Notes & Queries

W. H. R. asks once more the question as to the cannon fired from the rear end of the car. If he will refer to p. 273, vol. 32, he will find a solution of the difficulty. This answers a great many other correspondents.—F. M. J. will find an answer to his question as to the dimensions of a boat and engine to carry 20 persons on p. 299, vol. 34.—L. V. R. will find directions for reducing the temperature of water on p. 82, vol. 33.—F. H. H. will find an account of the manufacture of saltpeter on p. 52, vol. 34.—M. G.'s queries are too metaphysical for our columns.—H. V. will find a recipe for aquarium cement on p. 80, vol. 31.—C. A. B. will find directions for recutting old files with acid on pp. 363, 379, vol. 28.—M. B. should read our article of flying machines, on p. 112, vol. 32.—F. Z. A. will find a prescription for moles on p. 331, vol. 31.—O. H. P. should fasten his engravings in a book with rice glue. See p. 155, vol. 32.—R. P. will find an account of the fastest passage across the Atlantic on p. 97, vol. 34. It is absurd to maintain that a sailing vessel can beat this time.—A. P. H. can clean kerosene stains from marble by the process detailed on p. 347, vol. 34.—G. W. W. & S. will find a recipe for black paint for iron on p. 255, vol. 34.—C. L. M. will find directions for gilding on china on p. 43, vol. 29.—J. F. B.'s query as to a spring can only be answered by a manufacturer.—W. S. C. should read our article on p. 386, vol. 26, as to Paris green.—E. O. K. will find an excellent representation of a cistern filter on p. 282, vol. 34.—O. H. will find directions for making illuminating gas on a small scale on p. 131, vol. 33.—I. M. I. should forward a copy of his pamphlet to Professor Proctor.—S. D. L. will find directions for ridding a house of rats on p. 67, vol. 29.—A. F. S. and a great many other querists are referred to p. 273, vol. 33, for a description of an incubator.—R. H. will find a recipe for white hard soap on p. 331, vol. 31.—J. P. L., W. I., F. J. M., B. T. B., C. F. S. D., V. C. S., N. P. A., L. C. D., B. B., and others who ask us to recommend books on industrial and scientific subjects, should address the booksellers who advertise in our columns, all of whom are trustworthy firms, for catalogues.

(1) D. B. says: My locomotive boiler ought to be felted; but the grease strikes on some parts of the boiler, and I do not know how to work felt on account of the grease. What shall I do? A. With the exercise of a little ingenuity, coupled with a less liberal expenditure of lubricant, you could get the boiler into proper condition for felting.

(2) G. P. M. C. says: I wish to make a small steam boiler, 14 inches in diameter and 30 inches long. How many lbs. pressure to the square inch would it stand with safety if made of sheet copper $\frac{1}{16}$ inch thick, steel of the same thickness, or iron of the same thickness? A. Copper 25 lbs., steel 45 lbs., and iron 35 lbs. to the square inch.

(3) L. M. F. asks: 1. What should be the thickness of the heads, shell, and tubes of a return tubular boiler 13 by 5 feet, with 4 inch tubes, worked at 80 lbs. pressure per square inch? A. Thickness of shell and heads, 0·6875 inches, tubes 0·134 inches. 2. By putting in 4 inch tubes, would I not obtain a stronger draft than with 3 inch ones? A. Not appreciably.

(4) P. L. says: I have an oxygen gas cylinder made of ¼ inch boiler plate iron, well riveted and made. How will I test it, to know whether it will stand the pressure of gas from a given amount of chemicals? A. Fill it with water, and heat it gradually, attaching a safety valve which will open when the desired pressure is reached.

(5) P. S. N. asks: Can you inform me as to the merits of gravel or concrete houses? A. Houses answering every essential requirement can be erected with concrete walls; and where the materials are found or can be procured on or near the premises, a balance can be struck in their favor on the score of economy. In regard to the method of building them, the usual course has been to carry up the walls solidly in sections, so affording a considerable saving of labor in the handling of the materials; although quite a number in this vicinity have been erected by the system of building blocks, notably a large church near Newark, N. J. Confidence in the latter method, however, has been much impaired by the fall of a tower so constructed in Westchester county, N. Y.

(6) P. S. N. asks: 1. How are concrete structures as regards durability, heat, and frost, etc.? A. Concrete walls properly constructed become as hard as stone, and have been abundantly and favorably tested in respect to the action of the elements upon them. 2. Will you please give me the proportion of ingredients, as well as the *modus operandi* in full? A. The theory as to the proportion of the ingredients is that, when the broken stone, gravel, and sand are combined, there should be sufficient cement and water added to coat every grain of sand, etc., and fill all the interstices between them, thus binding them into a solid mass. A proportion of 5 parts stone and gravel, 3 parts sand, and 1 part cement, is supposed to effect this. Good cement and sharp sand free from loam should be used, with plenty of water. Mix in a mortar box, carry to the wall in a hand barrow, and deposit it on the wall between two stout planks held in place by proper frames; remove the plank when the cement sets, and float the face of the wall smooth. 3. Can I mold the blocks one day and lay them in the mold the next? A. In that system a much longer interval is desirable. 4. Can the chimney flues and tops be of the same material? A. Yes, if the chimneys are built large enough to give sufficient thickness of wall around the flues, and a larger proportion of cement is used. 5. Supposing a well 25 feet deep is closed 20 feet below the surface, leaving a reservoir of 5 feet into which a pipe leads to pump the water through, what is the effect on the water? A. A pipe for ventilation would be required. 6. Of what thickness should the walls be made, for a cellar 8 feet high, and for 2 stories 9 feet each? A. Cellar 18 inches, first story 15 inches, and second story 12 inches. 8. What are quick and hydraulic lime? A. Quicklime is freshly burnt unslaked lime; hydraulic cement is a cement that hardens under water, and is not deteriorated by the action of water upon it.

