Business and Personal.

Notes & Queries

W. H. G. will find directions for silvering mirrors on p. 267, vol. 31.—W. H. P. can make a battery for plating by following the directions on p. 202, vol. 32.—J. F. P. will find a recipe for black ink on p. 203, vol. 29.—J. C. can clean gilt frames by following the instructions on p. 27, vol. 31.—W.E. will find on p. 251, vol. 29, a formula for rubber varnish applicable to textile fabrics.—W. A. B. will find an explanation of the pyrometer, for indicating the fusing points of metals, on p. 171, vol. 32.—L. B. A. will find details of the threads to be cut in bolts of various sizes on p. 27, vol. 29. D. K. will find rules for ascertaining the strength of boilers on pp. 155, 186, vol. 32.—C. B. will find details of the process of making artificial butter on p. 246, vol. 29.—H. M. B. will find a description of nitro-glycerin on p. 283, vol. 30.—E. L. will find a rule for determining the curvature of the earth on p. 122, vol. 30.—H. M. A. will find a full description of the pantagraph on pp. 99, 179, vol. 28.—W. C. W. G. will find an article on steam on the Erie canal on p. 96, vol. 28.—F. W. P. will find directions for cleaning files on pp. 363, 379, vol. 28.—W. B. A. will find that iron can be softened by following the directions on p. 123, vol. 31, for steel.—P. McL. can cast Babbitt or other metal free from air holes by following the directions given on p. 409, vol. 31.—G. M. E. will find on p. 11. vol. 31, a recipe for a shellac varnish which will do for making leather airproof.—G. A. McL. will find that Greek fire is described on p. 267, vol. 30. The manufacture of starch from potatoes is described on p. 315, vol. 31.—J. M. S. and others will find a description of Hero's fountain on p. 50, vol. 29.—F. H. W. and C. S. P. will find directions for making rubber stamps on p. 156, vol. 31.—W. J. C. will find a recipe for cement for leather on p. 119, vol. 28.—J. K. and others will find full descriptions of tools for lathe work in the early chapters of "Practical Mechanism."—E. D. W. will find full directions for constructing a filter cistern on p. 251, vol. 31.—A. R. will find a recipe for laundry blue on p. 219, vol. 31.—G. A. B. will find directions for bluing steel on p. 123, vol. 31.—C. J. H. will find directions for bending timber on p. 23, vol. 31.—G. C. & S. and J. O. will find directions for casehardening wrought iron on p. 202, vol. 31.—M. K. W. will find complete instructions for coloring photographs for the magic lantern on p. 330, vol. 30.

(1) G. E. F. says: A machinist proposes the following: Threeup and down saws (with two upright iron rollers), the sides of the rollers to be fluted so as to press against the deal and feed it to the saws. He thinks that the deal, however crooked, will be always straight between the pulleys. Would this answer the purpose? A. The principle is old. One of the upright rollers is stationary or fixed at any desired position, the other yielding to irregularities.—J. E. E., of Pa.

(2) C. C. D. and others.—A one inch objective ought to divide Castor, but no power of 100 should be used. One of 50 is better.

(3) L. C. H., of Heidelberg, Germany, asks: How can I become a good practical master mechanic of a railroad? A. You must commence in the shops, and make yourself acquainted with the theory as well as the practice of the profession, and work your way up by industry and perseverance.

(4) G. W. L. says: I am working on a boiler 36 inches in diameter by 20 feet long, of $\frac{5}{16}$ inch iron, with cast iron heads 1¼ inches thick, without flues, tubes, or braces. What is the safe working steam pressure to be carried? I asked a theoretical engineer, and he gave a rule of algebra that I cannot work out, as I have never went beyond the rule of three in arithmetic. Is there any book that gives rules for finding the strength of iron, distance apart of stay bolts, braces, and rivets in a boiler without algebra? I asked the above mentioned engineer also what rule there is for getting the proper distance apart of stay bolts in flat surfaces of a boiler of $\frac{5}{16}$ inch iron, to carry 70 lbs. steam in salt water. He gave the following: $\sqrt{\frac{5530}{70}} \times 9 = \sqrt{79} \times 0.9 = 8$. This is all Greek to me. Will I have to learn algebra before I can get such a rule to work? A. You will find the information as to working pressure in the article on "Strength of Boilers," pp. 153, 186, vol. 32. Your remark about the formula being all Greek to you suggests that, in common with many others, you doubtless look upon algebra as a sealed book, entirely different from arithmetic. In a large measure, however, it is only a kind of shorthand for expressing rules, and we think that a few days devoted to the study of algebra would aid you greatly in your business. To illustrate how the use of algebraic expressions condenses an expression, we will translate the example quoted for you. $\sqrt{\frac{5530}{70}} \times 0.9$ expresses that the number 5530 is to be divided by the pressure of the steam, and that the square root of the quotient is to be multiplied by $\frac{9}{10}$. A little practice will enable you to translate all similar expressions.

