Notes & Queries

J. K. asks: How can I obtain a varnish or other liquid, that would be perfectly oil proof, and not crack when spread on a flexible surface? Soluble glass will not do.

G. W. B. asks: What is the best preparation for dyeing felt to a glossy black?

L. W. asks: How can brass be made of a permanent dark brown color without the use of paint?

G. W. C. asks: If two locomotives were placed at the summit of an incline and allowed to descend of their own gravity (all things being equal except the size of wheels, which are four feet diameter on one and six feet diameter on the other), which will reach the foot of the hill first? If either, why? [This is a good problem for some of our younger readers, and we would be glad to hear from them on the matter.—EDS.]

H. M. H. asks: How can I prepare test lead for assayer's use? I want to get it free from silver, copper, etc., and to have it as nearly pure as possible.

C. E. R. asks: How can I make ink which, if used on blue writing paper, will take the color out, leaving a clear white letter?

Answers to Correspondents

C. C. says: I wish to make a small speculum for a reflecting telescope. 1. Can I electroplate the surface of my mold with speculum metal? 2. If so, how can I polish the surface of my mirror? 3. Is there any way to determine the dip of the speculum that will be necessary to overcome all aberration? Answers: 1 and 2. Speculum metal, being an alloy of copper and tin, you cannot plate with it; but you can of course plate the surface of your mold with silver, which, when polished, gives an excellent reflecting surface. Polish with chamois leather and Paris white. 3. A parabolic form given to the mirror of a speculum will prevent aberration.

C. A. C. asks: 1. How can I bleach or whiten sponge? 2. How can I make a silver-coating solution? Answers: 1. Sponge can be bleached by first soaking it in very dilute hydrochloric (muriatic) acid to remove calcareous matter, and then in cold water, changing it frequently and squeezing the sponge out each time to remove all traces of the acid. It is next soaked in water holding a little sulphurous acid, or (better) a very little chlorine in solution. The sponge afterwards is repeatedly washed and soaked in clean water, scented with rose or orange flower water and dried. 2. You can silver brightly polished articles of copper or brass by using the following mixture: Silver dust (fine) 20 grains, alum 30 grains, common salt 1 dram, cream of tartar 3 drams; rub them together to a fine powder, make into a paste with water and rub on the surface of the copper or brass. The silver powder is made by precipitating it from a solution of nitrate of silver by means of a copper plate.

W. H. W. M. asks: What vegetable or mineral substance does the grape vine absorb from the earth in order to color the grape skins purple? Is the change due to the action of the sun? If so, what transformation does the grape go through? 2. What is the best and cheapest manner of preparing skeleton leaves for ornaments? 3 How can I remove ink from a Brussels carpet? Oxalic acid appeared to take it all out; but when the carpet dried, the dark color of the ink returned. Answer: 1. The change of color from the green unripe fruit to the purple grape is due to a molecular change, caused by the chemical action of light, or the natural organic changes in the fruit, on coming to maturity. A molecular change does not indicate any chemical change in composition. The influence of heat in effecting this change may be seen in the case of ordinary yellow and red phosphorus. Heat has effected a molecular change without altering the chemical composition. 2. Collect dry leaves and boil them for an hour or more in the following mixture: Dissolve 4 ozs. washing soda in 1 quart hot water, and add 2 ozs. quicklime; boil together 15 minutes, and pour off the clear portion after settling. Boil the leaves in this solution until the fleshy matter of the leaves is soft. Put the leaves then into cold water, and rub the soft portion away. Then place them for about 15 minutes in a solution of bleaching powder (chloride of lime) with a little vinegar. Lastly wash in cold water and dry. 3. Damp the spot with boiling water and rub quickly into it some finely powdered oxalic acid. Repeat if necessary.

L. H. W. asks: What will be the difference between the power of a steam cylinder three inches in diameter with six inches stroke of the ordinary construction, making two hundred revolutions per minute, and that of a rotary steam engine with the same amount of steam surface on the periphery of a seven inch drum, making four hundred revolutions per minute? Will the same proportion hold good in all sizes of engines? Answer: You can readily calculate this for yourself in any case. The power exerted by the reciprocating engine = area of piston in square inches × twice length of stroke × number of revolutions per minute × steam pressure ÷ 33,000. The power of the rotary engine = area of piston in square inches × mean circumference of revolution × number of revolutions per minute × steam pressure ÷ 33,000.

