whether the plastering is set off from the brick wall by upright wooden strips, called furring. This should be done on all outside walls, and, if not now done, would most likely be a remedy in this case.

(2) J. B. Jr. says: It is proposed to put up a block of buildings one story high in front, two stories in the middle, and three stories in the rear, with separate chimneys to each section. Will the two story building, being higher, interfere with the draft in the flues of the one story building, and the three story building with that of the flues of the two story building? If so, what is the remedy? A. The probabilities are that the flues will not draw well three quarters of the time. The remedy is to build the third story of the same depth as the second, to draw the flues of the first story extension over to the rear wall of the second story, and carry the chimney shaft up against the said rear wall, topping out above the main roof of the building at the usual hight above said roof.

(3) J. B. S. asks: What steel is used and how is it tempered, for making steel magnets? A. A very hard steel containing a high carbon percentage.

(4) T. C. N. asks: 1. What ingredients are used in the white glazing of cast iron pans? A. For enameling cast and wrought iron vessels, two compositions are in use; one has for its base silicate of lead, and the other boro-silicate of soda. One of these enamels is applied to the scoured surface of the metal in the form of a powder, which is fixed by heating to a sufficiently high temperature to fuse; it then spreads over and covers the metal with a vitreous varnish. The boro-silicate of soda possesses great superiority over the silicate of lead, for it is not attacked by vinegar, marine salt, or the greater number of acid or saline solutions, even when concentrated; and resists the action of agents used in cooking or chemical operations. The silicate of lead enamel is whiter and more homogeneous, which explains the preference given it by the public, but it gives up oxide of lead to vinegar or to common salt; it acts upon a great number of coloring matters, and it is attacked by nitric acid, which communicates a dull color to it. On evaporation the liquid leaves a white crystalline residue of nitrate of lead. This enamel is instantly darkened by dissolved sulphides, and also by cooking food containing sulphur, such as cabbage, fish, and eggs. 2. Can the same glaze be used on earthen tiles or other ware? A. Yes. 3. Can the glaze be colored green, blue, or yellow? A. To color the enamel green, mix with it before heating 1 to 2 parts oxide of chromium to 10 parts enamel. For blue, use prepared cobalt, red lead, niter, each 1 oz. For yellow, use lead and tin ashes, litharge, and antimony, each 1 oz., and niter 4 ozs. Gold and purple of Cassius are used for red and purple. For black, use calcined iron and cobalt, each 1 oz., or zaffre 2 ozs., manganese, 1 oz.

(5) S. C. D. asks: In blowpipe analysis what does the abbreviation B.B. mean? A. Before blowpipe. 2. What is reddle? A. Reddle is also called ruddle and red chalk. It is red ocher containing some clay.

(6) J. M. asks: 1. Will mercury evaporate if its surface is covered with water? A. It will not. 2. Can any one use an electro-coppered plate for the purpose of collecting gold from any composition which may contain it, without infringing on any patent right? A. Yes. 3. Can copper be coated with mercury without first being silver plated? A. Yes; clean the surface with a little sulphuric acid (dilute) and sand, rinse in clean water, dip in the mercury, and rub evenly over the surface with a brush. 4. Will an iron muffle answer in a furnace for the cupelation of silver in any form? A. An ordinary muffle is to be preferred.

(7) O. H. L. asks: How can I make a cylinder for compressing gas for the oxy-hydrogen light? Is there any special joint or seam, or any composition, in use for making the joint tight? A. These cylinders are made of boiler iron riveted together in the same manner as a steam boiler.

(8) S. T. asks: 1. How are magnetic fish made? A. See p. 218, vol. 32. 2. Is the paper of which they are made magnetized? A. No.

What power of microscope is necessary for chemists' use, for examining blood corpuscles, etc.? A. Theoretically, the magnifying power of a lens bears a definite relation to its focal length; but practically this is not precisely the case, since the mechanical difficulties of grinding and fitting the component lenses produce slight variations in the focal distance, and, of course, in the power. A lens whose focal length is actually $1\frac{1}{16}$ of an inch, and its magnifying power, when arranged with an eyepiece as above, is about 45 diameters, may be sold as a one inch objective; or the error, as is more frequently the case, may be on the other side, so that the purchaser obtains, for the price of a 1 inch objective, a lens having an actual power, when combined, of 55 diameters. For the use of chemists, we would recommend a $\frac{2}{5}$ inch object glass with an angular aperture of about 32°, magnifying, with the various eyepieces, from 75 to 450 diameters. For the use of physicians, a $\frac{1}{2}$ inch object glass, with angular aperture of 100°, magnifying from 250 to 1,500 diameters, will be found most useful.

