Notes & Queries

M. J. G. can give a gloss to writing ink by dissolving a little refined sugar in it.—J. W. is confusing brass and bronze. The former is made with zinc, the latter with tin. The article on manganese bronze, p. 353, vol. 34, is perfectly correct.—C. W. T. will find particulars of a fast railway train in this country on p. 393, vol. 34. Mr. Brunel's 78 miles an hour was done on the Great Western Railway, England.—W. W. B. will find on pp. 320, 336, 352, vol. 34, a history of the progress of the past century.—A. V. W. can remove ink from writing paper by the process described on p. 154, vol. 34.—A. P. can calculate the proportions of screw-cutting gears by the method described on p. 107, vol. 34.—T. W. M. will find a description of the Gulf weed on p. 91, vol. 31.—G. T. W. will find an answer to his cannon and car question on p. 273, vol. 32. As to the relative speeds of the top and bottom of a wagon wheel, see p. 298, vol. 31.—K. L. C. will find a description of the operation of a fly wheel on p. 288, vol. 28.—J. F. S. will find on p. 329, vol. 33, a description of a battery suited to an electric light.—G. will find on p. 213, vol. 34, directions for making polishing starch for laundry use.—F. J. R. will find on p. 344, vol. 34, particulars of the fastest trains on record.—A. S. can prepare fulminate of mercury by the formula given on p. 234, vol. 30.—S. G. A. can measure high temperatures with a pyrometer. See p. 50, vol. 33.—E. E. N. will find directions for polishing metals on p. 57, vol. 34. For the best method of polishing plated work, see p. 251, vol. 33.—R. W. D. and others will find an explanation of the different speeds of points on a carriage wheel on p. 298, vol. 31.—F. W. B. and A. L. will find directions for making colored fires on p. 203, vol. 34.—G. D. can purify water for drinking purposes by the process described on p. 395, vol. 32.—O. can lacquer his fine brass work. See p. 242, vol. 34.—W. J. McL. will find on p. 376, vol. 24, a description of the use of the steam plow in this country.—J. H. M. will find on p. 74, vol. 32, a recipe for balloon varnish.—E. B. R. will find on p. 214, vol. 32, a description of a boiler injector.—C. M. N. can bleach straw hats with sulphurous acid. See p. 11, vol. 32.—D. J. T. will find on p. 348, vol. 34, a description of the deepest well.—A. A. S. will find on p. 331, vol. 32, directions for measuring the piece of timber.—E. A. M. will find on p. 180, vol. 26, directions for proportioning cone pulleys.—E. O. R. can find on p. 186, vol. 34, a recipe for a depilatory.—E. D. R. will find on p. 186, vol. 34, directions for nickel-plating his brass instruments.—B. F. J. should consult a physician.—W. F. B. does not state what his boiler covering is made of.—P. F. E.'s question is merely metaphysical.—M. B. can bronze brass castings by the method described on p. 51, vol. 33.—D. H., C. W. S., J. B. H., C. F., B. L., W. B., R. J., R.N., E.N., S. V. N., M. D., W. K., 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) J. H. Jr., asks: 1. To what extent will a column of mercury expand when contained in a ½ inch pipe, 2 feet long, a gentle heat being applied? A. Mercury expands about 0·018 of its volume when heated from 32° to 212°. 2. Will mercury, when confined, expand with great force, like iron or other metal when slightly heated? A. Yes. 3. Will mercury injure iron in any way? A. Under ordinary conditions, no.

1. When gunpowder is exploded, is it changed into gas? A. Yes. 2. Could a little be exploded in a strong iron vessel until a great pressure is obtained, and the gas then be used to drive an engine? A. Such plans have been proposed. Usually, however, the gunpowder is inimical to confinement.

(2) F. C. S. says: 1. I am running a small engine of six horse power, but the boiler is rated at 12 or 15 horse. How many bushels screenings ought it to take to run the engine one day? A. The question is too indefinite. 2. What kind of grate ought we to use for screenings? A. One with narrow air spaces. 3. Which is the most economical, to keep a thick or thin layer of screenings for the fire? A. That depends somewhat upon the draft; and any one can readily settle the matter for his particular case by a few trials.

(3) E. P. says: I have occasion to use permanganate of potassa solution in staining woodwork, and have had some trouble on account of its affinity for metals. Of what metal shall I make a tank 2 feet by 4 feet, and 8 inches deep, to contain permanganate of potassa solution? A. In contact with strong solutions of this salt, all of the more common metals are gradually oxidized and dissolved. Vessels of glass, porcelain, or porcelain-lined iron may be employed: or, in case these cannot be obtained of sufficient capacity, tanks or wells made of brick, and lined with large flags and good cement, could be made to serve your purpose.

(4) J. C. O. asks: What effect will kerosene oil have on galvanized iron? A. If the oil contains no free mineral acids, it will not injure the iron. Galvanize your iron on both sides.

