Notes and Queries.

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(9403) R. C. says: Will you please answer these questions in the "Notes and Queries" column of your valuable paper, the SCIENTIFIC AMERICAN: 1. What would be the result if an electric arc be attached to a 110-volt incandescent lighting circuit in a building? Would any fuses be blown or incandescent lamps be burned out? A. An arc has a drop of about 45 volts in it. If the rest of the apparatus covers 5 volts, there will be a drop of 50 volts in the lamp. An arc lamp is rated for ten amperes. This would imply about 5 ohms in the lamp. Now if such a lamp is put directly across a 110-volt circuit, it will take 22 amperes and there will be trouble directly. A short circuit will be established, and either fuses will give way or fire be set from hot wires. Incandescent lamps may receive a rush of current if on the same lines and be burned out. 2. Are there any advantages of electric welding over other methods of welding? A. An electric weld is made in less time than you can describe it. There is no burning, the heat does not extend through the metal, the machine is compact, there is little or no danger of fire, etc. There are many advantages in electrical welding. By it, scrap can be joined up into bars without remelting and forging. The weld is neatly made. 3. Will you explain what is meant by the term carbureter as applied to gasoline engines? A. A carbureter is a device in which air, or coal gas or hydrogen is passed through or over a hydrocarbon liquid, such as naphtha, in order to impregnate it with the vapor of the naphtha. The mixture is then burned or exploded. You will find in Hiscox's "Gas, Gasoline and Oil Engines," which we send for $2.50, a full description of these apparatus as found in engines. 4. Would there be any induction of current if insulated bell wires should cross insulated electric lighting wires? A. If one wire lies across another at right angles, there will be very little induction from one to the other. If a wire lies along another in which there is an alternating current flowing, there will be a strong induction in the second wire.

(9404) B. B. says: A., who has never been 200 miles north or south of Kalamazoo, claims that in the Arctic Circle the "midnight sun" is to the north and your shadow falls to the south. B., who has been inside the Arctic Circle, Klondyke, etc., claims that he saw the sun to the south and that his shadow fell to the north (midnight, of course). Who is right? A. When the sun is seen at midnight from any place in the northern hemisphere, it is seen to the north above the northern horizon. Thousands go every June to see the midnight sun from Norway. Shadows then fall to the south at midnight. This can only be seen on or within the Arctic Circle. At noon the shadows would fall to the north as usual, since the sun would then be to the south.

(9405) P. D. McC. says: Will you kindly explain through your paper the theory of oil quieting disturbed waters? A. The action of oil on the surface of the sea in a storm in preventing the waves from breaking is explained by the great surface viscosity of oil. It covers the water with a film which is more viscid than the water, and holds the waves from combing and breaking over a ship. The surface of the oil is more tenacious than that of water, and is not readily broken into surf by the pressure of the water from below. We should not express the action as quieting the disturbed waters, but as we have done above. The seas still roll, but they are smooth on the surface and do not break over the vessels. Ships can ride the seas with safety in this manner.

(9406) J. W. H. asks: Being an interested reader of your SCIENTIFIC AMERICAN, I would ask you for some information through "Notes and Queries." 1. What would be the easiest way of sinking a 5-foot caisson through 8 feet or more of quicksand? I must deepen an irrigating sump pit and have a stratum of quicksand to contend with. I have a 40-horse-power locomotive style boiler. Would it be much economy to jacket it? If so, what is the best, and I might say home-made jacket? What gage of iron or steel plate should I use in making a caisson or well curb 5 feet in diameter? A. For deepening a well with a caisson through quicksand, pressure should be applied to the top of the caisson to continually force it a little below the sand bottom in order to protect the workmen or appliances in excavating the sand within the caisson. Studding may be set around and resting on the top of the caisson, extending above the top of the well and loaded with sufficient weight to sink the caisson while the excavation is progressing. A sand pump or any convenient device may be used for removing the sand. A moderate pumping of the well may be done to relieve the resistance at the bottom of the caisson by inflow of the sand, which if too free, should be stopped by keeping the water at full height. The caisson may be made of oak or cypress staves with hoops on the outside and angle-iron bracing hoops on the inside, or may be made of three-sixteenths iron or steel with angle-iron hoops on the inside for bracing. There is considerable economy in the jacketing of your boiler and for home-made work we recommend to inclose the sides with an 8-inch brick wall to just above the center line of the shell and under the smoke jacket and front to make an air-tight chamber, then plaster the top of the boiler with ashes or sand and as little clay as will make a light plaster. Asbestos felt plaster would be better and would stick to all parts of the boiler, requiring no brick walls.