(7) J. L. asks: 1. Will an engine work as well at a distance of 60 feet from the boilers as it will near them? A. With a well covered and trapped pipe, the difference will be very slight. 2. How much more power and steam does it require to run a circular saw at a distance of 60 feet from the engines than it would take if the saw were 12 feet distant from the engine? A. From 10 to 15 per cent more, with a good connection. 3. The steam pipe will be exposed to open air for 40 feet between the two buildings. Will it be liable to get out of order? A. Not necessarily. 4. Would you rather have the engines at a distance from than near the boilers? A. It is best to locate the engines as near the work as convenient.

(8) T. S. L. says: The outside p'astering of my house, near the ground, comes off for about 2 feet up. I have tried plastering in different seasons, so that it might dry thoroughly, but without success. What will make the plaster adhere? A. A coat of hydraulic cement in well washed sharp sand, for 2 feet up from the ground, might stand. It might be started upon a footing of slate driven into a joint of the brickwork at the surface of the ground.

(9) R. D. says: Will a ¾ inch pipe 75 feet long, supplied with water from the main through a ½ inch stop, deliver as much water as if it were connected with a ¾ stop? A. No.

(10) A. W. says: We are building a church 40 by 60 feet, with side walls 16 feet high and a roof at an angle of 50°, 24 feet high in center. We are making the ceiling flat overhead. Our carpenter argues in behalf of the old style of main rafters (7 by 10 inches) king post and cross beams, the latter to be 12 feet apart; now I contend that a plan, making each pair of rafters out of joists 2 x 8 inches, with cross joists, 2 x 6, well braced above the joists, each pair to be self-supporting, and placed 16 inches from centers, will be the strongest. Which is right? A. In all cases where the tie beam is placed above the foot of the rafters, there is danger of the weight of the roof spreading the walls apart, and thus causing a general settlement in the roof itself, often eventuating in its fall. Your carpenter's plan is the correct one, providing the walls are properly built to accord with it. The trusses being placed 12 feet apart, the windows should be located accordingly—one window between each two trusses in each side wall—and a stout buttress built with the wall at the bearings of each truss. These buttresses will resist the thrust of the roof, and maintain the integrity of the walls.

(11) C. S. says: I am using charcoal for blacksmith's purposes, and I cannot get heat enough to do ordinary welding, such as a plowshare or a wagon tire. The charcoal is made of cotton wood, and has a great deal of sand in it on account of having been burnt in sandy soil. How can I manage it any better? A. From your account, it seems that you must get better fuel to obtain a satisfactory fire.

(12) G. W. H. says. 1. A spring is 1,530 feet from a fountain, with 30 feet fall. How large must the reservoir be, and what size of pipe is necessary to secure flow enough to give a jet 10 or 15 feet high, or to supply a camp of 500 persons with water? A. The reservoir might be made 50 by 50 feet, with an average depth of 6¼ feet. This would allow about 25 gallons to each person. The friction of the water in the pipes would so reduce the head as to make the jet for a fountain of little account. 2. Would it pay to take the pipes up in the interval to prevent rust, camp meeting lasting only 10 days in a year? A. It would, provided you could thereby save the expense of sinking them into the ground.

(13) G. C. T. says: I propose to make a vessel on the plan of a Papin's digester. I use copper castings ¼ inch in thickness, outside and inside being turned off and properly stayed; what pressure to the inch would such a vessel bear? A. It will depend on the diameter.

(14) C. C. says: I am running an engine with locomotive boiler, taking muddy water from a pond. The deposit burns out the fire box, and I have to patch it. Is there no way to make the mud settle before the water goes into the boiler? A. Your best course would be to use a good heater.

(15) J. O. says: I have a canoe which is rather cranky. She is 20 feet long by 4 feet beam. Would two keels, one on each side of the center keel, make her less cranky, and improve her sailing qualities? A. A single keel made quite heavy would be more effective.

How are fret saws made? A. They are stamped out.

What is the red substance used by sailors for tattooing? A. Red ink or carmine.