(5) A. M. A.—The inventor must sign and make affidavit to the papers. But he may use his middle name, with first initial letter; and may give only the temporary residence where he is when the papers are signed.

(6) R. E. B. says: I find that the fire pot in my parlor stove never has clinkers on it. It is of cast iron. Why would not cast iron answer in place of brick in a cooking stove, which in a few days becomes coated with a substance like slag, which has to be cut off, causing a great deal of trouble? A. Probably its form would have to be changed as well as the material, to prevent it from burning out.

(7) S. H. H. asks: I have been perplexed in hardening two draw plates for drawing wire. When tempered and cleaned off, I discovered cracks or flaws all over the plates, on the side where the holes were smallest, but not entering the holes. I have made a great number of plates of this kind, and never met such an accident before. What is the cause? A. The plates were probably made of a different quality of steel from that which you had been accustomed to use.

(8) P. R. B. says: 1. I propose to bring a stream of water through a siphon, from a pond on top of a hill to base, through a pipe 2 inches in diameter. The distance from pond to summit of hill is 30 rods; perpendicular hight from pond to summit, 25 feet. Distance from summit to base is 300 rods: perpendicular hight from pond to base, 150 feet. What would be the amount of water discharged with a 2 inch pipe? A. The pipe will probably deliver between 40 or 50 gallons per minute, or the water will have a velocity of 5 or 6 feet a second. 2. How heavy a pipe would be required to stand the pressure? A. Ordinary iron pipe will answer.

(9) E. H. R. asks: What is the best shape, size, and hight for a brick chimney for a stationary engine of 50 horse power? A. A general rule is to make the cross section of the chimney, which may be either round or square, from $\frac{1}{8}$ to $\frac{1}{7}$ of the grate surface, and the hight from 50 to 75 feet.

(10) H. D. W. says: 1. I have a small engine, with a cylinder 2 by 2½ inches stroke, to run a lathe jig saw. I intend making a copper boiler. Of what capacity should it be? A. From 10 to 12 gallons. 2. How much pressure could such a boiler stand if made of $\frac{1}{16}$ or $\frac{3}{32}$ inch copper? A. It will depend upon the diameter. 3. How much pressure would be sufficient to run the engine? A. Fifty or sixty lbs. 4. How much weight should I put on my safety valve? A. Determine it by means of a spring balance.

(11) C. W. says: In an article recently published in your paper on combustion, the practice of admitting air to the top of a fire for the purpose of consuming the carbonic oxide is recommended. The theory of course is an old one, but is it a correct one in an economical point of view? In practice it is found, I believe, that, the more air you admit to a fire, the more rapidly is the heat evolved carried up the chimney. It is no use making the fuel give out more heat if we cannot retain that heat and utilize it. At the great factories at Mulhouse in Germany, a series of experiments was tried in relation to the combustion of smoke, with a view to the saving of fuel. The result was disappointing. When the necessary amount of air for the perfect combustion of the smoke was admitted to the fires, there was a loss of heat. The same result was described by practical engineers in London. At Mulhouse the practice now is to admit as little air as possible to the fires (¼ of the amount formerly admitted) and to "feed a little at a time and often." A. We do not think these matters are so definitely settled that a general rule can be given which will be applicable to all cases. We have known of a number of cases in which it seemed to us that there was an advantage arising from admitting air above the fire. We do not at present recall the experiments to which you refer, and would be glad if you would send us a record, in case it is convenient.

(12) G. M. E. says: 1. I wish to construct a boiler for a 2 inch cylinder engine to carry from 20 to 30 lbs. steam. What should be the size and thickness of boiler? A. It should be 20 inches in diameter and 3 feet high. 2. Would the engine be large enough to run a small round-bottomed boat, 4 feet long and 4 feet beam? A. Yes.

(13) W. H. M. asks: How can I make something to resemble snow, suitable for making a miniature winter scene? A. Use small pieces of paper.

(14) G. W. T. asks: 1. I am building a small engine, 1½x3 inches stroke. Will ports ⅛x¾ be too large to drive a small 6 inch foot lathe with 40 lbs. steam pressure? A. The engine will answer very well. 2. What weight of fly wheel would I want for such an engine? A. From 15 to 20 lbs. 3. Of what size should the steam pipe be? A. Use a steam pipe of about ⅜ of an inch in diameter.

(15) C. W. McC. says: I have water which I bring in a wooden conductor, of two inches bore and thirty rods long with fifty feet fall, using the same on a fifteen inch wheel to drive a churn. Would the power be increased by erecting a bulkhead at the lower end of the conductor 20 feet high, closed at the top and connecting the wheel with the bulkhead? A. We cannot see, from your description, how it could be.