(5) E. H. M. says: 1. I am running 5 pairs of stones, using hard coal screenings. Will the arrangement work equally for burning soft coal slack, tan bark, etc.? A. It does not necessarily follow that a furnace giving good results with refuse coal will also answer for wet tan and sawdust. 2. I get an intense heat, but am afraid my boiler will not stand it, as I have only 20 feet of fire grate surface. Would it be better to double the grate surface, and keep a thinner fire? A. If you will send us a sketch of your furnace, we will be glad to give our opinion. From your account you seem to be doing very well.

(6) S. H. asks: Is there any way of sawing cast steel bars as large as 6x1½ inches, when hot? A. Bars of steel or iron of any size can be cut off, either hot or cold, with a circular frictional disk running at great velocity. The rim of such a saw should travel at about 20,000 feet per minute.—J. E. E., of Pa.

(7) W. K. P. asks: Will you please be kind enough to give me a good recipe for making red calcium lights, such as are used on stages, tableaux, etc.? A. Place the light in a suitable lantern provided with a large condensing lens. The color of the rays may then be varied to suit the fancy by interposing near their focal point pieces of thin, finely colored glass. The glass employed for this purpose should be small, well annealed, of uniform texture, and as thin as possible.

(8) G. T. W. asks: If there be a hill three miles over and one across the base, would it take any more stakes or palings to build a fence over the hill, three miles, than to build one across the base, one mile, if the stakes or palings stand perpendicularly? A. No.

(9) W. B. says: 1. Animal and vegetable oils will bleach in the spring when we have cool days (in the ordinary glass bleaching houses, such as are familiar to all oil manufacturers, and which resemble an ordinary hot house) much faster than they will at midsummer, when the sun is stronger and the atmosphere hot. Why is this so? An ordinary observer would suppose that, the hotter the sun was, the faster the oil would bleach; but this is not the case. A. The bleaching quality of sunlight is chiefly confined to the more refrangible rays of the upper or violet end of the spectrum. They seem to act by virtue of a peculiar reducing or deoxidizing power; while the heat rays, or those from the lower or red end of the spectrum, on the contrary, serve to stimulate oxidation and fermentation. This latter force is comparatively slow in its action in comparison with the activity of the former, and can therefore only slightly influence or retard the final results. 2. Can you tell me the reason why hothouses and forcing houses for plants are always ventilated at the top? A. You are mistaken as to the fact.

(10) R. H. says: In making French mustard, I have some trouble in bottling the same. After being bottled, it ferments and forces the corks out, and smells badly. What can I do to prevent this? A. After filling the bottles, place them loosely stoppered in a large vessel of water, which gradually raise to the boiling point. Then remove the bottles and seal them. It is common to allow the bottles to stand 48 hours before performing the above operation.

(11) F. McA. asks: With what can I clean diamonds? A. You fail to state with what the stones are soiled. Try the following list of substances in the order named: Water, alcohol, ether, hot benzole or naphtha, bisulphide of carbon, dilute acids, dilute alkalies, strong acids, strong alkalies, mechanical friction with putty powder, rouge, fine emery.

(12) F. J. says: I wish to have cast a vessel somewhat like the air chamber of a hydraulic ram, but wider at the bottom, being 7½ inches in diameter at base, 10½ inches in widest part, and 12 inches high. What is the least thickness it should have to safely sustain a pressure of 75 to 80 lbs. to the square inch, if made of ordinary cast iron, and of cast malleable iron? A. It should not be less than ¼ or ⅜ of an inch thick, in either case.

(13) J. C. Jr. asks: 1. How can I make a cheap soda water fountain for family use? A. It would be safer for you to purchase one. 2. What is the composition of soda water? A. The so-called soda water is simply water that has been supercharged with carbonic acid gas under pressure. When allowed to escape from under pressure, a portion of the dissolved gas escapes into the air, causing the effervescence or briskness of the beverage.

(14) H. S. K. says: In making small anchovy casks, the staves are cut with a bilge, and leak. The brine oozes out through the pores of the oak because they are cut with the bilge. Is there any preparation that will make them tight? A. It is common to fill the pores of the wood with hot rosin. If this does not give satisfaction, try the following: Make a strong solution of glue in hot water and add a sufficient quantity of tannin to precipitate all the glue. Wash this precipitate of tannate of gelatin (artificial leather) in running water for some time, dissolve it in boiling vinegar, and while hot flow the interior of the cask with the liquid. Allow it to partially dry, and then fill the cask with clean water, allow to stand for several hours, and finally remove the water, invert the cask, and allow to dry.

(15) J. M. M. asks: 1. How can I bleach stearin at one operation? I am at present obliged to melt the stearin twice (for making candles); the first melting leaves it too yellow. A. Your method is perhaps one of the most practical and economical. 2. What is the cause of the yellowish tint? A. The color is due to a mechanical admixture of liquid oleic acid with the crystals of the solid stearic and margaric acids.

(16) J. M. H. asks: Has there ever been invented any means to destroy the dead center in an engine? A. Yes. Rotary engines have no dead centers.

(17) A. I. P. asks: 1. How can the two rules, published on p. 33, vol. 33, and p. 276, vol. 34, relating to the power of small engines, be reconciled? A. The first rule is for the actual horse power, and includes deductions for friction of pipes, friction of mechanism, condensation, radiation, etc. To apply the second rule, the average steam pressure, which would not be equal to the initial pressure, must be known.

