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(8802) C. C. A. says: I have a gas engine cylinder that leaks water through fine holes in the cylinder wall near a boss, the holes evidently being caused by the "draw" of the iron in cooling. Can you suggest any method of closing these pores solidly enough to stand the heat and pressure of explosion? A. The application of a saturated solution of sal ammoniac in water to the spongy surface will soon rust up the leaky places.

(8803) G. G. asks: 1. Is there a paper on the market which, when dampened, will be discolored by the passage through it of a mild electric current, such, for instance, as would be generated by five dry cells? A. Perhaps a paper for determining the pole of a circuit can be purchased. If not, it may be made as follows: Dissolve one part of phenolphthaleine in ten parts of alcohol, and add 100 parts of distilled water. Soak blotting paper in this and dry it. Then soak again in a 20 per cent solution of sodium sulphate in water and dry again. To use this moisten a piece of the paper in water and apply the wires to it. The space around the negative pole turns a bright red. 2. Is there any harmless chemical preparation which would cause paper dampened in it to take a dark color by the passage through it of such a current? A. Dissolve some potassium iodide in water, add starch and bring to a boil. Soak paper in this, and while damp apply the wires as before. A dark color is formed around the positive wire. By moistening the paper of No. 1 with the starch solution, two colors would be formed.

(8804) W. M. B. gives the following information in reference to query 8726: If ammonia is applied to a nitric acid stain to the point of neutralization, even though a few minutes have elapsed, the color of the cloth if dark may be relieved; if not relieved, apply a saturated solution of ferrous sulphate, following with a saturated solution of pyrogallol acid.

(8805) F. T. H. asks: Will you kindly inform me what is the common practice in writing the past participle of the verb to *arc*, a term which I believe is common in electricity? Is this spelled *arced* or *arcked*? Also, what is the practice regarding the spelling of the past participle of the verb *shellac*? Should this be spelled *shellacked* or *shellaced*? A. The word "shellac" is spelled both with and without a *k*. As a verb its past participle is always spelled with the *k*, *shellacked*. If spelled *shellaced*, it must be pronounced with a soft sound of the *c*, as in the word *laced*, which is not admissible. When the word *arc* as a verb shall find a place in the dictionaries, it would seem that it must be treated in a similar manner, and have the *k* inserted in its past forms, and for a similar reason.

(8806) J. P. says: Please give a recipe for a cement that will fasten unglazed porcelain to iron. A. 1. Melt carpenter's glue in wine vinegar, add a little Venice turpentine and boil up for half a day over a slow fire. 2. Mix 15 parts copal varnish, 5 parts drying oil, 5 parts turpentine, and 5 parts liquefied glue, and set in boiling water until all are melted together. Then stir in 10 parts of slaked lime. Use immediately.

(8807) L. G. L. says: A contends that in telephone work, using the standard type of transmitter, induction coil and batteries for primary circuit, the current induced in the secondary is an alternating current of given frequency, with a reversal of polarity many times a second. B contends that the induced current in a secondary is a fluctuating one, or intermittent current, and that it is not strictly an alternating current in the proper sense of the term as it is known in the art; both agree that it is of high voltage. A. Miller ("American Telephone Practice," page 53, third edition) says: "The current in the primary circuit is an undulating one, and is always in the same direction. The current in the secondary, however, is alternating in character, changing its direction completely with every large fluctuation in the primary current." This was the question which lay at the basis of the suits, many years ago, in the tests of the patents upon which the immense industry of the telephone was built up.

(Continued on page 87)