How can I make a sea green paint? A. The following will give a beautiful blue-green tint: Add to a solution of sulphate of copper a decoction of fustic, previously clarified by a solution of gelatin. To this mixture is then added 10 or 11 per cent of protochloride of tin, and lastly an excess of caustic potash. Wash and dry the precipitate.

What can I mix with common stable manure to make a good tobacco fertilizer? A. Lime, but ground bone is much better, or some reliable superphosphate of lime.

(9) C. A. K. asks: Is heat visible? A. Heat is a motion of the ultimate parts of a body, and is not visible.

(10) A. F. asks: What is the difference between ebonite and vulcanized india rubber? A. Ebonite is made by heating india rubber with half its weight of sulphur.

Is there any method of reducing tortoiseshell to a soft state, so that it could be easily molded? A. No.

(11) M. D. W. asks: 1. Can the same still that is used for distilling oil of peppermint be used for manufacturing sassafras oil? A. Yes, if well cleaned. 2. Is there any difference in the process? A. Very little. The peppermint oil generally requires rectification to render it bright and fine.

(12) J. J. KcK. says: My hair grows very low on my forehead, in fact it reaches my eyebrows and quite covers my temples, injuring my looks very much indeed. As I am a lady, I am vain enough to wish it removed, if it can be done without scarring my face. A. The following has been successfully used: Take sulphuret of calcium (fresh) and quicklime equal parts, reduce them separately to fine powder, mix, and keep the mixture in a well stopped bottle. When used, a portion is made into a paste with warm water, and immediately applied to the part, previously shaved close, a little starch being generally added in order to render the paste more manageable. It requires caution in its use. It should be applied to only a small surface at a time, and great care should be taken to prevent it from extending to the adjacent parts. The powder loses its properties unless entirely excluded from the air, and no liquid must be added until just before application, and then to no more than is required for immediate use.

(13) G. D. S. asks: Will Babbitt metal impart unhealthy properties to butter, when about 4 inches surface of the metal is in contact with about 4 gallons of cream? A. There would be some risk, especially if any souring took place.

(14) L. L. D. asks: Is it not good reasoning that, when an article is cut through with a saw, it ought to separate? Nevertheless, I have an article that I can honestly saw through ten times on the same line, and then hand it back very nearly as strong as ever. A. We have frequently seen a similar result brought about by the proper use of magnetic force.

(15) A. McG. asks: What is the cheapest method of finding water in a light, loose sandy soil? A. Drive an iron pipe well.

(16) G. S. asks: How can I make laundry blue paper? A. Make a concentrated solution of indigo carmine, in which steep the paper desired to be coated, and evaporate the solution until the paper is coated with a heavy deposit of the coloring matter.

(17) J. G. H. asks: 1. What ingredient in the egg causes the spoon to be stained? A. Sulphur. 2. What chemical change takes place? A. A compound of sulphur in the albumen of the egg attacks the silver, forming a sulphide.

(18) C. D. P. F. asks: How can the steel on an engine be cleaned so as to look bright and burnished? A. Use fine emery paper.

(19) G. L. S. asks: Is there anything that can be used in making cologne that will make the perfume lasting? A. No.

(20) E. E. E. asks: 1. Should green apple wood for handles be cut into pieces the size of a handle, and let it dry before using, or would it be better to saw into boards and cut up when dry? A. The latter is best. Let the boards dry thoroughly before using. 2. How are light colored handles made black and polished to imitate ebony? A. See p. 299, vol. 30. 3. What is the usual way of polishing apple and other hard wood handles? A. See p. 372 vol. 26.

(21) C. E. C. asks: Is there any way in which the dates on coins can be made clearer? A. Carefully clean the coins with dilute nitric acid rinse with water, and polish.

(22) L. H. W. asks: How can I best remove a baked Japan surface from old sewing machines, in order to get a smoother surface for another coat of Japan? A. Use a steel scraper.

