Notes & Queries

L. K. Y. will find directions for lacquering brass on p. 283, vol. 31. The Minotti battery is described on p. 26, vol. 32.—H. M. will find a full description of artesian well boring tools on p. 54, vol. 33.—A. F. H. will find a recipe for aquarium cement on p. 202, vol. 28.—W. R. will find a recipe for paste for labels on tin boxes on p. 253, vol. 30.—J. W. C. P. will find directions for casehardening iron on p. 202, vol. 31.—J. B. will find a description of paper boats on p. 163, vol. 27.—C. B. H. can calculate the power of his engine by the rules given on p. 33, vol. 33.—L. M. S. will find directions for making an æolian harp on p. 330, vol. 26.—D. O. will find a recipe for filling for walnut wood on p. 315, vol. 30.—P. V. J. will find a recipe for cement for gas bags on p. 395, vol. 32.—W. B. will find directions for making Pharoah's serpents on p. 315, vol. 32.—R. R. W. will find a full description of the Carré ice machine on p. 82, vol. 33. Salicylic acid is described on p. 96, vol. 33.—E. R. & W. will find a recipe for copying ink on p. 123, vol. 32.—L. K. L. will find a description of blue lacquer on p. 75, vol. 22.—W. B. H. can destroy ants by sprinkling salt plentifully over their holes.—P. C. H. will find a recipe for indelible ink on p 112, vol. 27.—A. C. H. will find that the construction of a windmill is fully described on p. 241, vol. 32. There is no government foolish enough to offer a premium for a perpetual motion.—A. O. will find formulas for engine fly wheels on p. 251, vol. 32.—H. E. H. will find directions for expelling rats on p. 66, vol. 32.

(1) C. M. asks: Why does the sun shine in at the north door in latitude of a house 40° N. in the summer? It seems to indicate that the sun is further north than 40°, though the sun never comes further north of the equator than about 23·5°. A. Were the earth so poised in space that the sun were vertical at the equator throughout the year, it would, of course, rise exactly in the east, and set exactly in the west throughout the year, for this is what the sun does do on March 21 and September 23, when it shines vertically at the equator. As the earth's inclination from a perpendicular to the plane of its orbit is the same throughout the year, thus causing unequal day and night, alternately north and south of the equator, when the sun shines vertically at the equator it shines obliquely, more or less, according to the latitude toward either pole; and the moment that it deviates from a perpendicular at the equator, it must shine beyond the north pole, as in our summer, or beyond the south pole, as in our winter. When the sun's declination is 23° 28′ north of the equator, as at the summer solstice, it, of course, rises 23° 28′ north of an east direction, and then will shine in at a north door for a portion of the morning and evening, until, in its oblique course through the heavens, it reaches those points where it will be south of an east course in the morning, and south of a west course in the evening. At the north pole, at the summer solstice, and for 23° 28′ this side of the pole, the sun will shine directly into a north door at midnight; and at the exact pole it will, at that hour, occupy a position in the sky 23° 28′ above the horizon.

(2) A. E. P. asks: Will a three horse engine give power enough to run a small planing machine to plane boards about one foot wide? A. It may not run the machine at full speed, but it will probably answer quite well.

(3) G. B. says: The pump on our boiler suddenly stopped working, without any apparent cause. It cannot be made to force water into the boiler in any amount, though it will pump when there is no pressure. The water is merely forced both ways between the cistern and pump valves. The packing around the plunger is perfectly tight. The valves have been refitted and well ground into their seats. Every part is in as good repair as a machinist experienced in making engines and pumps can make it. Where can be the defect? A. As you state the case, it is indeed a mystery. But if the pump continues running when turned on to the boiler with the cylinder full of water, and still does not deliver any water, it is reasonable to suppose that there is a leak. You can try the experiment, and settle the matter conclusively.

(4) J. P. asks: Can I draw water through a ½ inch lead pipe, out of a well, over a hill, to my house, the distance being about one hundred rods, and the rise from bottom of well to top of the hill 25 feet, and the fall from the top of hill to the house about 35 feet? A. Yes, if you make provision for drawing off the air that will collect at the highest part of the pipe. You must also be very particular to lay the pipe without kinks and bends, and with easy curves, whenever it is necessary to curve it at all.

(5) T. C. H. asks: I have had an argument as to the value of a glass gage on a boiler. My friend claims that a gage glass is more liable to get stopped up than gage cocks, and therefore is useless and not reliable. He also claims that the glass is not of any value in detecting the foaming of a boiler, and that the only way to tell if a boiler foams is by carrying water over into the cylinder. I claim that the glass is the best. A man in charge of a boiler is not supposed to rely on the look of the water in the glass to determine the water line in boiler, unless he is sure that the openings of the tube are free from stoppage. It is as easy to try your glass as your gage cocks. I say also that, if the piston has a large clearance, it might carry a great amount of water in the cylinder without its being detected. Which is right? A. A glass gage is a very useful appendage to a boiler, and it is as easy to tell whether it is in working order as to determine the same for a gage cock. For several reasons, if it is necessary to make a choice between a glass gage and gage cocks in determining the fittings of a boiler, it is generally better to take the latter. When a boiler foams, it is frequently indicated in the glass gage, though the gage cocks give a more certain test. Glass gages are frequently fitted up in such a manner that foaming can readily be detected. A boiler containing clean fresh water may foam, if badly proportioned, or if the fire is violently forced.