J. N. N. says: When a common house fly dies upon a mirror or pane of glass, it is found surrounded by a kind of opaque vapor, or substance resembling vapor, for about a sixteenth of an inch in all directions. Can you tell me the cause? Answer: It is a mold or fungus that springs from the decaying body of the fly.

W. C. C. asks: Why do railroad men continually grumble about cast iron wheels, and yet cannot be prevailed upon to use any other? Answer: Chilled cast iron wheels are considered by many railroad men to be the best. The principal objection to wrought iron and steel wheels is the cost.

D. asks: If a patent is granted for an article of product in the United States, can a party put up the same article in Canada, and export it across the water or ship it into the United States for sale on paying duty? Answer: In this country no person has the right to sell, use, or make a patented article without the consent of the patentee.

E. W. C. asks: 1. What is the greatest horse power obtainable by a turbine water wheel? 2. What is soluble glass, and how is it manufactured? 3. What is the analysis of salt? Answers: 1. The horse power capable of being exerted by a turbine wheel is limited only the hight of fall, quantity of water and size of wheel. 2. Soluble glass is a silicate of potash, or of soda, or a double silicate of both. It can be made by fusing together 1 part silica and 2 parts carbonate of potash or soda, or 54 parts dry carbonate of soda, 70 parts of dry carbonate of potash and 192 parts silica. 3. Common salt is chloride of sodium, a combination of the two elements chlorine and sodium. It contains, when pure, 60 of chlorine and 40 of sodium in 100 parts.

A. R. asks: Is it true that a locomotive engine, when towed for a short distance, would fill the boiler (by suction) full of air, taking the supply through the exhaust nozzles, making the boiler a compressed air receiver, and by this means store up power sufficient to propel the engine? The engine is supposed to be in full working order, with the cylinder cocks closed. The pressure (over a certain amount) would, I maintain, be relieved by the air escaping by the way it entered. Answer: Such an occurrence might take place under certain circumstances, depending upon the direction in which the engine was moving and the position of the link.

M. H. S. asks: What is used for bronzing small cast iron pieces, so that the bronzing does not corrode or wear off? Answer: The method most commonly employed is to use a bronze lacquer. Sometimes bronze powder is put on with sizing.

D. asks: What will destroy cutch brown on silk or wool, and not injure the goods, so that a good black can be dyed on it? Answer: Wash the goods thoroughly and expose them in a close chamber to the fumes of burning sulphur, or plunge into water moderately impregnated with sulphurous acid gas. Afterwards wash thoroughly and dry.

D. J. J. says: 1. I have a blue flannel shirt with a white flannel bosom; the latter cannot be taken off, and I would like to know how to clean the white flannel without injuring the blue flannel. Will ammonia or ether do it? What will clean the blue flannel without injuring it? Answer: Wash your flannel in the ordinary manner, but immerse at once in warm water, not in cold, and let the operation of washing be done as quickly as possible. This will prevent, in some cases, the removal of the coloring matter, and also shrinkage.

G. H. asks: 1. Is there any chemical compound which will give to dark hair a permanent, natural gray color? In other words, can you destroy the vitality of the hair without injuring its growth? 2. What is the nature of the dye that some ladies use to give their hair the appearance of age? 3. Is this dye permanent? 4. Has it ever been demonstrated that explosions of boilers, not manifestly due to low water, are caused by generation of electricity or by some power greater than steam, inside of the boiler? If not, what is the accepted theory on this point? Answers: 1. We think not. 2, 3. They employ a powder. 4. Our theory of boiler explosions is that they occur because the pressure of the steam is greater than the boiler can sustain.

S. T. W. asks: What is the American standard for a horse power, and what difference is there between the American and the English standards? Answer: The English and American units for horse power are the same, namely, the work performed in raising 33,000 lbs. one foot high in a minute.

S. P. asks: If a rope has a horse hitched to each end, the horses pulling in opposite directions with a force of 500 lbs. each, what is the strain on the rope? Answer: 500 lbs.