(16) J. R. says: A plate is 10 feet long by 6 inches wide by 2 inches thick; 6 inches of its width is iron and 2 inches steel, welded together. At each end and in the middle, on both sides, I desire to weld on square pieces of iron, each piece 8 inches square and 2 inches thick. Can these six pieces be welded by passing them with the plate through the rolling mill in the same way as the plate was rolled, and welded at the last passage of the plate through the rolls? I suppose that the pieces could be welded by hand. A. There would be some difficulty in effecting the weld as you suggest, as it probably never has been done, so that the question could only be decided definitely by experiment.

(17) J. C. asks: 1. I wish to place a small engine in a boat 18x2 feet, and am told that it will be very dangerous to have an upright boiler, on account of the boat's rolling. Would it be so? A. It is very common to use vertical boilers in small boats. 2. What speed could be got from such a boat, drawing 8 inches water, with an engine 3x3 inches, and a boiler pressure of 50 lbs.? A. If the boat is well designed, you might get a speed of 6 miles an hour.

(18) C. H. P. asks: What is the difference between one square mile and one mile square? A. None.

(19) H. S. says: I am building a small steam engine 2x6 inches; the exhaust is ⅝x¾, and the steam ports ¼x¾. Do you think the exhaust is too small for the steam? What size of boiler will I have to get for the engine, and what pressure of steam will I have to carry to get the most power? This engine is a beam engine with side pipes and two steam chests, as on river boats, but I shall have slide valves instead of the usual poppet valve. Do you think they will admit it up to the Fair next year? I have only been at my trade two years. I designed and made my own drawings and my own patterns for the engine. A. The dimensions of ports will answer very well. A boiler 1 foot in diameter and 3 feet high will answer to run the engine, but not to do much work. The higher the pressure of steam, the more power you can obtain from the engine. You will have no difficulty in exhibiting your engine at the American Institute Fair. We should judge that you were doing very well at your trade.

(20) L. M. asks: Will a stack 30 yards high without artificial heat, ventilate upwards regularly? If so, what is the cause of it? A. It will, for the same reason that the products of combustion from a boiler pass up the chimney.

(21) H. H. C. says: 1. I am building a steamboat with 15 feet keel and 4 feet beam. She is 2 feet deep. She has an upright engine, cylinder 2 inches bore by 4 inches stroke. Her propeller wheel is 15 inches in diameter; boiler is horizontal, 25 inches long, with 11 two inch return flues working at a pressure of 100 lbs. Firebox is 30 inches long. How much weight will the boat carry? A. It would be necessary to make a calculation from the drawing of the boat, but you can easily settle the matter by experiment, either with the boat or a model. 2. How fast will she run? A. The boat will probably have a speed of from 6 to 7 miles an hour, under favorable conditions.

(22) S. D. asks: A few weeks since I saw, on exhibition in Chambersburg, Pa., a machine called a perpetual motion. It worked with levers and balls. It drives a balance wheel and several cog wheels. I could not see where the power to drive it was applied. The machine was placed on a boxed table that looked suspicious. How is it driven? A. We never heard of it before; but it reminds us of a story we once read of a wheel that started itself and neverstopped, but which did stop when the horse that was turning it got tired.

(23) F. D. asks: 1. Will water flowing from a hight of fifteen feet perpendicularly through a two inch tube, the lower end of which tube is gradually contracted to one inch in diameter, turn an overshot water wheel three feet in diameter with sufficient force to drive a small two gallon churn? A. It ought to drive a number of such churns. 2. What amount of water would flow through such a tube in an hour? A. From 300 to 400 cubic feet. 3. Could not more work be obtained from an overshot water wheel than from any other with the above conditions? A. We think it likely.

(24) T. R. says: I am desirous of discharging grain from the cars to a flouring mill at a distance of 350 feet. The discharging point can be a few feet the lower, if desirable. Can it be done through an airtight tube, by suction or otherwise, and would an exhaust fan produce a sufficient vacuum to do the work? A. We think a suction fan would answer very well. See our front page of this issue.

(25) E. W. P. asks: Is it true that the lateral pressure of water against a perpendicular surface of any hight is just the same when the water extends back only one inch, as it would be if it extended back twenty feet or any greater distance? A. Yes, it is true; and the reason is that the pressure of water is transmitted equally in every direction, so that it only depends upon the hight of the column and the area of the surface pressed.

(26) C. S. B. asks: What size of engine is necessary to propel an ordinary Whitehall boat, 18 feet long, at a speed of eight miles an hour? What should be the size of boiler and screw? A. Engine 2x3 inches; boiler 24 to 28 inches in diameter; propeller 22 to 24 inches in diameter, with 3 feet pitch.

(27) P. F. M. says: 1. Our fire engine has a 9 inch cylinder with 12 inches stroke; pump is 5 inches in diameter and 12 inches stroke, double acting. The boiler has about 165 square feet of heating surface. We have two checks on our air