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A. K. can cast iron free from air holes following the directions on p. 409, vol. 31.—F. K. will find a recipe for hair wash on pp. 267, 363, vol. -R. J. will find that casehardening iron is described on p. 69, vol. 31.-R. N. will find directions for frosting glass on p. 264, vol. 30.

(1) B. B. N. asks: How and why does the magnet attract the compass needle, and extract its magnetism? A. By its superior power. When the two are placed with opposite poles in contact or near together, they tend to neutralize each other; but the magnet, being more powerful, demagnetizes and even reverses the polarity of the needle.

(2) W. S. R. says: I have a telegraph sounder, of which only one spool is wrapped, and I would like to wrap the other spool myself. I have enough wire to do it, but the good one is wrapped to the right, and I would like to know if the other is wrapped to the left, or as the first one is done. A. Wrap the same way and connect the inside ends

(3) J.T. S. asks: If I dissolve or liquefy ood or paper insulphuric acid, is there any way of separating the liquid wood or paper from the acid? A. The action of sulphuric acid on woody fiber is to extract the elements of water, leaving it black and charred. If the clean fibers of the wood be digested in strong sulphuric acid for sev eral days, a change will take place, and the cellulose will be converted into starch. If the acid is then largely diluted with water, boiled for severa hours, and then carefully neutralized with chalk. a mass of glucose (grape sugar) will be obtained which, if the process has been well conducted may exceed in weight the woody fiber employed.

(4) P. D. B. says: I am in want of some material that will hold water, and in which ice, in congealing, will not adhere to the sides. A. Try vessels lined with smooth non-conductors, like porcelain, glass, etc.

(5) L. H. R. asks: How can I obtain a vacu ım in a glass tube with out the use of an air pump I wish to seal the ends of the tube in such a man ner as to admit the two wires from a battery, for an electrical experiment. A. Close one end of the tube by means of a blowpipe, and displace the air contained in the tube by means of carbonic acid gas. Then hermetically seal the open end of the tube into the mouth of a strong glass bottle or flask containing a quantity of caustic potassa. After a long time the potassa will have absorbed the carbonic acid contained in the tube, thereby forming a nearly perfect vacuum. That part of the tube just above its connection with the bottle may then be softened by means of a blowpipe (or Bunsen lamp), drawn, out and sealed. The wires previously placed in position in the tube, should be of platinum.

(6) J M. C. asks: 1. Do bones that have been exposed for some years on the prairies lose any of their valuable properties as fertilizers? A. Very probably. 2. Is the demand for crushed bones sufficient in the Northern States to justify one in shipping the same from Texas? A. We do not think it would be advisable.

(7 F. C. & Co. ask: What alloy of metals turns nitrate of silver black, and what are the proportions? A. Nearly all the common metals and their alloys, when brought into contact with an aqueous solution of nitrate of silver, precipitates the silver in the form of a fine black pow-

What will take the rust off the steel points of drawing instruments? A. Try a little emery paper and oil,

'8', J. C. L. asks: How can I make a small cord (about $\frac{1}{16}$ of an inch thick) impervious to dampness without diminishing its pliability? A. Saturate it with a concentrated solution of copper in ammonia, and dry.

(9) F. A. W. says. 1. In melting silver I bave used a flux of pumicestone and borax; and when I cast, part of the flux runs in with the silver. How can I avoid this? A. The pumicestone should be added in sufficiently large quantities to absorb the superfluous borax. Do not crush your pumicestone too fine. 2. How can I get the silver out of the pickle into which the bars are put after being cast, the pickle being made of sulphuric acid and water? A. Precipitate the silver in the form of chloride by the addition of muriatic acid. Then heat the precipitate together with a quantity of borax and a little rosin, in a small crucible, un til the metal is reduced. The flux may then be removed by means of pumicestone as before

(10) B. asks: Is glucine to be had in New York? A. We do not recognize any substance by this name.