(23) G. S. R. asks: What size of cistern will it require to supply a school of about 75 pupils, collecting the rain water by spouting, about 80 feet of spouting being used? A. Make your cistern 6 feet in diameter in the clear on the inside, and about 5 feet deep below the crown. 2. Of what materials and shape should the cistern be? A. Build it of brick with 8 inch walls laid up in Rosendale cement mortar, and with brick bottom and crown. Make it circular. 3. How can I make the best filter? A. Partition off one third the space with a 4 inch brick partition; have small holes for the ingress of water at the bottom of this partition, and fill said one third space with a layer of gravel and clean coarse sand about 6 inches deep. Place on top of this a layer of charcoal about 3 inches thick, and then another layer of sand and gravel like the first. Let the water enter the cistern into the larger space, and be drawn from the smaller.

(24) H. A. M. asks: I intend to build an outdoor cellar of brick. Could I make it frost proof by having an eight inch wall outside and a four inch wall inside, with a four inch space between the walls, filled with dust from the bed of a charcoal pit? A. This would make a wall that should retain the warmth of the interior of the cellar; but care should be taken to bind the walls together to prevent their being thrown apart.

(25) J. V. says: I have just built a large fireplace 5 feet wide and 3½ deep, opening about 6 feet high, in the basement of a building 2½ stories high, connecting it with two flues about 8x8, in the room above, about 10 feet from top of fireplace. There is a good draft to both flues, but not enough to prevent the fireplace smoking terribly. How can I remedy it? A. If the flues are together, and it is practicable, you had better remove the dividing partition between them, and make them into one.

(26) D. J. F. asks: 1. How can I find the number of square inches on the face of a millstone or any other circle? A. (Radius in inches)^2 x3·1416 gives the area in square inches. 2. How an I find the number of square inches on the surface of a triangle? A. Half the hight in inches x by the base in inches gives the area.

(27) W. W. N. says: I tempered springs made from Bessemer steel in oil at a very low heat, and then flashed them off. But most of them would set too much, and a very few were good. I tempered some in very cold running water, then dipped them in oil, and flashed them off. But most of them were too soft, some broke, and a few were good. There is a point of hardness and toughness that I am unable to hit. Can you suggest some pickle that will help me? A. If the springs set too much, do not continue the blazing so long, but dip them in water as soon as the blazing commences. If they are too hard after blazing, let them cool without dipping. Blaze them in a tank of oil placed over a fire.

(28) A. S. asks: Can a shaft be driven by a belt at an angle of 45° or any other than 90°, without the aid of a third pulley? A. Yes, by crowning the pulley and keeping the shafts in line.

(29) S. S. S. asks: 1. Is there anything better for house plants than clear water? A. Soapy water with a little ammonia is good. 2. Should the dust in the pots be loosened often? A. If it hardens on top, yes. 3. What kind of plants will blossom the most? A. Geraniums, calceolarias, and verbenas. 4. What kinds of plants are best for hanging baskets? A. Lobelias, musk, and ferns.

(30) H. R. asks: Is the motion of the valve uniformly the same in a locomotive engine and in a stationary engine? A. Yes, practically.

(31) F. G. says: In tempering steel, some mechanics use the lead bath. Is the molten lead in any way injurious to the steel? A. No.

(32) W. S. R. asks: Which is the best way to drill saw plate? A. Use a flat drill, and run slowly, with a little oil.

(33) G. W. L. asks: How can I harden files? A. Heat them to a red heat, and quench endways in salt and water.

(34) W. G. B. asks: How can I stick cloth on glass, so that it will hold firm, in order to sew it into an article? A. Try painting the glass with oil paint, letting it dry, and then using glue as a cement.

(35) W. B. asks: What is the best kind of pipe to connect a cistern with an iron pump where the water is to be used for drinking and cooking purposes? A. Use tin-lined lead pipe.

