Notes & Queries

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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