

J. R. S. asks: Can you tell me how glass is made for a microscope? Can I melt and pour it into a mold? A. You could not make a lens suitable for optical purposes by melting glass and pouring it into a mold. Glass for such purposes has to be of wonderful uniformity of structure, and ground with exquisite care.

R. I. B. asks: 1. How can I dissolve common India rubber and then restore it to its former hardness? A. Cut 2 lbs. of caoutchouc into thin, small slices; put them in a vessel of tinned sheet iron, and pour over 12 to 14 lbs. of sulphide of carbon. For the promotion of solution, place the vessel in another containing water previously heated up to about 86° Fah. The solution will take place promptly, and the fluid will thicken very soon. 2. Is there any chemical that will curl human hair without injuring it? A. We do not know of any.

A. C. R. asks: 1. Is electricity instantaneous? A. No. Its velocity is 288,000 miles per second. 2. If two bodies, one heavy and one light, are dropped from a tower or any high point, which of the two will strike the ground first? A. If the bodies are the same in exterior size, the heaviest body will first strike the ground.

J. G. asks: I. How can I make an electrical condenser? A. With sheets of tinfoil. They are fastened on two sides of a band of oiled silk, which insulates them, forming thus two coatings; they are then coiled several times round each other, another band of silk being interposed between them. 2. How is the induction coil connected with it? A. One of these coatings, the positive, is connected with the binding screw which receives the current on emerging from the primary wire; and the other, the negative, is connected with the binding screw which communicates with the commutator and the battery. 3. In Mr. A. Ladigian's electric lamp, with only 1 carbon point, what gas does he supply after having exhausted the air from the tube? A. Pure hydrogen will answer. 4. If I connect one wire from the machine with the carbon, what must I do with the other wire? It stands to reason the current will not flow if the circuit be not complete. A. Connect your wires to either end in such a manner that the carbon completes the circuit with both poles of the battery.

G. S. T. says: I recently found that a lightning rod vendor was using for conductors tubes made of corrugated thin sheet copper, and that he attached them to buildings by nailing strips of sheet zinc around them instead of passing them through glass insulators, claiming that, though glass when dry might be so used, yet when wet, it was of little value and not to be relied on. Is this so? A. Insulators are of no use. The method of attachment described is correct. The important thing applying a lightning rod is to have a large extent of conducting material at the base or terminal of the rod to the ground. See reply to another correspondent last week.

G. C. R. asks: How are the aniline colors said to be procured from coal tar made? A. Coal tar colors are made from aniline, carbolic or phenic acid, and naphthaline, bodies obtained directly or indirectly from the distillation of coal. The reds, such as magenta, are obtained by the action of bichlorides of carbon, tin, or mercury on aniline, and the purples, such as mauve, by the action of oxydizing agents, as bichromate of potassa.

S. G. Jr. asks: How is the beautiful crystallization upon water coolers and on brass mathematical instruments produced? A. By exposing the metallic surface for a few moments to nitric acid.

G. E. P. asks: How can glucose be distinguished from cane sugar? A. The easiest method is by the saccharimeter.

B. W. M. asks: 1. What is the alloy for white metal for harness castings? A. Melt together 1 lb. brass, 1½ ozs. spelter, and 1 oz. tin. Your other question is illegible.

J. E. L. asks: What will keep Russian iron from rusting and becoming discolored during the summer season? A. Immerse in a strong solution of carbonate of soda, out of contact with air. Or coat thoroughly with black lead and keep in a dry place.

D. asks: What colored veil will afford the best protection to the complexion? Of course an immediate solution would be furnished by a knowledge of the colors which intercept in the greatest measure the actinic or chemical rays of the sun. I know that yellow possesses this power pre-eminently, but as it is a hue which would scarcely be tolerated for the purpose of a veil, I would like to know whether there is any less vivid tint which could be used with similar effect. Blue must be particularly injurious, judging from the fact of its invariable use as a shade to photographers' skylights where the transmission of the actinic rays of the sun is absolutely indispensable. Please also state the effect of the gray veils now so much in use. A. The gray veils will probably serve as well as any for obtaining the object desired.

E. P. H. asks: Can you give a recipe for the manufacture of a sympathetic ink which will fade completely in a short time after being developed, and which cannot be re-developed? A. There is no ink fulfilling all these conditions.

O. F. M. says: I have set up a page of type and I would like to take a stereotype or electrotype plate from it. How shall I proceed? A. To stereotype: Paste together a piece of tissue paper and a piece of printing paper, and lay on the type (with the tissue paper next the metal) which must be well oiled. Cover the paper with a damp rag, and beat on to the type evenly with a hard brush; then add three other thicknesses of soft paper, pasted, and beat as before after adding each piece. Backup with stiff paper. Dry under a moderate heat, and take off the paper mold. You can readily arrange this mold for casting, but a metal matrix, properly constructed, can be cheaply obtained. To electrotype: Take a cast in plaster of Paris, brush plumbago into the matrix, and plate in a copper galvanic bath in the usual way.