(36) W. F. M. asks: 1. I have almost completed a small steam engine, 1·5 bore x 3 inches stroke, which I wish to run at a speed of about 200 revolutions per minute. I have made the steam ports $\frac{3}{32}\times\frac{3}{8}$, exhaust ports $\frac{5}{32}\times\frac{3}{8}$. I intend the fly wheel to weigh 10 lbs. The engine is a vertical link motion, so arranged that, by means of a lever and notched segment, I can cut it off at almost any point of the stroke. Will a ¼ inch tube be large enough to supply steam, and a ⅜ one to exhaust it? A. Yes. 2. Will such an engine, working under a steam pressure of 20 or 30 lbs. per square inch, at the above-named number of revolutions, develop sufficient power to run a sewing machine? A. Yes. 3. If it is necessary to have a governor, will it answer to attach it to the cut-off lever and let it operate in that manner? A. A governor is not absolutely necessary. The method of attachment you mention would answer very well. 4. Will you be good enough to tell me what you think of the engine, as near as you can judge? A. Judging from your account, you have turned out a very creditable piece of work. 5. I never worked in any machine shop, nor attended any scientific school, but I have always had a great liking for machinery. I made all my drawings, patterns, etc., myself, as also the hand planer I use. From what I have written, do you think it advisable for me to enter a machine shop rather than any other business? A. It would be better for you to enter a good scientific school; but if you are determined and persevering, you can enter a machine shop, and get a good education out of shop hours.

(37) D. B. W. asks: What makes our gage, in very cold weather, show 60 or 70 lbs. pressure when there is no steam in the boiler? A. The gage must be frozen.

(38) M. C. says: I saw a notice in your paper about using zinc in steam boilers. I had a pipe to convey the feed water into a boiler some 26 feet long; it was gas pipe; and in about 12 months' use, it had many holes in it, some so round that they looked as if drilled. To stop them, I covered them with a sheet of zinc, and the next time that I cleaned the boiler I found many scales had left the tubes and shell, and were in the mud receiver. At the time, I did not know the reason; but seeing the account in your paper, I have continued the zinc until now, and only stop using it because my employer is afraid it will injure the boiler. Does it act on the iron injuriously? A. We do not think it will injure the boiler; and by keeping a careful watch, you can discover any corrosion, should it take place, before much harm is done.

(39) A. A. C. asks: What would be the proper length of a belt to drive a stone crusher? A. It depends on the distance between centers of pulleys, and will be a little less than the circumference of the driving pulley increased by twice the distance between centers.

(40) H. J. M. asks: Given a cistern 10 feet long x 10 feet wide x 10 feet high. What is the pressure on any one of the four sides, when full of water? A. The pressure is the area of the side, in square feet, multiplied by the distance of the center of gravity of the side below the surface in feet, multiplied by the weight of a cubic foot of water in lbs.

(41) J. E. P. asks: Where can I get a book that tells about hunting and fishing? A. Address the publishers of "Rod and Gun," West Meriden, Conn.

(42) H. S. S. asks: What, if any, difference would there be in the power required to run a pulley with a given load and width of belt in the following three cases? (1) With a belt long enough to run loosely without slipping. (2) With a belt so much shorter as to require a tightener. (3) With a short belt stretched very tight. A. A general answer cannot be given to such a question. With narrow belts, there would be little, if any, difference in the three cases; but in the case of a wide and a thick belt, method No. 3 would probably give the most satisfactory results. We do not know of any work that treats specially of this subject; but we imagine many of our readers have information acquired by experience which they will be glad to impart, and which we shall be pleased to receive.

(43) J. A. W. asks: How can I put walrus hide on wooden polishing wheels, so that it will stay on? A. Use the best glue.

(44) L. W. asks: 1. Can I use a copper plate instead of platinum or silver in a Smee battery? A. No. 2. Will a galvanic pile, composed of 100 pairs of copper and zinc plates 1 inch square produce as heavy a shock as one of 100 pairs of 4 inch plates? A. Yes. 3. Will it produce a shock that can be felt by taking hold of the wire with the hands? A. Yes. 4. What is the best work on galvanic and frictional electricity? A. Noad's or De la Rive's are probably the most comprehensive works published in English. 5. How can I make carbon for battery plates? A. See p. 186, vol. 32.

(45) E. L. G. asks: Can permanent steel magnets be magnetized so strongly that their power will not be increased by use? A. We think they can.

(46) S. asks: 1. How shall I proceed to silver plate lightly sheets of thin copper on one side? A. Cover the other side with wax. 2. Must I prepare a special battery, and how? A. Use Callaud's or Daniell's battery. 4. Will the ordinary rolled sheet zinc of commerce answer to secure the negative action? A. It will answer for the positive plate. Use copper for the negative. 4. How shall I proceed to test a galvanic appliance to determine how many degrees it will deflect the magnetic needle? A. Connect the battery with a tangent galvanometer.

