

the surplus emery. 2. How shall I manipulate gutta percha to use it as a cement? A. For a flexible cement melt together equal parts of brown pitch and gutta percha. For a hard cement melt together gutta percha, pitch and shellac, equal parts. 3. How to determine whether a battery is working? A. If it is a single cell, touch the ends of the wires to the tongue. If there are several cells, dip the wires in acidulated water. Gas will rise from the wires if the battery is active. A galvanometer, however, is preferable.

(3663) C. C. asks: Is there any way of deodorizing the common coal oil used in our lamps? What will do it? I have been using it for ten years as a hair dressing which keeps the hair soft and moist, but its disagreeable odor is a great objection to its use. A. Something can be done in the way of deodorizing coal oil by treatment with a mixture of bichromate of potash and concentrated sulphuric acid. If these are mixed and agitated with it, and the whole is then allowed to settle, the oil can be siphoned off, and after washing with water containing a little washing soda, will be found improved as regards odor. Conduct all operations without heat, and experiment on small quantities. The first named chemicals are very corrosive and poisonous. You might also try simple agitation with bone black. This is simpler, and might be measurably effective.

(3664) H. T. asks: 1. Does the generator in the Bell telephone connect with the main line and ground direct, or does the current pass through some of the other parts than the polarized bell? A. The magnetogenerator is connected through the bell magnet with the ground, either directly or through an annunciator. 2. Does the continued excessive sparking of a dynamo or flickering of the lamp indicate leakage? A. The sparking shows that the commutator is rough or otherwise out of order, or that the brushes are not correctly adjusted, or that the armature is not properly constructed. 3. What would an eight light dynamo like one described in SUPPLEMENT, No. 600, cost, ready made? A. About \$100.

(3665) T. B. asks: 1. What is a magneto-electric machine? What is the difference between one and a dynamo? A. The magneto-electric machine is one in which the armature revolves between the poles of the permanent magnet. In a dynamo, the small residual magnetism of the iron core of the field magnet serves to slightly excite the armature, generating a small current, which traverses the winding of the field magnet and increases the original magnetism until the maximum is reached. The field magnet of the dynamo is an electro-magnet. 2. How is the electric system of timing races, as practiced a short time ago at the athletic meeting in St. Louis, managed? A. In the electric system of timing races an electric contact maker is arranged to be operated by a bullet from a pistol. The starter fires the pistol into the contact maker, thus giving the signal for the start, and at the same time causing an electrical impulse to be sent, which sets in operation the recording mechanism. The mechanism continues operative until the runners reach the end of the course, where is stretched a thread connected with the recorder, which is broken by the runner and causes an electrical record of the close of the race to be made. 3. What is carbolic acid? Is it poisonous? A. Carbolic acid is a product of coal tar. It is a light liquid which often crystallizes in long needles. It is very poisonous. 4. What is the poison brucine, and how is it made? A. Brucine is extracted from the bark of the *Bruce antidysenterica*. It has also been detected with strychnine in nux vomica. It is made by reducing the bark to a coarse powder, digesting it in ether to remove fatty matter, then with strong alcohol. The alcohol solutions are then distilled to drive off the alcohol. The matter remaining is dissolved in water and subacetate of lead is introduced to throw down the coloring matter. The excess of lead is removed by sulphureted hydrogen. The brucine is then precipitated by boiling it with magnesia. The liquid is evaporated, when a brown granular alkaline mass results. This is saturated with oxalic acid, and the oxalate is washed with absolute alcohol. The brucine is obtained by decomposing the oxalate by boiling it with magnesia and water. The brucine is then dissolved in boiling alcohol, which yields crystals of pure brucine when the solution cools.

(3666) A. S. H. asks how much wire, size, etc., and all that is needed to make a battery for shocking purposes, such as is used in the medical batteries. A. For an ordinary shocking coil make a bundle of soft iron wires, 3/8 of an inch in diameter and 3 inches long, of No. 24 wire. Wrap this with two or three thicknesses of stout paper, glue on a pair of heads to form a spool, and wind on the paper-covered core two layers of No. 20 magnet wire for the primary of the induction coil. Wrap this coil with two thicknesses of paper, and upon the paper wind twelve or fifteen layers of No. 36 silk-covered magnet wire. Bring out the terminals of this fine wire secondary coil, and connect them with binding posts for receiving the handles. Provide the primary wire with a circuit breaker, and connect the primary with a plunging bichromate battery. The strength of the current may be varied by sliding over the outside of the secondary wire a piece of brass tubing.

(3667) W. G. G. writes: To settle a doubt in regard to the winding of the armature of electric motor described in SUPPLEMENT, No. 759, will you kindly inform me if the armature is not wound in precisely the same manner as that of the dynamo in SUPPLEMENT, No. 600, with the exception that instead of twenty-four divisions of the periphery of the armature core in the dynamo, the armature of the motor is divided into but 12 divisions on the periphery of the core? A. The armatures are both wound according to the same system.

(3668) J. S. P. asks for the manner of polishing tortoise shell. Would like the successive steps of scraping or cutting down and final fine polishing. A. Tortoise shell is prepared for polishing by smoothing it with a single-cut file, then scraping it with a scraper like those used on wood. If this part of the work is carefully done, the polishing may readily and quickly be effected by holding the work on a thick leather buff charged with calcined Trent sand and oil,

or fine pumice stone and oil. The finishing is done with rottenstone and oil, applied with similar wheel, the final touches being given by means of rotten stone applied dry with the hand.