(11) W. ●. C asks. Can you give me a recipe with which I can dissolve pieces of imitation tortoiseshell, so as to run it into molds? do not state of what your imitation shell is composed. We of course must know its composition before we can tell what will make a good solv-

Is there anything, not injurious, which will completely remove dandruff? A. Dandruff or ptyriasis is a chronic inflammation of the skin, attended with redness and itching, and characterized by the production of minute white scales or scurf in great quantity. It may attack any region, but the scalp is the most common seat. Great cleantiness is the first consideration in its treatment. The use of tonic infusions and of sedative or alkaline lotions to the affected part are measures to be employed. A wash frequently used is the following: Boil J ib. rosemary in 2 quarts water, and add to the filtered liquid 1 oz. spirit of lavender and 1/4 oz. salt of tartar.

(12) . F L. asks: Is there any substance which will absorb coal gas when mixed in small quantities with the air in an ordinary living room? A. It can be absorbed by a solution of cuprous chloride in hydrochloric acid, presenting a large absorbing surface.

(13) L. S. C. asks: In the manufacture of brown sugar from cane juice, I have large quantities of muddy sediment in the bottom of juice vats, also a great quantity of skimmings: both are somewhat gummy in character, but as valuable as clear juice, if purified. Can this material be filtered through bone black, charcoal or any other material, and made reasonably pure, and how? A. You will require charcoal filtration, and Dumont's filter will probably work to your satisfaction. It consists of a wooden box of the form of a four sided truncated pyramid with a double bottom. The inner bottom is a metallic plate pierced with numerous holes; upon it a cotton cloth is laid, and coarse-grained animal charcoal moistened with water is then spread layer by layer, each layer being rendered of uniform thickness and packed or pressed closely together by means of a trowel. When the bone black has been thus formed into a compact bed or stratum of about 15 inches in thickness, and within 5 to 10 inches rom the top of the box, it is covered with another cotton cloth, and with another metallic plate pierced with holes. The object of the second cloth and metallic cover is to collect any substances which would otherwise obstruct the interstices of the superior stratum of the bone black, an inconvenien accident which is easily prevented by the use of such a cover, and this cover is readily ex changed for another, should it become itself ob structed. It is important, in order to avoid false passages, that the juice should be constantly at the same level of about three inches above the cover of the bone black. This is accomplished by means of a self-regulating cock. Animal charcoal is expected to purify, on an average, an equal weight of fine, or twice its weight of seconds, sugar. The same bone black may be employed any number of times, provided the substances which it has withdrawn from the sirup be removed. This is often done by simple rekilning. Consult Muspratt's "Chemistry," vol. 2, pp. 950 to 1,000.

(14) C. Z. P. asks: In one of your late num bers you said that silver (metallic) is to be re-obtained from nitrate of silver by melting it with borax or rosin. Will this be applicable for oxides or other metals, such as lead or zinc? A Gold may be reduced by this method, but not lead, zinc or any of the more common metals

(15) S. B. P. asks. If the lower metals are alkaline, are the higher metals acids? Is there any distinct division between the alkaline and other metals? A. We do not understand your classification of the metals. The term alkali is restricted to those bodies, such as potash and soda, which have an acrid nauseous taste, and are unct uous to the touch. If the metals be arranged into a table with reference to their affinity for oxygen, the noble metals-gold, silver, platinum, -will be found at one end, and the metals of the alkalies at the other. Those elements having the greatest affinity for oxygen are called electropositive; while those at the other end of the list are known as electro-negative hodies. There is no definite dividing line between these, each element being negative to the one preceding, and positive to the one following it.

(16 C. L. W asks: What oil is best for oiling silk for insulation? A. Paraffin oil.

(17) ●. B. asks: What is the formula for producing oxide of gold? A. The protoxide of gold is obtained as a dark green powder by precipitating the protochloride of gold by a dilute solution of potash.