(47) B. D. asks: 1. Can a magneto-electric machine be made powerful enough to produce a two inch spark? A. Yes. 2. Is there any book explaining the construction of such machines? A. Yes, "Introduction to Chemical Physics," by J. R. Pynchon.

(48) H. S. says: I put up 5 Tom Thumb batteries, and connected them by wires. By leading the current through a drop of water on a slate, the oxygen immediately rose in very small bubbles on the negative pole. After a short time a small blue lump appeared between the poles. By moving the wires to different places such lumps were formed at every place. What are they? I had well water to try it in. A. The lumps are blue oxide of copper. The bubbles which arose from the negative terminal were of hydrogen gas. Hydrogen, being electro-positive, is always drawn to the negative pole of the battery, as are all electro-positive metals, for the same reason. The oxygen of the water, united with the copper of the positive terminal, formed small lumps of blue oxide of copper, and for this reason the oxygen is classified as electro-negative.

(49) R. G. W., of Glasgow, Scotland, asks. How can I solder or otherwise join broken cast iron stove patterns? A. Use hydrochloric acid killed by zinc, and sal ammoniac for a flux.

(50) H. N. S. asks: How can I determine at what distance from the end of a stick of timber, of uniform size, a bar must be placed under it in order that three men, two taking hold of the bar and the third taking the other end of the stick, may carry the stick and each carry an equal share? A. Place the bar at ¼ the length of the stick from the end.

(51) H. H. asks: How can I true up paper cylinders? The cylinder is formed of disks of paper pressed together. A. Tools for turning wood will answer. Run your cylinder at a very high velocity.

(52) J. B. W. says: In answer to several inquiries concerning the strength of flues, you have replied: To determine the strength of any flue, made of good iron, well put together and perfectly cylindrical, divide 806,000 times the square of the thickness in inches by the product of the diameter in inches and the length in feet; but to K. K., who asked what would be the difference between the pressure necessary to explode a boiler from the inside, and that necessary to crush or flatten it from the outside, you say the internal pressure required to rupture it is the thickness in inches × tensile strength in lbs. per square inch ÷ by the diameter in inches; while the external crushing force is 111,000×(thickness in inches)^2 ÷ by the diameter in inches×length in feet. Why do you use the unit 806,000 for the flue, and 111,000 for the shell when the cases are identical? In Roper's "Handbook of the Locomotive," I find that the unit is 806,300×by square of the thickness in inches ÷ by diameter in inches×the length in feet, and this sum ×3. In the example given, the length of his flue is 10 feet; where does he get the 3 from, and why have you discarded the odd 300? A. The 111,000 should have been 806,000. In Roper's rule, he probably uses a factor of safety of 3, and so makes the flue 3 times as thick as it would require to be, if it were just strong enough to resist the pressure. Our rules had reference to the ultimate strength of the flue, and we would recommend the use of a factor of safety of 7 or 8.

(53) A. R. C. asks: I want to run an engine, 4 inches bore x 9 inches stroke, at 150 revolutions Per minute, at 100 lbs. pressure. I will cut off when piston has traveled ⅓ distance, or at 3 inches. I want to know what fire surface is necessary to keep up steam at that pressure. A. From 60 to 80 square feet.

(54) S. F. S. asks: Which is the most economical to carry, high or low water, in a boiler of the locomotive style? A. There is not a great deal of difference; but probably some of our readers have made experiments bearing on the subject, and, if so, we would be glad to hear from them.

(55) S. W. asks: Would a boiler 3 feet long x 1 foot in diameter be large enough for an engine of 4 inches stroke by 4 inches bore? A. No.

How long ought a person to be learning to be a good telegraph operator? A. A few weeks, if he is intelligent, and has a chance of learning in an office where much business is done.

(56) B. D. W. says: An engineer claims that the lead of an engine can be lengthened or shortened by turning the eccentric around on the shaft without touching the valve or connecting rod. I say it cannot be done without lengthening or shortening both ends of the valve. Which is right? A. The engineer.