(18) R. B. says: I am about to organize a fire brigade, each man to be armed with, among other things, a knotted cord 20 feet long with a hook on the end, so that he can go upon the roof of a building and sustain himself by the hook and cord from the ridge pole. Can a rope be so prepared as to be non-combustible, that is, when in use as described? A. Probably the best thing you could use would be rope of galvanized iron wire, which is very strong and quite flexible. Knots can easily be made at intervals by weaving in a single strand of wire with the strands of the rope, so as to form the rings called by sailors Turk's heads. We cannot positively recommend any of the various fireproofing solutions when life depends on their efficacy. Tungstate of soda in solution is employed for fireproofing fabrics, but might not prevent charring, which would greatly weaken the rope. You might carry a core or strand of iron wire through the line, and use tungstate of soda in addition, the wire being strong enough to bear a man's weight in case the rope should be burnt through.

(19) E. O. says: Can you tell me how to treat wood so as to make a good plate for an electrical machine? A. There is no good way. Use glass or ebonite.

(20) H. M. W. says: 1. In your article on the apparent size of the moon, p. 305, vol. 34, you say that a ¼ inch hole at 28 inches distance would bring it under an angle of half a degree. What are we to understand 1° to be at that distance? A. Nearly ½ an inch, more correctly 0·47 inches. 2. In figuring I find 1° of a circle 11·46 inches in diameter to be $\frac{1}{10}$ of an inch, which would make ¼ inch at that distance occupy 2·5°. Am I correct? A. You are correct, and so were we. If a quarter inch hole at the distance of 6 inches is seen under an angle of 2·5°, it would at a distance of 28 inches be seen under an angle of 6x2·5° divided by 28, or 0·233 inch, for which we use 0·25 or ¼ inch, intending that the hole should slightly surpass the apparent size of the moon so as to allow the observer to see the edges.

(21) A. B. asks: Does the temperature of zinc and mercury rise when a current of electricity passes through them? A. No.

(22) F. I. M. says: 1. I have made a telegraph sounder and wound it with No. 20 (English gage) wire, 20 feet on each spool. It works well enough by itself; but when I put it on a line with other instruments, it fails. I think the wire is too large. What number (American gage) of wire should I have, and how many feet on each spool? A. Nos. 20 to 23 are good sizes; but there should be about 150 or 200 feet. 2. Where can I get full instructions for making an induction coil? A. See p. 344, vol. 33, and p. 362, vol. 31.

(23) C. S. M. asks: What is a birdseye view? A. It is a view taken from above the object, and is always a perspective, except when taken looking directly down.

(24) W. says: I have a building to protect from lightning. The size of tin roof and cornice is about 80 x 114 feet, and the house is about 35 feet from a canal, about 60 feet wide and many miles long. Will a rod of ordinary construction, with the lower end of it in the water of the canal or in the wet mud at the bottom of it, have a sufficient contact to give full protection? If not, what do you recommend? A. It should be understood that all conductors offer some resistance to the passage of electricity, and that a current divides among several conductors in proportion to their conducting powers. The materials of a building are to some extent conductors, consequently, unless the resistance of the rod and its connections with the earth are almost infinitely less than that of the building, some of the charge will pass by way of the latter. As a general thing the ordinary rod offers sufficiently long resistance or is a good conductor; but the earth connections in nine cases out of ten are faulty. Water is a better conductor than damp earth, to be sure; but the fact that an equal volume of water or of earth offers very many times greater resistance than metals seems to be overlooked. In order to reduce the resistance at the junction of the rod with the earth, the latter must have great surface contact with the former, and this is only effected by using exceedingly large metallic terminals for the rods. The statement of requirements referred to is not, in the main, extravagant.

(25) M. S. S. asks: 1. Have the poles of the earth the same temperature? A. It is supposed so. 2. Have they the same length of night and day? A. Yes, when the sun is on the equator. 3. How near to the poles does the land extend? A. That has not yet been determined.

(26) G. R. T. asks: Why does the moon go farther north and south than the sun? A. Because the moon's orbit is inclined 5° 9′ to the ecliptic, which causes her to go north of the equator 28° 36′, and also the same distance south, while the sun goes only 23° 27′.

(27) D. H. asks: 1. What pressure ought a boiler 18 inches long and of 6 inches diameter, made of $\frac{1}{16}$ inch copper, to stand per square inch, if bound with hoops of same metal, ¾ inch wide and 3 inches apart? A. It would be safe to carry from 75 to 80 lbs. 2. What size ought the cylinder to be in proportion to this boiler? A. Diameter ¾ x 1½ inches stroke. 3. What should be the diameter of the fly wheel? A. Make it 4 or 5 inches. What is the easiest method of cleaning old files? A. Use a wire scratch brush.

(28) D. F. asks: How much steam will it take to lift 2,000 lbs. off a 5⅝ inch pipe, inside diameter? A. Divide 2,000 by the area of the pipe which gives nearly 25 square inches.