(18) I. B. M. asks: Wh t is the name of a microscopic organism, occurring in an infusion of walnut leaves last spring, and consisting of a cup-shaped head anchored by a thread to a twig? The thread slowly contracts to a spiral spring, and then suddenly and projects the head forward, as if to secure food. A. The microscopic organisms described by you are infusorial animalcules. of the family vorticellide or bell animalcules. The genus vorticella consists of little creatures placed at the top of a long flexible stalk, the other extremity of which is attached to some object, such as the stem or leaves of an aquatic plant. This stem, sleeder as it is, is nevertheless a hollow tube, through the entire length of which runs a muscular thread of still more minute diameter. When in activity and secure from danger, the little vorticella stretches its stalk to the utmost, while its fringe of cilia is constantly drawing to its mouth any luckless animalcule that may come within the influence of the vortex it creates; but at the least alarm the cilia vanish, and the stalk, with the rapidity of lightning, draws itself up into a little spiral coil. But the vorticella is not wholly condemned to pass a sort of vegetable existence, rooted, as it were, to a single spot by its slender stalk; its Crearor has foreseen the arrival of a period in its existence when the power of locomotion would become necessary, and this necessity is provided for in a manner calculated to excite our highest admiration. At the lower extremity of the body of the animal, at the point of its junction with the stalk, a new fringe of cilia is developed; and when this is fully formed, the vorticella quits its stalk, and casts itself freely upon its world of waters.

(19) W. W. B. asks: 1. What is the form of galvanometer used in testing the connection of a lightning rod with the ground? A. An ordinary tangent galvanometer of the form designed by Dr. Bradley is most convenient. 2. What is the method of operation? A. Two earth connections in addition to that of the rod are necessary. Call these B and C, and the rod A. Measure the resistance of A and B together, then A and C, and finally Band C. Add the resistance of A and B to that of A and C, subtract the resistance of B and C from their sum, and divide the remainder by 2. This will give the resistance of the rod alone. 3. Would a sink vault be a good place to insert a lightning rod? A. Yes, provided it exposes sufficient sur-

(20) J. W F. says: In a rainstorm, four barrels of water were caught on one balf of a roof of a house 16x24 feet. I claim that the same amount of water would have fallen on a piece of ground 8x24 (leaving out projection of eaves). A friend claimed that the roof, being ½ pitch, contained more square feet, consequently would catch more rain. Which is right? A. You are right. It is the same problem as that of perpendicular pickets in a feoce running up hill; it takes the same number of pickets over a hill as upon evel ground When the rain is driven obliquely against the roof, there will, of course, be more to fall upon one incline, but just to the same extent will there be less falling upon the other.

(21) A. B. C. asks: 1. What is the proper pronunciation of Léclanché? A. Lehclanchei. Please explain why the zinc of a battery is the positive pole or element (as stated on p. 107, vol. 33) when the flow of electricity is from the other ole to the zinc? A. There seems, at first sight, to be some inconsistency in using the terms positive and negative in connection with the zinc plate of a battery; but as any part of a circuit considered by itself must present both a positive and a negative pole, and as the outside poles alone are of practical importance, these are the ones alluded to when any are mentioned: the negative pole being that one towards which the current is directed. When the metal itself is referred to, we call that one positive which is consumed, because, in this case, attention is more particularly called to the direction of the current in the battery, and here it is from the metal on which the action takes place. Which of the following four methods is best applied to lightning arresters for telegraph offices: Points, connected with the line wire presented to points connected with the ground, line points presented between ground points, line points presented to a plain ground surface, or ground points presented to plain surface connected with the line? A. Experiments, made for the purpose, showing that those lightning arresters are most efficacious which combine, in one system, opposed points and opposed plates separated by very thin ieces of mica 4. Why do you think that the best one? A By their diffusive property, points tend to prevent an accumulation or charge; sometimes, however, the sudden presence of a great quantity of electricity exceeds this power of points; in such cases, the plates act like condensers, in which the potential becomes so high that a discharge takes place between them rather than through the instruments; this is what constitutes their principal advantage. 5. Is the efficiency of the arrester increased by increasing the number of points? A. Yes.