J. S. asks: What ingredients are used to render neutral to each other two or any number of different colors of oil paint, so as to keep them from running together on water or while wet, and the process of mixing the paints with such substances? Answer: If you have in view the finishing of water colors with oil paints, a method to prevent the different colors running together is to cover the water color, when perfectly dry, with a thin coat of size, carefully applied.

J. G. D. T. asks: Does confined gunpowder, when ignited, expand gradually until it breaks its enclosure, or does it create an explosion without any gradual expansion? Answer: Expansion is necessary to explosion. In the case of gunpowder, it takes place quickly.

S. B. L. asks: How can I temper small tools? Answer: You should heat the articles to a straw color, and plunge them into water which has the chill taken off. You may be able to produce a better temper by dissolving some soap in the water. To heat to a straw color, place the articles in a pot of melted tallow, over a fire. When the tallow is heated to such a degree that it just commences to smoke, withdraw the articles, and plunge them into the water.

W. M. asks: What will take the stains of pears and apples out of linen and cotton? Answer: Wash the articles thoroughly in hot soap and water, and then apply, with a rag or sponge, a little *aqua ammonia*, commonly called spirit of hartshorn.

C. N. asks: Does not the use of a bucket pump, instead of a double acting one, involve the loss of over ½ of the power that would be available by the use of the latter? Suppose that the head be 102 feet, which gives a pressure of 45 lbs.; to this head add 10 feet, as the pump is set in the water, which will add about 4 lbs. to the lift on the bucket, the diameter of the bucket being 57 inches: 57 inches diameter = 2551·7646, which × 49 lbs. pressure gives a load on the bucket of 1.7588·23 lbs. The diameter of the plunger (being 40 inches) gives an area of 1256·64, which × 45 gives a water load of 56548·8. Answer: The double acting pump ordinarily has a check valve at the bottom of the delivery pipe, so that the head of water in the pipe is not available in the down stroke. It would appear, then, that the only loss in the bucket pump, which is not also incident to the double acting one, arises from not utilizing the weight of the bucket and pump rod in the down stroke.

W. F. S. asks: 1. Is it safe to blow off at 60 or 70 lbs, the certificate allowing me to carry 80 lbs.? The boiler is 5 years old and in good condition. 2. I am greatly troubled about keeping packing in around valve rod and piston. The engine runs very hot. It makes 250 revolutions and the packing burns out very quickly. 3. Is it easier to keep up steam with a little over one gage of water, or is it better to have the boiler full, after it once raised to the required pressure? Answers: 1. If you are in doubt about your boiler, the best plan would be to test it. A convenient method was given in our answers to correspondents, a short time ago. 2. Try asbestos packing. 3. We do not believe there is much difference in either case.

W. W. J. asks: How can I temper malleable iron, or convert it into steel? Answer: We suppose you refer to the case-hardening of iron. Heat the iron to redness, cover it with prussiate of potash, and plunge it into cold water. A better process is to heat the iron in an airtight box, containing animal carbon, which may be prepared by slightly burning horns or hoofs, and reducing them to powder. Keep the box at a light red heat, for an hour or more, and then empty its contents into cold water. Either process hardens the iron on the surface, but does not convert the whole material into steel.

R. M. says: I have a steam engine, 14 inches cylinder and 20 inches stroke, making from 100 to 120 strokes per minute, running without governor. The valve has very small lead, scarcely one thirty-second of an inch. I want to know if more lead would not give me more power, and also let the engine run more easily? About twenty years ago I had an engine of 2 feet stroke, with but small lead; I had occasion to change the run of the engine; and in doing so, I happened to give her nearly ¼ inch lead, which made her run, I think, one fourth faster, with the same amount of steam. Answer: The proper amount of lead can best be determined by experiment, and you can probably hit upon it after a few trials.

J. says: In riding in the bed of a creek, I came across a spot that sounded hollow; no outlet could be seen; the bottom was sand and gravel, and the creek was moderately full only. What would be the result of digging? 2. Does it injure a shot gun to oil it inside? If oil is used, what kind is best? Answers: 1. If you should dig over the spot where the hollow sound was perceived, you would probably tap a cave, or natural hollow in the earth. Such are produced, especially in limestone districts, by water, which has dissolved or washed away the mineral substance which originally filled them. 2. If you use any oil for your gun, use some kind that will not oxidize or thicken, such as watchmakers' oil; and use very little of that.

