

coal of the gas, and is there any other way besides using heat? A. By a heat verging on redness. There is no other rapid way of removing the gas. It might be done slowly by absorption by chemicals, such as slaked lime, caustic soda, etc. 5. About how long will it take the charcoal to absorb the gas, and how long to free it of the gas? A. A few seconds to one minute.

(632) J. P. writes: You gave a recipe for artificial honey in Sci. Am., December 8, 1888, page 363, query 23, in that you say 80 grains cream tartar. Please state how many grains to a pound or to an ounce of 16 ounces to the pound? Also, will it keep any length of time with the whites of eggs in it? A. There are 7,000 grains in a pound avoirdupois, or 437 1/2 grains in an ounce. It will not keep well if made with whites of eggs.

(633) J. E. O. writes: Physiologists tell us that an image when received on the retina of the eye is inverted; but few give any satisfactory explanation why we see all images righted. It is claimed by some that the brain receives the image inverted, and our judgment rights it. Will you please give us your opinion? A. The connection between the brain and the outside world cannot be traced. A specific image produced on the retina affects the brain with the sensation of sight; the inversion of the image is immaterial to the question, as the question transcends mechanics or physics.

(634) J. C. M. writes: An aquarium of mine, made of marble and glass, leaks at the joints. Please tell me in the Notes and Queries column of the SCIENTIFIC AMERICAN how to make a cement to mend it with? A. Try litharge and glycerine, or melt in Burgundy pitch and gutta percha cement (see Queries 630 and 641) with a hot iron when the glass and marble are perfectly dry.

(635) F. S. W. asks: How many cubic feet of ordinary illuminating gas are required to equal one ton of ordinary Pennsylvania pea coal for steam, when burned under a boiler? What effect has a gas jet on the iron of the boiler compared with a coal fire? A. 50 to 70 lb. of coal are considered equal to 1,000 cubic feet of gas in heating power. The gas may be burned from long pipes with numerous perforations, preferably arranged with air injector burners, as the least production of lamp black indicates inefficiency. For cost and exact details consult an engineer.

(636) J. C. asks: 1. How to make paper out of rags? A. For paper making we refer you to Davis' work on paper making, \$6; Cross, Bevan and Johnson on paper making, \$4. 2. Do the clouds move, or is it the earth turning on its axis that gives them the appearance of moving? A. The clouds move, dissolve, and reform again continually; their motion and changes are real.

(637) F. A. asks how wood can be electro-plated with copper? The object I desire to plate is the ebony handle of a surgical knife. A. First rub the wood with hot paraffine; coat it with a thin coating of plumbago, applied with a brush, and then submit it to the regular electro-plating process.

(638) E. W. M. writes: In testing gas meter, there are five cubic feet pass through the test meter, while six cubic feet pass through the meter to be tested; is the meter to be tested 10 2/3 per cent fast or 20 per cent fast, or in other words, what is the divisor—five or six? A. The meter is 20 per cent fast. If gas were one dollar a thousand, you would by such a meter pay \$1.20 for \$1 worth of gas. The correct figure always should represent 100 per cent.

(639) L. S. M. writes: Can you inform me of any acid or other substance which will rapidly putrefy and liquefy the flesh of crustaceans so that it may be removed through a small aperture, and which will not affect the shell in any way? The intention is to preserve the shell intact in its natural color, and I am looking for some way to remove the flesh without disintegrating the shell? A. Try caustic soda solution; you must experiment, using different strengths of solution and various temperatures. You may have trouble from the disintegration of the ligaments connecting the segments. You might try the old receipt of placing them near ant hills, in order that the ants may clean them.

(640) E. LeR. S. asks: In speaking of a mile on land between two points, is there any difference between the English and American mile? A. There is no difference; the distance is 5,280 feet.

(641) W. McB.—If no heat is to be applied to your glass-lined acid vat, we would recommend some such cement as bicycle tire cement. The following is recommended for making wood watertight and proof against sulphate of copper, but not against cyanides:

- Burgundy pitch 1,500 parts.
Old gutta percha in fine shreds..... 250 "
Finely powdered pumice stone..... 750 "

First melt the gutta percha and mix with the pumice stone and then add the pitch. Apply hot, using a soldering iron. For resisting heat and acids the following is recommended:

- Sulphur..... 100 parts.
Tallow..... 2 "
Resin..... 2 "

(642) L. K. S. asks for the names and price of the most complete work on chemistry of glass. Also name of firm supplying such books? A. We can supply you with Feuchtwaenger, Water Glass, \$5. Shenstone on Glass Blowing, 80 cents. Powell, Chance and Harris on Glass Making, \$1.50. The first named is devoted to silicate of soda, and not to glass in general.

(643) J. L. asks for gold size for gilding on wood so as to obtain a bright finish, resembling burnished finish. A. Waterproof gold size is prepared from half a pound of linseed oil with two ounces of gum animi, the latter is reduced to powder and gradually added to the oil while being heated in a flask, stirring after every addition until the whole is dissolved; the mixture is boiled until a small quantity, when taken out, is somewhat thicker than tar, and the whole is strained through a coarse cloth. When used, it must be ground with as much vermilion as will render it opaque, and at

thesametime be diluted with oil of turpentine, so as to make it work freely with the pencil. This does not give a burnished finish. For burnishing a mixture of American bole, a little wax and parchment size is used. The latter is made by boiling parchment scraps in water. We refer you to "Workshop Receipts," first series, which we can supply free by mail for \$2, for a very elaborate account of gilding operations.