(3669) L. H. & Co. write: We have a 5 inch steam pipe in dry kiln which has a bad leak at a coupling. Can we get or make a solder of some kind to close it without taking out the pipe? We also inclose specimen; please let us know what it is? A. If the coupling is wrought iron, you can calk the leak with a calking iron and hammer. If you are not able to stop the leak in this way, a clamp of wrought iron should be made to fit the place where the leak is, and bolted tightly over the leak with a thick piece of rubber between clamp and leaky place. The specimen is pyrites, composed of iron and sulphur.

(3670) L. M. W. asks: 1. What is the chemical difference between artificial and common camphor? A. Camphor is a terpene, a hydro-carbon (C<sub>10</sub>H<sub>16</sub>). Camphor contains oxygen. A typical formula is C<sub>10</sub>H<sub>16</sub>O. 2. How is bisulphide of carbon changed to the proto-sulphide? A. It is said by Sidot to be obtained by exposing the bisulphide to the sunlight in sealed glass tubes. Free sulphur and mono-sulphide are formed. The latter is dissolved out with bisulphide. 3. Is the protoform a crystal or liquid? A. It is a maroon-colored powder.

(3671) I. K. M. writes: I have a deposit of kaolin, which shows aluminum 40 per cent, silica 45 per cent, and iron about 2 per cent. I have also a deposit of marl, which shows by the analysis 45 per cent of carbonate of lime, and have been informed with these two articles combined, a first-class article of cement can be made. A. You can only tell by experiment what your materials will give. Mix ten per cent of the kaolin with ninety per cent of the marl, knead with water into lumps, and burn in a coal or charcoal fire. Grind and experiment by making briquettes with water, observing time of setting, etc.

(3672) A. W. N. asks for best receipt for dressing over rubber carriage tops. A. The varnish for this purpose is made by digesting orange shellac in ammonia until a solution is effected, which will require several days. Another varnish often used for this purpose consists of refined asphaltum cut in turpentine. It should be applied quite thin.

(3673) R. F. asks: Explain choke boring in a shot gun, the principle on which it depends, the manner in which it is done, and whether guns are choked throughout the entire length of the barrel or only a portion of the length? A. Many systems of choke boring have been tried, affecting different portions of the barrel. It is done by reaming or drilling. The general system is to choke or diminish the bore at the muzzle. This is supposed to deflect the outer pellets inward and to secure a more compact distribution of shot.

NEW BOOKS AND PUBLICATIONS. ELECTRICITY SIMPLIFIED. The Practice and Theory of Electricity. By T. O'Connor Sloane, E.M., Ph.D. New York: Norman W. Henley & Co. 1891. Pp. 160. Price \$1.

This book is designed to give a kind of information much needed by the student of electricity, but heretofore obtainable only by digesting a number of comparatively extensive works. It goes into the theory of electricity and furnishes many apt analogies of electrical action, giving examples of its practical application in every-day life. The analogies are new and well calculated to elucidate points which are generally regarded as obscure. As examples of its treatment of the subject, the sections devoted to the velocity of electric transmission, the relations of static and dynamic phenomena, the meanings of the units, volt, ohm, etc., may be cited. The dangers of the current and conditions for the death-giving shock are also explained at some length.

PICTORIAL ASTRONOMY FOR GENERAL READERS. By George F. Chambers. London: Whittaker & Co. 1891. Pp. xvi, 268. Price \$1.25.

This little manual is one of Whittaker's Library of Political Science. It is well illustrated and quite popular in its tone. As it is not written with a view to cramming for an English examination, its scope does not appear subject to the disagreeable limitations that so often mark contemporary English works. It is a review of the celestial world, rather from the old than from the new standpoint. For this reason it will be found to be of more popular cast than if the spectroscopic and photographic methods of the observatory had filled the greater part of the text.

PRINCIPLES AND PRACTICE OF PLUMBING. By S. Stevens Hellyer. London: George Bell & Sons. 1891. Pp. xv, 294. Price \$2.

Mr. Hellyer is already well known on this side of the ocean by his other writings on this subject. In the present book the details of sanitary plumbing are treated with numerous illustrations of good and bad practice. The minutiae of the subject, such as the making of wiped joints, the treatment of the solder, their proper length and size, etc., are given in practical form. An excellent index and a full table of contents, with the numerous illustrations, add greatly to the value of the book.

A Souvenir Edition of the Memphis Evening Scimitar presents a notably enterprising newspaper novelty. It is a large illuminated quarto containing reproductions from photographs of the principal churches, schools, public buildings, and private residences of the city of Memphis, with portraits of more than a hundred of its representative citizens. The pictures, as a whole, are remarkably excellent, and the enterprise of the publishers will doubtless receive a high degree of appreciation from Southern people, as they deserve to have. The beautiful buildings of Memphis, as portrayed in this illuminated Scimitar number, equal those of many of our larger northern cities, both in number and beauty of design.

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Plow, S. Landauer... 462,801
Plow, M. B. Smith... 462,790
Plow, V. L. Williams... 462,787
Plow, rotary, M. T. Hancock... 463,047
Plow, sulky, Thom & Bailey... 462,886