(57) A. D. says: I am making a boiler of 12 pieces of 1 inch gas pipe, 12 inches long, connected at each end with Ts. Steam dome is 3 inches in diameter and 9 inches long. Grate surface is 8 inches square. All the pipes are exposed to the fire. Will the above be suitable for an engine 1¾ inches in diameter x 2¾ stroke? A. It is probably large enough, but you may have some difficulties in using it. We would be glad to hear from you again, after you get it done.

(58) J. B. says: I am building an engine 3 inches bore and 6 inches stroke. Will ports 2 inches long and ¼ inch wide be large enough to let the steam into the cylinder? A. Yes. 2. Will ⅝ iron be large enough for the piston rod? A. Yes.

(59) E. G. C. says: 1. I am making a small upright boiler, 15 inches in diameter x 30 inches high, of $\frac{5}{16}$ inch iron, with heads ¾ of an inch thick, with flue 4 inches in diameter. What will be a safe pressure? A. About 100 lbs. per square inch. 2. What power from an engine, 1½ x 3 inches, would I get with 40 lbs. of steam, running at 100 feet per minute? A. Multiply pressure on piston by speed in feet per minute, and divide by 33,000.

(60) R. B. asks: How many horse power can be got from an engine of which the pulley is 32 inches and the belt is 9¾ wide, running over a 20 inch pulley? The 32 inch pulley runs at 150. A. Under favorable circumstances, from 15 to 18 horse power.

(61) P. S. H. asks: Is the pressure the same in the steam chest as it is in the boiler? A. It is generally less, some pressure being lost by the steam in passing through the pipe, and some being required to give the steam the velocity of flow.

(62) R. H. M. says: I. I want to put an engine into a boat 28 feet long by 6 feet beam, drawing 1 foot or 15 inches of water. What horse power do I require to drive her at 6 or 8 miles an hour in still water? A. About 2 horse. 2. How large a screw and of what pitch will be required? A. Diameter, 28 to 30 inches; pitch, 3 to 3¼ feet.

(63) J. F. asks: 1. Can the officers of a corporation of a town stop me from operating a steam engine within said town on the plea of danger from fire or any other cause? A. It depends entirely upon the local laws. 2. Can a steam boiler be supplied with water from a tank above it by a pipe running through upper shell of boiler to within an inch of lower shell by merely the force of water? A. Not unless the pressure of the column of water is greater than the steam pressure. Insert a steam pipe into the top of the tank, however, and you will have an arrangement similar to an equilibrium oil cup.

(64) S. N. M. says: To the questions lately asked by two of your correspondents, what is the force of the blow of a pile driver, and of a steam hammer of a given weight, falling a given distance, you reply that it can only be determined by experiment. You question whether the rule given in the books, that the "momentum of a falling body is equal to the weight multiplied by the velocity" will determine what weight, pressing steadily, will produce the same effect as the blow. By the rule, the momentum of 1 lb. falling $16\frac{1}{12}$ feet is equal to $32\frac{1}{6}$ lbs. I lately extemporized a simple, inexpensive apparatus. I took a small lever, of uniform size and density, and made a slight crease across the center of it; I balanced it on a dull knife edge in the crease and hung a weight of $32\frac{1}{6}$ ozs. to one end; I kept the lever horizontal by a stop over it near the other end, and let drop a 1 oz. bullet on to the end from a hight of $16\frac{1}{12}$ feet. It just sunk that end away from the stop, perhaps the $\frac{1}{60}$ of an inch. I next let drop a bullet about 2 dwts. lighter; it did not sink the lever away from the stop. Though my apparatus and experiment were necessarily somewhat imperfect, my result came so near the rule that I maintain that the rule does determine what weight, pressing steadily, will produce the same result as the blow.

(65) O. E. W. says, in reply to S. S.'s query as to cone pulleys: The offset from the size of the largest pulley in the treadle wheel must be the same as from the smallest cone to the second size of cone, and the offset from the second to the smallest size in treadle wheel must be the same as from the middle to the largest size in the cone.

(66) O. E. W. says, in reply to C. D., who speaks of water foaming and showing a boiler full of water, while in reality the boiler is nearly dry: This has been my experience. Our works having stood idle from February 20 to April 5, the scale in the boiler became loosened by successive freezing and thawing. It was then cleaned out and a boiler purge, composed of *terra japonica*, carbonate ammonia, and soda, freely used. The result was foaming to such an extent that the water would show in every gage and to the top of the glass tube, and in the same minute would run down out of sight in the glass, with a steam pump working at its highest speed to fill the boiler. We use steam to heat dry house and factory, and to run the engine (20 horse power) and steam pump, and for several other purposes; but were obliged to shut off all except the engine and pump for an entire day.