(22) E. M. C. says: Our orchards have ocen greatly infested with caterpillars, which seem to have few enemies, as no bird round here will eat them. But I have several times noticed small gatherings of red ants, and upon examination found them to be eating a large caterpillar; and since then I have often seen two or three ants attack, kill, and eat large caterpillars. Is this common? A. Yes. It is by no means a new discovery.

(23) A. K asks: 1. Bow can a wriging ink be made that will stand the test of acids, so that no acid can erase it? A. Aniline black, asphalt in turpentine, and coal tar in the same solvent have been used for this purpose. 2. What color is most permanent? A. Writing fluids are, as a rule, more permanent than ordinary black ink. After a short exposure to the air they become black, or nearly so.

- (24) B. B S. says: I have never succeeded in making a perfect ink or fluid from any recipe, either with extract of legwood, nutgalls, or a combination of both. How can I make a bright, limpid, and bluish green at first, turning black on drying? A. Try the following: 12 ozs. nutgalls, 8 ozs. each sulphate of indigo and copperas, a few cloves, 4 or 5 ozs, gum arabic, for a gallon of ink. The addition of the sulphate of indigo renders the ink more permanent and less liable to mould. It is blue when first written with, but soon becomes an intense black. It is a true solution, and in composition nearly resembles that of P. & J. Arnold.
- (25) C. ●. ●. says: I am using tin for plating; it works well for a time, but becomes hard by being heated so often. What can I do to make it flow more freely? A. This is probably due to impurity in the bath. You should state what are the character and the composition of the articles plated.
- (26) R. S. W. asks: How can brass be melted on a small scale, by amateurs? A. The operation is rarely at first accomplished by amateurs without considerable difficulty. It requires a good furnace, capable of fusing copper, and a crucible capable of withstanding the high temperature. For this latter reason black lead crucibles are generally employed. The crucible is placed in the newly made fire, so as to heat up gradually. When well heated, place in your copper in small pieces, and force your fire until the copper is just fluid: then place in your zinc, stirring the fused alloy meanwhile. Do not allow the temperature to rise too high, as in this case a great part of the zinc will be volatilized, and, coming into contact with the air, will become ignited and converted into a copious white vapor of oxide of zinc. It is advisable to keep the surface of the fused metal covered with a quantity of chloride of ammonium (salammoniac), in order to preserve the surface free from oxide and clean.
- (27) H 'Γ.C. asks: Is there any scientific method by which to ascertain the depth to water underground, without digging or boring? A. No
- (28) W. A. D. asks: 1. Is there an article of the nature of oilcloth, or thin rubber cloth, that can be put over a frame about 3 feet square, and heated, from underneath, to a temperature of from 100° to 140° or 150° Fah., and willadmit of a shower of water being thrown on immediately after the discharge of heated air, without injury to the covering or any disagreeable odor from the material? It must needs be airtight and watertight. A. Try a suitable modification of asbestos cloth. 3. What material could I get for heating the space in the manner described? A. Try gas manufactured from a suitable light coal oil.
- (29) J. A. says: I have seen an argument that, the centrifugal and centripetal forces at work in the earth's rotation not being equal, the earth is consequently hollow. What are the centrifugal and centripetal forces in this connection? A. Consult "Sketches of Creation," by Professor Winchell, pp. 36-60.
- (30) A. E. says: I have been troubled for a long time with my well water. The well is over 40 feet deep; the water is desicious, clear, and cool; and yet, on holding a glass of it between you and the sunlight or lamplight, you can see minute living creatures. I have discovered two species. There are also earth worms occasionally drawn up in the bucket. Will you tell me the cause of these appearances? A. It is very unusual for animal life to be developed in water of such a character as you describe. The earth worms have probably gotten in accidentally, and the living creatures may not have come from germs present in the water itself. 2. Is wholesome water ever found in this condition? A. If you fill a quart pose, subject to the charge mentioned at the head bottle half full of the water, close it with a good of that column. Almost any desired information cork, put it in a warm room, and then after a can in this way be expeditiously obtained. week's time find on opening the bottle there is no smell, the water is probably wholesome.
- (31) J. J. C. asks: 1. Why will not aniline yellow (lemon) and aniline blue mix? A. They are used separately-first the blue, and finally the yel- in order to obtain the desired shade of green. 2. What colors can I take that will make any shade of green ink I may want? A. Verdigris dissolved in acetic acid gives an elegant green.
- (32) W. H. B. asks: Is there any way to remove printed matter from postal cards, sufficient ly to allow the surface to be legibly written over? A. Remove the printing by means of a sharp steel eraser, and polish with a good bone or ivory paper
- 1. How can I make a liquid preparation to apply to cuts and bruises, such as will quickly dry and form an artificial cuticle? A Use collection 2 Is collodion dissolved in ether a good preparation for this purpose? A. Yes. 3. Can collodion be dissolved in alcohol? A. Collodion is a solution of negative cotton in ether, or a mixture of ether and alcohol. Gun cotton is insoluble in alcohol alone.
- (33) F. A. H. asks: Can a good durable white ink be made? If so, what are the ingredients? A. Shake up a little finely ground oxide of zinc with a small quantity of gum water. This, we think, will answer your purpose.
- (34) ●. M. S. says: How do you compound nitric acid with water so as to give galvanized iron the snowflake finish? A. Use muriatic acid 3 parts, nitric acid 1 part, and water 3 parts: wash immediately afterward with pure water.