(9407) G. A. B. says: 1. Why is it you can place the hand without its being burned, on the bottom of a vessel containing boiling water and as soon as the water ceases to boil the hand will suffer a severe burn? A. A vessel containing boiling water can usually be held on the hand if the person has a good thick skin from labor or exercise, for a short time; just about long enough for the water to stop boiling. If the bottom of the kettle is covered with soot, which is a non-conductor of heat, it can be held longer than if it is clean metal. We do not think the fact that the water ceases to boil about the time the burn is felt has anything to do with the burn; it is a coincidence, merely. 2. Why is it that water boils, seemingly, easier in an old tin vessel than in a new one? A. Water boils sooner in a kettle with a rough, unpolished bottom than in one with a smooth, polished bottom. Hence it boils easier in an old tin than in a new one. 3. Why can you cut glass with shears under water? A. When glass is cut under water with shears the water seems to take the shock and hold the glass, so that the glass is chipped off without cracks running across it as we ordinarily see them do. 4. Is the temperature of steam at the bottom of the liquid boiling at a higher temperature than that at the surface? Does the temperature of the steam on the bottom vary with the depth of the liquid? Else what has the superincumbent liquid to do with the vapor pressure? A. Boiling takes place when the saturated vapor has a pressure equal to the atmospheric pressure at the time. Since the elasticity of the vapor is then the same as that of atmosphere, the vapor may be formed anywhere within the mass of the liquid. The bubbles formed below the surface rise through the liquid and the act is called boiling. Unless the fire is very hot, the entire mass, kettle and all, is of the same temperature, that of the boiling point of the liquid. We do not understand that the depth of the liquid influences the temperature of the boiling point to any extent. 5. Is there any truth in the statement that liquids when hot and thrown into the air on a cold day will fall frozen, while liquids not heated will not do so? A. Water that has been boiled and by this means deprived of its contained air, freezes more easily than water in its natural condition. But it must be extremely cold for water which is thrown into the air to fall in the frozen condition. It hardly seems credible, though water blown as spray often freezes as it strikes upon some surface. These drops are quite minute and the water is already at its freezing point when it strikes. 6. Why will not the leaves of an electroscope (gold leaf) remain diverged? Is there a remedy for it? A. An electroscope should have its metallic parts quite smooth, clean and free from dust; it then ought to retain a charge for several minutes if the air of the room is reasonably dry. The glass of the instrument should be clean and dry also. We know of no other remedies for an electroscope which does not retain its charge. 7. What could cause an electrolytic machine to cease working, after a few minutes? Could anything save a fall in potential cause this? A. You ask, "What could cause an electrolytic machine to cease working?" We take it that you intended to write "an electrostatic machine." These machines easily lose their charge by the action of the air, dampness principally. The remedy is to have the plates in a glass case and keep calcium chloride in the case to absorb the moisture. Even then, there may be occasional trouble. 8. What *two* second-class conductors with *one* first-class conductor would make a voltaic one? A. For a voltaic cell, use zinc as the positive plate, and carbon for the negative plate. The liquid may be either ammonic chloride dissolved in water, or bichromate of potash or soda, dissolved in water with sulphuric acid added. To make a battery you should have specific instructions. Our SUPPLEMENT No. 792 described a very fine battery for lectures and students' experiments. Hopkins's "Experimental Science," price $5, gives instructions in almost everything which a person engaged in teaching needs to enable him to carry on his work.

NEW BOOKS, ETC.

THE MECHANICAL ENGINEER'S REFERENCE BOOK. By Henry Harrison Suplee, B.Sc., M.E. Philadelphia: J. B. Lippincott Company, 1904. 16mo.; pp. 834. Price, $5.

Of making many engineer's pocket books there is no end, but it is seldom that we are favored with one which stays on the editor's desk for constant reference. Mr. Suplee has shown a large grasp of the subject and has performed his task in an exemplary manner, and we consider that it is indispensable to every one who is in any way concerned with mechanical engineering, or civil engineering for that matter. It is impossible to note the individual contents, but it is safe to assume that practically all the engineering data that are required are at hand. The book is a labor saver, and the "short cuts" are excellent. The book has thumb indexes, and is substantially bound. It is worthy of an extended sale, and we do not doubt that it will be a most welcome addition to the library of the engineer, old or young.