A. B. asks: 1. Why does lime water, when breathed on, become opalescent and white, like milk? A. Because the breath contains carbonic acid, and the carbonic acid unites with the lime to form carbonate of lime or chalk. 2. What is photographers' paper made of, and why does it become black when exposed to the light? A. Because it is covered with a wash of chloride of silver, which blackens by exposure to the light.

S. asks: 1. What would be the temperature of a body in space, removed from the influence of the sun? A. The absolute zero is estimated to be -490° Fah. 2. How can common factory cotton cloth be rendered waterproof and transparent, to be used instead of glass for protecting plants? A. Try Canada balsam and rectified turpentine, equal parts. 3. Can chronic dyspepsia be cured? A. Yes.

G. S. B. says: I am constructing a machine in which I require to use an electric spark, and will have but a small place to spare on my machine for it. What can I use to give me a spark that I can conduct to the end of a rod on the principle of the electric gas lighter? I prefer something that will work promptly with very little friction, and that can be made cheaply. What two bodies brought in contact by friction will be cheapest and give the largest spark? A. Attach a shallow cup of brass on the under side to a copper rod of the required length; the end from which the spark is to be drawn should be sharpened down and tipped with platinum. In the cup place a smooth tight-fitting piece of hard rubber; for your movable disk use buckskin conveniently stretched and mounted. Fine oiled silk may be used in place of the buckskin. This answers both questions.

M. O. M. O. B. says: I wish to study mineralogy. What work would be the best for a beginner? A. Dana's "Mineralogy" is the standard work. See our advertising columns for booksellers' addresses.

L. says: 1. F. H. H. asks why does water form an exception to the law of contraction by cold. I would ask, does it? A. It contracts until the temperature has fallen to 39° 4', and then expands until it has reached the freezing point, and is converted into ice. 2. A stone jar filled with melted lard and kept until cold was found to be cracked from top to bottom. Was it the expansion of the lard, or was there a chemical or mechanical mixture of water sufficient to cause the bursting of the jar? A. The jar was cracked by the cause above named.

C. L. asks: What is the best method of preparing a composition for plating metals with gold? A. The best method is that of electro-plating. For plating without a battery, see p. 331, vol. 30.

A. W. M. asks: 1. What must be the length of the rafters of a house, so that the shingles may last as long as possible, the width of the house being 40 feet? A. About 28½ feet will answer very well. 2. In a combination of movable pulleys, the inclination of the ropes being at any angle, required to find the power, the weight and the number of pulleys being given? It is understood that the ropes are not parallel, and that there is more than one pulley. A. In such a case the relation between the power and weight will generally vary at every position of the weight, since the angles of the cords will be continually changing. But the relation can be found for any position, by calculating the relative distances moved over by the power and weight for a slight displacement. 3. The area of the piston of a high pressure engine is 1,200 square inches, the length of stroke 3 feet, and the pressure of steam upon the square inch of the piston is 32 lbs., the number of strokes per minute being 18; required the number of cubic feet of water which the engine will raise from a mine 350 feet deep, the friction being 1 lb. per square inch plus the pressure of the atmosphere? A. You will find answers to this question on p. 64, vol. 30, on indicating steam engines, and on p. 48, vol. 29, on the friction of water in pipes.

G. S. D. says: A friend of mine bought a ring, with a stone in it called aquamarine. The stone is cut like a diamond and is very clear; it cuts glass, but not very well. What is the value of the stone? It is about the size of an ordinary white bean. A. The name of aquamarine is applied to a bluish green variety of beryl, on account of its resemblance to the color of the sea. If it is a genuine aquamarine, it ought to scratch glass readily.

W. B. P. asks: 1. How can I make a hydro-electrical machine? A. Use a small steam boiler, insulated from the ground by glass pillars. The steam is allowed to escape from a number of jets against a number of sharp metallic points. 2. Will such an apparatus make chemical decompositions? A. No. 8. Suppose I have a battery of copper and zinc, and instead of joining copper to zinc, I join copper to copper and zinc to zinc; would it not make a quantity current, joining in the usual way making an intense current? A. Yes. 4. Wind impedes heat and sound; will it impede light? A. It will not impede light. 5. How can I obtain oxygen from the oxide or sulphate of oxide of zinc? A. It could not be obtained from either in an uncombined state. 6. Would clay or brick be porous enough for the porous cup in a voltaic battery? A. No; besides, the acid would act on it. 7. If I nail the copper and zinc together on a piece of dried wood, would the battery work? A. Yes, by running a wire from one to the other so as to complete the circuit. 8. How can I make a crucible out of bone ashes? A. By compressing the bone ashes into a mold of the desired form. 9. In what number of the SCIENTIFIC AMERICAN was that recipe for mending rubber boots? A. See p. 203, vol. 30. 10. Will rubber tubes do to convey chlorine in? A. Yes, but they are rapidly decomposed. 11. Which will break the quickest by heat, thick or thin chimneys for lamps? A. Thick ones. 12. Can I prepare oxygen from the specimen I enclose? A. Your specimen is oxide of zinc. See answer to No. 5. 13. Are not chlorhydric and hydrochloric acids the same as muriatic acid? A. Yes. 14. Are potash and potassa the same, and their salts, such as chlorate of potassa and chlorate of potash, identical? A. Yes.