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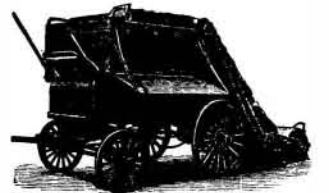
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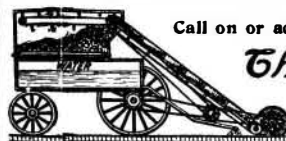
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(8808) J. B. R. wants one or two good formulas for making a strong and absolutely waterproof cement, suitable for use on leather and other similar substances where a flexible joint is needed. A. Gutta-percha and rubber cements are practically the only ones that fully answer the requirement of absolutely waterproof, and if carefully applied are very strong. Either of the following formulæ is serviceable: 1. Dissolve sufficient gutta-percha in 10 parts of carbon disulphide to form a thick solution, then add one part of turpentine. 2. Dissolve gutta-percha as in No. 1, but thin down with petroleum in place of turpentine. 3. Marine glue: Dissolve one part of India rubber in crude benzine and then mix into this solution 2 parts of shellac, heating on a water bath. 4. Marine glue: Dissolve 1 part India rubber and 2 parts asphalt in benzol or naphtha to about the consistency of molasses. In mixing any of these formulæ all the heating must be done in a water bath, as it would be dangerous to use a direct flame on account of the inflammable nature of carbon disulphide, benzine, and benzole.

(8809) H. S. M. says: Kindly give me a good recipe for making rubber cement, something for putting rubber soles on rubber boots to stand hot water. I have the raw rubber (¼ pound) cut with benzine, but don't know what else to use with it. A. Your solution can be used just as it is; if too thin, allow it to stand open in a moderately warm place until some of the benzine has evaporated; if too thick, add more benzine. Another good solution can be made by dissolving ¼ pound of the raw rubber, cut into strips, in about 1 pound of carbon disulphide.

(8810) O. B. F. says: I wish to etch recorded sound waves on polished zinc or copper plates; these plates being first covered with a film of wax, on which the record is engraved. Please give me the proper acid, or combination of acids, strength of same, and possibly length of time required. A. A liquid which is well recommended for etching copper is the following: Water 880 parts, chlorate of potash 20 parts, hydrochloric acid 100 parts. All chemicals should be chemically pure. Dissolve the chlorate of potash in the water and add the acid. From three to six hours will be required according to the depth of the cutting.

(8811) M. H. H. asks: In what countries are magnetic iron ore mines located, and what is the yearly production of the different countries? A. Magnetite is found in this country in the States of New York, New Jersey, Pennsylvania, Michigan, Minnesota, Virginia, Colorado, Utah, Wyoming, Arkansas, and California. As to foreign deposits, they occur in various parts of Asia, in Siberia, in the island of Elba, and in the Hartz Mountains. Figures on the production are not available, but might be obtained by consulting the "Mineral Industries," and by addressing the Department of the Interior, Washington, or the United States Geological Survey, Washington.

(8812) D. H. M. says: 1. Please inform me of a way—if there is any—to deodorize fish or cod oil if possible without the use of chemicals, or at any rate without leaving any trace behind. A. The deodorizing of fish oils has been very often attempted, but with very little success. The odor can be kept down to a minimum by care in the manufacture: that is, to express the oil before the fish have begun to decompose, and to avoid overheating. 2. Have you any books dealing with cod and fish oils? A. There are no books devoted exclusively to the fish oils. We can refer you, however, to W. T. Brann's work on "Fats and Oils," which is very comprehensive from a technical point of view, and Lewkowitsch's "Fats, Oils, and Waxes," which is the recognized standard for analytical work. 3. Would fish or meat done up in cans with almost a complete vacuum, but with no preservative, keep, and if not what effect would the vacuum have upon the article? A. Preservation of food products in vacuo has been tried without previous sterilizing by heat or by antiseptics. As the process is not being used commercially, it seems evident that it has not been successful.

(8813) E. H. says: Can you tell me what is the best preparation to use in clothes to prevent moths from injuring them when packed away? A. Camphor is the best substance to use. On account of its high price, naphthalene has largely superseded it; but it is much less efficient. The tar bags that are now on the market are very good because they can be tightly closed and so prevent the access of moths from the outside; if the clothes are well cleaned before putting away, there should be no trouble from moths.

(8814) J. W. M. says: I would like to know how calcium chloride may be used for extracting moisture. A. Calcium chloride has such a strong affinity for moisture that on simple exposure of the dry substance for a minute, it will become quite wet. Exposed long enough, it will completely dissolve in the water it absorbs. The air is simply passed through tubes or chambers containing the loosely packed chloride. Zinc chloride acts similarly. Oil of vitriol will remove the moisture from air that is bubbled through it. When it is necessary to remove the last traces of moisture from air, phosphorus pentoxide is used.

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