(6) G. W. H. asks: Will it increase or decrease the power of an engine to raise numerous pyramids on the face of the piston head, so as to increase its surface? A. There would be no change as far as the effective area of the piston is concerned.

(7) J. A. B. asks: Do you know of a seed called bird pepper? If so, can you tell me any other name by which it is known? A. We are unacquainted with it under that name. It may be *capsicum annuum* or *piper nigrum*.

(8) B. T. asks: What are the names of the explosive agents that explode at a very low temperature, and what are the degrees of heat, respectively, at which they explode? A. There are many compounds known to chemists which explode with violence at temperatures below that of boiling water; but owing to their properties of undergoing spontaneous decomposition, as well as instantaneous explosion from the slightest cause, such as friction or contact with metals, etc., they are exceedingly dangerous to handle. Gun cotton might answer your purpose, but as regards the temperature at which it ignites, statements differ; it has been in some instances dried at a temperature of 90° to 100° without any dangerous consequences, while it has been found to ignite at 43°. In one instance a small magazine of guncotton situated in the Bois de Vincennes, Paris, was exploded by the sun's rays.

(9) A. L. K. says: The water in my cistern smells as though it were putrid. How can I render it pure and odorless? A. Place several bushels of animal charcoal in the bottom of the well.

(10) J. N. says: For the past six months my hair has been continually falling off. How can I remedy it? A. Try the following: Iodine (crushed small) ½ drachm, olive oil (lukewarm) ¼ pint; agitate them together in a small phial until solution is complete. It may be scented with a little essential oil of almonds or lemons; but it is better without it. Most of the other oils cause the gradual decomposition of the hair. It has been very highly recommended as a hair oil for daily use, in partial loss of hair and baldness, also to rub indurated glands, etc., with.

(11) O. W. B. asks: What can I put in with common glue to make it dry quickly and become hard? A. Try a little sulphate of lime (plaster of Paris).

(12) W. H. W. asks: Is it possible to decolorize a solution of copper and ammonia and still retain the copper in solution? A. Salts of copper, except in very dilute solutions, always reveal their presence by their characteristic blue or bluish green color; and in the presence of an excess of ammonia, the color, even in extremely dilute solutions, is of a strong, deep blue. In the presence of ammonia, therefore, the solution of the salts of copper cannot be rendered colorless.

(13) C. W. asks: By what process is crude coal tar refined and made into a paint? It is used extensively for roofing purposes. A. The tar is placed in large low iron stills, and heated to about 176° to 212° Fah. for the purpose of distilling off the lighter hydrocarbons along with the ammoniacal water the tar may contain. After about 36 hours, the residue, consisting of the refined coal tar, or coal tar asphalt as it is sometimes called, is drawn off by means of a tap in the lower part of the still.

(14) W. V. W. asks: What is the philosophy of death by sunstroke? A. *Coup de soleil* or sunstroke is thus mentioned by Tanner: "Causes: In its perfect form, it is met with only in the tropics. It has been noticed that those attacked have often been affected for a few days previously with suppression of perspiration. The nights have been sleepless, while attacks of vertigo and a sense of weariness have been complained of. Such men, too, may have been irregular in their habits; while perhaps they have also been indulging freely in alcoholic drinks, and prowling about under exposure to an almost vertical sun for two or three days previous to the seizure. Symptoms: These are generally faintness, thirst, great heat, and dryness of the skin, with prostration. As the disease advances, the heart's action becomes violent, the man can scarcely be roused, the face gets pallid and perhaps an attack of vomiting ushers in the stage of coma. The affection sometimes comes on very insidiously. A man will be seen to be listless and stupid; but he makes no complaint beyond saying that his head feels a little queer. Yet in twelve hours he may be dead. Dr. Morehead agrees with those observers who refer the phenomena of sunstroke to depressed function of the cerebro-spinal and sympathetic nervous systems. The three most urgent things to be performed in treatment are: Cooling the body, removing listlessness and oppression, and increasing the respiratory action.

(15) T. G. says: The inside of a store was painted with guaranteed pure white lead and pure raw linseed oil. All the white and light colored paint has turned yellow, even as dark as yellow ocher. Why is this? A. The trouble is probably due to the presence of some salt of iron in the materials.