H. T. H. says: I have a roof covered with canvas that was painted several years ago. The paint is broken in many places, and I wish to remove the old paint. How can it be done without damaging the canvas? A. Use benzine.

N. P. L. says: I have an overshot water wheel which does not give as much power as I want. Can I put in an engine, and belt on to my main shaft to run with my wheel without having the speed of both regulated alike? Will the engine assist the power of the wheel without both running at the same speed? A. It would be better to arrange the engine so as to drive a portion of the machinery separately.

R. A. says: I am building stationary engines which are used for saw mills, etc., and I am troubled with their pounding. They strike hard on turning the centers. A. We could not tell you the remedy without a personal examination. An experienced engineer could readily find the trouble and the means of preventing it. 2. Can you recommend a good practical book on the construction of modern stationary engines adapted to saw and grist mills, etc.? A. There is no book published such as you speak of. It has yet to be written.

R. F. B. P. asks: Is a man who uses his right hand at end of the ax, shovel, or sledge hammer, and his left applied to the center of the handle, a right or left handed man? A. Right handed.

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

A. H. S.—Two are iron pyrites. One is copper pyrites.—C. S. & F. O. S.—It is magnetic oxide of iron.—

H. M. F.—The little scales are kaolinite, which is a hydrous silicate of alumina.—A. S.—The stone is valuable for some purposes. It is found in quarries.—F. C. E.—It is galena or sulphuret of lead, and contains 87 per cent of lead.—J. S. N.—It is iron pyrites, and is not worth working as an ore of iron.—R. W. Z.—No. 1 is banded argillite or clay rock. No. 2 is micaceous oxide of iron. No. 3 is actinolite, a silicate of magnesia and lime.—W. F. S.—Partially decayed wood, covered with a variety of vegetable mold.—E. P. H.—It is a fine clay containing a large amount of hydrated yellow oxide of iron. It would probably repay you to have the numerical percentage of iron determined, as it would be necessary to do so before its market value could be determined. A. M. B.—It is fibrous selenite, which is a native crystallized sulphate of lime.—J. S. W.—It is a fine sand, and might be advantageously used in some cases as a polishing powder.—R. M.—It is not iron pyrites. It is blende or sulphuret of zinc.—J. D. W.—They are small crystals of quartz. When of large size and perfect, they are interesting as mineral specimens, and, when cut, are of some value as ornaments.—W. F. S.—No. 1 & 2 are very impure limestone. If polished, they might answer for ornamental purposes. No. 3 is a variety of pipe clay. No. 4 is gray clay.—W. P. B.—No. 1 is a variety of kaolin. No. 2 did not come to hand. No. 3 is crystallized carbonate of lime or calcite.—G. M. R.—No. 1 is greenstone. No. 2 is iron pyrites and galena. No. 3 contains blende or sulphuret of zinc. No. 4 is decomposed talcoid schist. No. 5 is carbonate of lime and iron. The last, if in sufficient quantity, might be used in iron manufacture.

E. F. T asks: How can I print on gelatin?—J. E. B. asks: What is the best stain for staining popular cigar boxes?—H. M. G. asks: How can I smoke buttons?—S. V. asks: What will remove wall paper that has been put on with gum arabic dissolved in vinegar and copal varnish, without staining the paper?

COMMUNICATIONS RECEIVED.

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

- On Eremacausis and Cremation. By H. H.
On a Curious Freak of Nature. By C. H. M.
On a Californian Chute. By J. J. G.
On the Sun's Attraction. By W. B.
On Gravitation. By H. B. W.

Also enquiries and answers from the following:

H. B. B. L. V.—J. F.—G. B. S.
Correspondents in different parts of the country ask: Who sells the best drawing instruments? Where can boys' chemical apparatus be obtained? Who makes card railway tickets, as used in Europe? Makers of the above articles will probably promote their interests by advertising, in reply, in the SCIENTIFIC AMERICAN.
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.
Several correspondents request us to publish replies to their enquiries about the patentability of their inventions, etc. Such enquiries will only be answered by letter, and the parties should give their addresses.

Correspondents who write to ask the address of certain manufacturers, or where specified articles are to be had also those having goods for sale, or who want to find partners, should send with their communications an amount sufficient to cover the cost of publication under the head of "Business and Personal," which is specially devoted to such enquiries.

[OFFICIAL.]

Index of Inventions

FOR WHICH

Letters Patent of the United States

WERE GRANTED IN THE WEEK ENDING

May 5, 1874,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

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