(67) D. N. says, in reply to H. M. F., who asks for a method of determining the pitch line of a cog wheel, having the number of cogs and the pitch. A very simple rule is to multiply the number of cogs by number of thirty-second parts in the pitch, and point off the two right hand figures for decimals. For example: In a wheel of 2 inches pitch with 100 cogs, there are 64 thirty-seconds; then 100×64=6,400: or 85 cogs, 85×64=53·60 inches. Take any pitch, say ⅜ and 25 cogs: 25×12=3·00 inches. This is the way that I have found the pitch line of wheels for the last 15 years, and it is perfect. The rule can be inverted and the number of cogs found if the diameter and pitch be given

(68) O. E. W. says, in answer to E. R. C.'s query as to using lead pipe to convey steam: This should not be done if the pressure is more than 5 or 10 lbs. per square inch. I made an attempt to carry steam at a pressure of from 40 to 60 lbs. (underground), and the result was a reduction of the lead to a white paste or powder in a few weeks' time, and a consequent expansion and bursting of the pipe. I have found by many years' experience that lead in contact with steam under pressure of over 10 lbs. per square inch very soon loses its strength, and it is therefore good neither for packing joints nor conveying steam.

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

G. M. O.—Iron pyrites.—H. P. W.—It shows little particles of sulphuret of iron, but you must look farther if you suspect zinc or silver ore.—R. S. F.—It is a piece of ordinary spelter or cast zinc.—G. H. & J. S. C.—It is oxide of iron, with a large percentage of silex.—H. W. S.—It is not nitrate of potash; it is yellow magnesian limestone.—S. P.—It is brown hematite, an ore of iron extensively used.—T. H. R.—They are rock crystals or crystallized quartz.—H. W. B.—Iron pyrites.—B. E.—It is muscovite, or potash mica, containg about 10 per cent of potash. If spread upon the ground, it would decompose in the course of time, and the potash would be converted into a soluble form and would serve as a fertilizer to plants. It would be well to institute experiments of this kind with it. The other uses to which muscovite can be applied will be found in the *Science Record* for 1875, p. 137.—J. D. P.—The metal particles appear to be a sulphuret of some kind, probably pyrites. If you will send some of the metal free from the gangue, this can readily be determined. The amount sent was not sufficient for analysis.—C. G. O.—One of your specimens (from Yonkers, N. Y.) is beautifully white kaolin. The other contains a small amount of oxide of iron.—We have received specimens of porcelain clays of inferior quality from W. L., Central City, Col. Ter., and M. P. A., West Bloomfield, N. Y. The price depends largely on quality, etc. The purest is retailed in New York at 10 cents per lb.

S. L. G. asks: 1. Are violin tops and bottoms sawn thin and then bent? 2. Is there a block or anything of the kind inside the violin, to glue the neck to, or is the neck simply glued to the outside? —R. M. C. asks: How can I make blue marking ink, used by the express companies?—F. E. W. asks: Is here anything besides tin with which I can coat tead castings before covering them with vulcanized rubber?—T. C. H. says: I wish to run an engine of from 5 to 10 horse power in the smallest possible space. To do so I propose to use coke, with an apparatus for sprinkling small quantities of crude coal oil on the coke to increase the heat. Who can tell me of the results of this method?

COMMUNICATIONS RECEIVED.

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

On Drawing Ovals. By E. C. T.
On Light. By F. G. F.
On Criminal Entailments. By B. S. B.
On Chemical Elements. By W. T.
On Euclid, I, 47. By F. M. S.
On Curves in Nature. By E. C.

Also enquiries and answers from the following.

T. L. S.—O. P. S.—J. W. S.—P. O. H.—C. R.—W.—H. W. G.—X. Y. Z.—L. N. S.—J. S. L.

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: "Whose is the best system of short hand? Who sells a book on the Turkish bath? Who sells works on chemistry? Where can I get a good microscope for laboratory use, and what will it cost?" 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.