(16) J. R. asks: I. In making plaster figures I use gelatin molds, made of glue. In summer the gelatin melts and I cannot work. How can I prevent this? Will tannic acid be of any use? A. No. Melt the gelatin in a small quantity of water by heating it over a water bath until a thick paste is formed; add glycerin in the same quantity by weight as the (dry) gelatin. Then stir the mixture and allow the excess of water to evaporate. It may then be poured on a marble slab or in a mold, and allowed to harden. The above, we think, will answer your purpose. 2. How can I melt pure rubber and make it into molds? A. Pure rubber may be softened by steam or hot water; but if melted by application of heat, it suffers partial decomposition, and does not gain in solidity. Caoutchouc dissolves in naphtha by heat and agitation. This is accomplished over a water and sand bath, or by means of a steam jacket, in closed vessels.

(17) J. M. H. says: Recently a frightful flash of lightning fell from the gathering clouds, striking a lightning rod, breaking it in two, and melting the metal, which ran down in drops. The house was somewhat damaged, pieces of the second floor being torn out and scattered over the room. The rod was only about three feet in the ground, and I think it had not a sufficient connection with the earth. Am I right? A. If the rod had been in proper connection with the ground, the currents would doubtless have passed into the earth without damage to the building. See p. 386, vol. 32.

(18) J. R. asks: 1. Under what conditions will common coal gas become a liquid? A. The requisites are a sufficiently low temperature and an adequate pressure. 2. What is the process of distilling coal oil or crude petroleum, and how are the lighter constituents collected? A. The crude oil is pumped into stills holding from 200 to 1,000 gallons each, and submitted to a gradually increasing heat, the vapors being passed through a worm immersed in cold water. At first, there comes over a very light, mobile, and volatile liquid, exceedingly inflammable. As the operation proceeds, the product is tested from time to time; and when the specific gravity corresponds to about 90° Baumé's hydrometer, the receiver is changed, and the operation of testing, but by a different standard, is again repeated. The receivers are changed several times, or until, at a high temperature, paraffin and illuminating gas constitute the bulk of the products of the distillation. At the end of the operation there remains in the retort, as the heat has been greater or less, a thick tarry matter, or a porous coke. The products of the distillation are commonly classified as follows: Those products whose densities are below 90° Baumé are termed gasolin; those between 70° and 80°, naphtha; from 60° to 70°, benzine; those between 40° and 60°, kerosene; and finally the heavier products, fit only for lubricating purposes, and paraffin.

(19) C. T. V. says: Please publish directions for welding iron rings without scaling. A. We know of no reliable compound for this purpose; but you might try the Belgian recipe. It is: Iron filings 1,000 parts, borax 500 parts, resinous oil of any kind 50 parts, sal ammoniac 75 parts. Pulverize completely and mix; heat the rings to a cherry red, powder the parts with the mixture, and join them together.

(20) T. H. asks: 1. Of what lenses are the most improved opera or field glasses composed, and what is their arrangement? What power is attainable in those of moderate size? The common telescope or spy glass is obtainable, of convenient size, to powers of 15 to 20 diameters, but it is inconvenient to use, being difficult to hold steadily without a rest, and it taxes the eyes more than a field glass. Is there any portable instrument having a power of 15 or 20 diameters? A. All opera and field glasses are constructed on the principle of the Galilean telescope, that is, with a convex object glass and a concave eyepiece. In the better class of instruments, all the glasses are achromatic. The object glasses are generally made with two lenses (crown and flint); and if the eyepieces are not achromatic, those are known as six-glass (three in each tube). Sometimes the object glasses and eyepieces are each triple achromatic, having three lenses in each, in which case the instruments are known as twelve-glass, and are so marked. In the best opera and field glasses, the power rarely exceeds 6, and is seldom more than 5. For a power of 15 to 20 diameters, you can get nothing that will be as good or as cheap as a telescope.

(21) M. H. V. says: I have just made a refrigerator, filled in on all sides with charcoal. There is a partition up and down through the center, with 4 holes 3 inches square through the partition. We put in 20 to 30 lbs. ice, and yet my butter, milk, etc., sours almost as though there were no ice in the refrigerator. There is a discharge pipe for waste water, 1 inch in diameter, running down from the ice box, which is of zinc. What is the trouble? A. We would suggest the removal, in part, of the partition. Also place in one corner a quantity of caustic lime, in such a position that water from the melting ice will not reach it, and see that the box is closed as tightly as possible.

(22) Bicycle.—You can probably buy good bicycles through carriage dealers at your place.

(23) M. E. J. asks: 1. Who was the first man who invented the self-rake on a reaper? A. The earliest instance of a self-acting rake on a reaper appears in an English patent granted to Mr. Gladstone in 1806. 2. Who invented the first reaper? A. The first account of a machine to reap grain appears to be given by Pliny the Elder, who was born, it is thought, in A. D. 23. And the first patent for a reaping machine was granted in England to Joseph Boyce, July 4, 1799, and in the United States to Richard French and J. T. Hawkins, May 17, 1803.

(24) J. C. C. asks: 1. Are metal roofs superior to lightning rods as a means of protection to dwellings? A. If the metal roof be connected with the ground properly, by means of several stout rods of copper or iron, which should also have connection with all the interior metal work of the building, this method will afford excellent protection to the property. 2. In what manner should metal roofs be constructed, of what metal