THE METRIC FALLACY. By Halsey and Dale. New York: D. Van Nostrand Company, 1904. 8vo.; pp. 231. Price, $1.

The chief points which the writer endeavors to maintain are these: That, as shown by the experience of other countries, the changing of a people's system of weights and measures is a task of enormous difficulty, attended by widespread confusion; that the retirement of the inch and the substitution therefor of the millimeter involves the destruction of all mechanical standards; that the prosperity of foreign trade in nowise requires the adoption of the metric system as a basis of manufacture; that the system has for industrial purposes no such superiority as is claimed; and that the claims for the saving of time in calculations and in the school life of children are completely negatived by the certainty that, here as elsewhere, the old units will persist in use and must be learned; that the confusion which is said to exist in our weights and measures is a fiction; that, measured by the number of units in common use, and by their uniform value in all sections and all industries, we have the simplest and most uniform system of weights and measures in the world. Whether Mr. Halsey's arguments are sufficiently strong and well presented to convert the pro-metric mind or no, the reader can scarcely doubt his earnestness and sincerity. Mr. Dale's contribution to the work is an exhaustive consideration of "The Metric Failure in the Textile Industry." It shows knowledge and research, makes interesting reading, and is certainly worthy of notice as an able presentation of "the other side of the question."

DIE VERWERTUNG DES SPIRITUS FUER TECHNISCHE ZWECKE. Von Prof. Dr. N. Wender. Mitt 88 Abbildungen. Large 8vo. Price, $1.50.

Low-grade alcohol is destined to become of great industrial value as an engine fuel. Up to the present time there has been no work in German in which the technical utilization of alcohol has been discussed with anything like the thoroughness technologists demand. The present book seems well calculated to supply this want. After treating of the method of utilizing alcohol in various countries, the author describes methods of producing alcohol, alcohol illumination, alcohol cooking and heating apparatus, alcohol motors and locomobiles. In a brief chapter the author reviews the utilization of alcohol in chemical industry.

FISCHWEGE UND FISCHTEICHE. Die Arbeiten des Ingenieurs zum Nutzen der Fischerei. Von Paul Gerhardt. 142 illustrations. Leipzig: Wilhelm Engelman, 1904. 8vo.; pp. 147. Price, $2.

Since the publication of H. Keller's "Die Anlage der Fischwege," in 1885, no notable scientific book on what may be termed the engineering side of fishery work has been published. The present book is, therefore, rather a timely addition to the literature of an art that of late years has grown in importance. Mr. Gerhardt has confined his investigations not merely to Germany. He has studied the construction of fish weirs and ponds abroad, and has made many an interesting comparison with similar structures of his own country. His book may well be considered an excellently prepared scientific treatise on a subject which in this country has been discussed, so far as we know, only in the reports of the United States Fish Commission.

A CLEAN CHIMNEY. The Economical Burning of Coal Without Smoke, with Especial Reference to the Use of Washed Coal. By A. Bement, Member American Institute of Mining Engineers, etc. Published for private circulation by Peabody Coal Company, Chicago, 1904. 8vo.; pp. 48.

The efficiency or inefficiency of bituminous coal is generally supposed to depend almost entirely upon the chemical characteristics of the coal and the construction of the apparatus used in consuming it. As a matter of fact, the method of operation, while generally slighted, is also of high importance. It has been the aim of the writer to show how the costly evils of incomplete combustion, the loss of coal and coke removed in the ashes, and the escape of heated gases, may be remedied by scientific operation and manipulation. The chapter setting forth the valuable features of "washed" coal deserves the careful consideration of firemen, engineers, and proprietors.

CHEERFUL AMERICANS. By Charles Battell Loomis. New York: Henry Holt & Co., 1903. 8vo.; pp. 300. Price, $1.25.

"Cheerful Americans" is a volume of short stories in Mr. Loomis's usual cheerful style. All the yarns have appeared at different times in different well-known periodicals, and are here collected and reprinted for the delectation of Americans who are already cheerful, and the conversion of those who are not. The humor is of the quiet, good-natured kind, dependent as much on character as on situation. The fads and follies of humanity are sketched for our amusement, but there is nothing caustic or cynical in the manner of their presentation. Well-executed drawings by popular illustrators heighten the enjoyment of the reader.

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