(644) T. A. McC. writes: In a tunnel 1,600 feet long will a ten foot pressure of water force out earth and rock that readily dissolves when exposed to the atmosphere, in a few weeks? The tunnel has a total fall of some two feet. A thousand feet of the tunnel is through this shelving rock which readily dissolves when exposed to the atmosphere, and has so caved in that it will not permit the water to pass through. Tunnel is 6x6 feet. By means of a flume we can pour the water in some ten feet above the floor of the tunnel, and we want to know if the water will force its way through and wash out the debris? A. If you can supply a full stream of water at 10 feet head, you can wash the dirt and gravel through the tunnel, if not entirely obstructed. After an opening is obtained, a volume of water will be required to give a velocity of 4 feet per second through the obstructed part for carrying forward the broken stone which would be deposited in the unobstructed part of the tunnel. To remove this, a volume equal to the whole area of the tunnel, or 144 cubic feet of water per second, would be required to entirely clear it from sand, gravel and small broken stones. The large rocks would require other means for removal.

(645) W. W. T. writes: I have made a glycerine barometer, using a pint tin can with two necks, in one of which I insert a barometer tube open at both ends, bore 1/25 inch, and in the other a thermometer to make corrections for temperature. All fittings and seams are air tight. While it very often agrees with the signal service barometrical readings, sometimes there is a difference, for which I can find no cause. Please tell me the reason. A. The barometer tube should be closed at the upper end, and should be of such height, about 25 feet, that a vacuum will be left above the fluid. The liquid in the tank should be in some kind of communication with the air. You may insert a tube through the cover of the tin can and tie an India rubber balloon over it. In the SCIENTIFIC AMERICAN of December 25, 1888, you will find described a glycerine barometer.

(646) B. O. L. writes: When the phonograph is talking can it be heard all over the room by the entire audience if the voice talked into it was loud enough, or must a person have ear to receiver in order to hear anything? Can only one hear at a time? A. An ear tube is required. If several are provided, as many persons can listen as there are tubes. It cannot be heard all over the room.

(647) H. S. H. writes: There has been some discussion on the subject of "parks," in a literary club here, at which it was stated the park at Versailles, France, was the largest artificial park in the world. A few of us had some doubts of it, and I write to you as the surest way to settle the question. If Versailles has not the largest park, can you tell me where it is and how many acres it contains? A. The park at Versailles is not remarkable for size, but rather for its water works and buildings. The following are representative parks of the world, with their acreage:

- Fontainebleau..... 21,000 acres.
Boulogne 2,500 "
Vincennes..... 2,275 "
Windsor..... 3,800 "
Richmond..... 2,253 "
Fairmount..... 2,740 "

(648) C. F. P. asks how to test the purity of drinking water with permanganate of potash. I wish to test an open well for any organic matter which it may contain. A. Dissolve 2 grains permanganate of potash in 10 1/2 ounces distilled water. 10 drops of this represent 1-1000 grain of oxygen. Add it to the water drop by drop until a faint pink color is produced which is permanent. The number of drops per gallon represents the amount of oxygen required to oxidize the organic matter. It should not exceed 0.2 grain per gallon. The test should be executed by a chemist, and at best is a mere approximation and may condemn a water that is perfectly healthy. It has only confirmatory value.

(649) H. McC. writes: An advantage claimed for Mercator's projection reads, "The true shapes of continents are given, although expanded toward the poles. If the last statement is true, the first (in my eyes) cannot be true. Kindly explain. A. It is not strictly true. As the poles are approached the lateral distances become magnified, so that only a general accordance of shape is preserved.

(650) G. F. R. writes: Will you kindly let me know through your paper whether theoretically it would weaken the current passing through a conductor if a magnetic needle is placed under it? A. It would not.

Replies to Enquiries.

The following replies relate to enquiries recently published in SCIENTIFIC AMERICAN, and to the numbers therein given:

(403) T. H. DeS.—Radiator, Coal, etc. —1. A steam radiator is more efficient at the higher pressure by the difference in the temperature of the steam at both pressures. 2. The Jellico mountain coal ordinarily has 60 parts fixed carbon, 36 parts volatile matter or gas=to 96 parts combustible in 100. The canal coal from the Jellico upper bed has 35 parts fixed carbon, 50 parts volatile matter=85 parts combustible in 100. We have no record of any true canal coal in Alabama. The Cahaba and Corona beds have from 50 to 55 parts fixed carbon to 41 parts volatile matter; or 91 to 96 parts combustible in 100. The nearest to a semi-bituminous or semi-anthracite are: The Deer Creek mines, which have 68 parts fixed carbon and 22 parts volatile, or 90 combustible in 100. The steaming qualities of these coals as compared with Cumberland, 100, are as follows: Jellico 90-7, Cahaba 93-2, Corona 93-0, Deer Creek 89. 3. A direct connection with vertical pump is best and

cheapest. A long-stroke crank connection with engine by belt is much used and preferred for constant and heavy work, as for very deep wells. 4. Bones that have grease or carbonaceous matter in them will enrich ordinary coal gas and add to its volume. Gas made from grease or oil is heavier than ordinary coal gas, containing more carbon.

Books or other publications referred to above can, in most cases, be promptly obtained through the SCIENTIFIC AMERICAN office, Munn & Co., 361 Broadway, New York.

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