(16) A. P. McC. says: Our schoolhouse here is warmed by steam, but it is not well ventilated There are about 20 rooms in our house, not including corridors. Please give me a good plan for ventilating. A. You do not state whether the heater operates by direct or indirect radiation. In the latter case the radiators are in the basement, and in the former in the several apartments. When the radiators are in the basement, they are enclosed in boxes at the bottom of the warm air flues, and the cold air is introduced into these boxes from the exterior atmosphere, thus insuring a continual supply of fresh air; but when the radiators are placed in the rooms, there is only a partial change of air, limited by the tightness or looseness of the doors and windows. When fresh air is introduced by a shaft in the basement, the fireplace flues should be kept more or less open for its egress; but in the case of direct radiation the radiators should be placed near the windows, and some means adopted to supply fresh air to each radiator, still keeping the fire flues open to insure a movement and gradual change of the air. Damper valves should graduate this movement, so as to adapt it to the state of the temperature for the time being.

(17) F. K. asks: Why are the sun's rays warmer in the valley than they are on the top of a high mountain? A. On account of the rarity of the atmosphere at the greater hight.

Would highly superheated steam, when mixed in small quantities with hot air, be better than hot air only for aiding the combustion of coal gases and coal smoke from soft coal, if admitted to the fires of stoves or furnaces? A. No.

(18) F. C. L. says: A steam pony pump, of the crank and plunger pattern, has diameter of cylinder 4½ inches, diameter of pump 3⅛ inches, stroke of both 6 inches, steam pipe to engine ¾ inches in diameter, feed pipe to pump and from pump to boiler 1 inch in diameter, 1¼ inch check valve between pump and boiler. Its work is to draw water 6½ feet perpendicularly from tank and force it into a boiler, which it did rapidly at a pressure of 35 lbs. to the square inch on boiler. It was necessary to remove the feed pipe from the tank below and place it into the lower end of a barrel standing about 1 foot from the pump. When the barrel was full, there was 2½ feet head of water over the pump, when the engine seemed powerless to move the pump and would not work at all unless we pulled her over the centers, even at a boiler pressure of 65 lbs. to the square inch. We then drove a plug into the end of the feed pipe, partially filling it up (say ⅜), when she pumped but very poorly. The pipe was then removed from the barrel and put down into the tank below, when she pumped like a charm. My opinion is this: that, when pumping from the tank below, the inertia of the water caused the pump to only partly fill, and therefore the engine had less work to do to force the water of the partly filled pump than when there was a head of water over the pump. Is this so? A. The feed pipe is apparently large enough, if it is direct; and from your description we imagine there is some defect in the pump, such as excessive friction or bad arrangement of pipes, valves, or ports, so that the steam cannot act to the best advantage. Your explanation, to the effect that the pump cannot deliver a full barrel of water against boiler pressure, is probably correct; and this points to some defect in the steam cylinder or its connections.

(19) R. R. says: 1. I am running an old-fashioned engine 7 by 18 inches, with cut-off at half stroke. The engine is set below water line of the boiler, and 6 feet from the boiler. When I let it stand for 10 or 20 minutes, I cannot start it without opening the stopcocks to let the water off. Would it do any good to raise the steam pipes 3 or 4 feet higher? A. Very little if any, we imagine, if the pipe is properly connected at present. 2. Would it make any difference to change the exhausts from 2½ inches by 12 feet long to 2 inches by 24 feet long? A. It will probably increase the back pressure slightly.

(20) W. C. W. asks: Why is it that one of two circular wheels, having the same diameter and being on the same axle, runs faster than the other in turning a curve? A. The "why" is evident: because one wheel has to go farther than the other in the same time. The "how" is almost equally evident: one of the wheels must slip.

(21) G. N. L. says: Please tell me which would require the greater amount of force in raising ice into an ice house, a steep incline or a gentle incline. A. Using the same motor in each case, a heavier load could be raised on the gentle incline, but not as fast as the lighter load could be raised on the steep incline.

(22) W. H. asks: If a rifle barrel be accurately bored for ten or more copper cartridges, what would be the result, in the matter of deflection of the shots, if all were fired simultaneously? Would the rapid rotation of the balls in the air, in close proximity to each other, materially scatter the balls? A. No, we think not.

(23) C. F. S. asks: Would it be possible for me to obtain water enough, through a brick wall placed in a flume for the purpose of filtering, to supply a 3 inch pipe, for washing purposes? The wall is 7 feet long by 6½ feet high. A. The difficulty is that such a filter soon becomes foul and fails to perform its function. A reservoir in two compartments, where the water may lie still for a certain length of time for the impurities to settle out of it, and another to receive the pure water and distribute it, has been found to answer better in cases like this.

(24) S. C. J. says: Is it necessary to cut the rifling of a breech-loading gun deeper at the muzzle than elsewhere? A. We think not.

(25) A. S. says: I am about erecting a wheel on my plantation for the purpose of drainage. Such wheels are generally set on bricks, but I am compelled to set my wheel on wood. What is the best preserver for wood exposed, partly to water, partly to the atmosphere? I intended to use for this purpose two coats of heated coal tar, but I am informed that crude coal oil as it comes out of the mine is preferable. Is this so? A. We think the coal tar will answer very well, if you take care to keep the exposed surfaces covered, renewing the application as often as necessary.

(26) G. J. E. asks: Would cold air, forced into the bottom of a dry house filled with cut staves, dry the timber in a reasonable time, chimneys taking the damp air from the bottom? A. A constant current of air driven through a building