Why does metal blister after it comes out of the water, immediately after galvanizing? A. This may be due to the fact of the metallic surface not having been perfectly clean, or on account of the too rapid cooling of the surface.

(35) C. W. B. asks: How can I crystallize alum, so that it will adhere readily, in quantity and in regular forms? A. Make a concentrated

solution of the salt in boiling water, and set it aside to cool slowly.

(36) C. L. C. says: A grain of corn consists of the heart or soft part(the germ) and a hard portion; which of these would produce the most spirits, starch, and sugar, respectively? What difference is there in the chemical composition between the hard and soft parts? A. We do not find any published statement that furnishes the desired information, and an experimental investigation would require considerable time.

(37) J. S. asks Is there anything that can be mixed with glue to make it harder? A. Try the following: Melt together equal parts of common pitch and gutta percha. Apply hot.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

J.C.B. F.-It is sulphide of iron.-C.B. K.-It is a rock composed of felspar and hornblende. The brilliant yellow metallic particles are sulphide of iron.-D. H.-It is decomposed potash mica. For a possible advantageous use of such mica, see an article by Professor Leeds in the Gardener's Monthly for August, 1875.—E. A. H.—You are right. A further examination, however, shows that these pecimens contain a small percentage of lime and silicicacid. It is largely used in the manufacture of paints, for which the mineral sent would answer.-M. M. C.-It is difficult to account for the presence of such a mass of the mineral which you send, at the bottom of a well. It is sulphide of iron. Such concretions sometimes occur, but the factof one being in a well may be due to acci-

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN ac knowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On Large and Small Wygon Wheels. By S. L. M. On Tens and Hundreds. By W. S. H. On Weather Predictions. By M. O'R.

On the Keely Motor. By F. K. On Railroad Cars. By S. On Natural Phenomena and Temperatures. By

On Mouse Traps. By C.R. On Repairing Bells. By T. K. A On the Relation of Time and Movement. By

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HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Enquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "Who makes an air or steam engine suitable for driving a sewing machine? Who sells podoineters? Who sells machines for making matches? Who sells steel drills, used in riveting crockery and glass? Who sells mica in sheets? All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that pur-

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