F. X. M. says: Our men in the shop use soft soap to remove the grease and dirt from their hands when they quit work. This, they find, causes cracks to come; but if they dip them in vinegar just after washing with the soft soap, their hands will remain soft and smooth, and any cracks on the hands will immediately heal up. Can you give the chemistry of this? Answer: In the ordinary careless manufacture of soft soap, there is apt to be sometimes an excess of alkali or lye, above that necessary for complete saponification. This has a caustic action on the skin, making it rough, and otherwise injuring it. After using soap of this kind, washing in vinegar removes the excess of alkali from the hands. Vinegar, being an acid, combines with the alkali, forming a neutral and soluble salt.

D. F. asks: Will carbureted air burn in an atmosphere of its own carbonic acid, under a pressure of 60 lbs. to the inch? Answer: No.

S. R. asks: What can be done to make gasoline gas burn steadily when a draft of air or gust of wind strikes the flame? Coal gas is not affected by winds nearly as much as that of gasoline. Answer: The peculiarity you speak of is due to chemical causes which it is difficult to obviate. Coal gas or heavy carbureted hydrogen is a complete chemical compound with little or no mechanical mixture of incombustible substances. Its combustion, therefore, gives rise to a steady flame, the light being produced by incandescent particles of carbon, and a complete chemical decomposition of the hydrocarbon taking place. In carbureted air, however, made by passing atmospheric air through naphtha, etc., we have merely a mechanical mixture of a hydrocarbon vapor with an incombustible gas, namely, the atmosphere. The nitrogen, by far the larger portion of the air, not being combustible, is rapidly driven off through the flame, giving rise to the flickering unstable flame of carbureted air.

M. asks: What should be the form and size of the fire box for a vertical boiler (without flues) 3 feet by 1½ feet, made of No. 14 iron; and what pressure will such a boiler safely bear? Answer: The boiler should have a flue all around it, extending nearly up to the top (the smoke pipe connecting at one side), and the grate should be as large as the diameter of the flue. The boiler will sustain with safety a pressure of about 35 pounds per square inch, if, as we suppose, its diameter is 18 inches.

E. E. H. asks for an explanation of our recipe for preserving cider. Answer: Read ½ pail of sugar instead of ½ part. We have since learned from the manufacturer that the sugar may be omitted, with advantage, when the juice is good. The sugar is apt to cause too great a fermentation. If sugar be added, however, experience would teach what quantity to use.

J. R. asks: When an electric battery is applied to a person for some time, and he keeps shaking afterwards as if he still had hold of the handles, is it right to apply the battery to take it off him again, or to let the electricity remain in till it goes of itself? Answer: Any trembling or shaking of the muscles or limbs after an electric shock is a sign that the shock has affected the nerves too severely, and not that any free electricity still continues to circulate in the body. Another application of the battery would only make matters worse.

J. T. asks: How is it that steam taken from a boiler will force water into same boiler, that is, force it against itself? Answer: In the action of the Giffard injector, steam is condensed, and the power previously existing in it is expended in the propulsion of the water.

G. W. asks: 1. What is Javelle water? 2. What is the easiest and most economical way of procuring oxygen gas? 3. How is soda water made? 4. Where can I get Bloxam's "Chemistry?" Answer: 1. See, p. 278 vol. 26. 2. Heat the binoxide of manganese to a dull red heat in an iron retort. 1 lb. of good commercial binoxide of manganese will yield from 5 to 6 gallons of oxygen. 3. By charging water under pressure with carbonic acid gas, procured by the action of sulphuric acid on marble dust or any carbonate. 4. See our advertising columns for publishers.

C. A. D. asks: When, where, and by whom were spectacles invented, and what first suggested their use? Answer: Spectacles were first invented in the thirteenth century. Francisco Redi, in a treatise on spectacles, says that they were invented between the years 1280 and 1311 A. D., by a monk of Florence named Alexander de Spina. Muschenbroeck says that it is inscribed on the tomb of Salvinus Armatus, a nobleman of Florence, who died in 1317, that he was the inventor of spectacles. By others Roger Bacon, in England, who died in 1292, has been considered the inventor.