financial, commercial, industrial, and, to some extent, political affairs. Although not a complete review of the conditions in every branch of industry the book contains all the important facts and statistics in most departments of activity.

TOTAL ECLIPSE OF THE SUN. By Mabel Loomis Todd. New and Revised Edition. With Introduction by David P. Todd. Illustrated. Boston: Little, Brown & Company. 1900. Pp. 273. 16mo. Price $1.

The recent eclipse has aroused popular interest in the sun. A new edition of Mabel Todd's work having become necessary, the opportunity has been seized of incorporating an account of the eclipses of 1896 and 1898, so successfully observed in Nova Zembla and India, and of that of May 28, 1900.

LESSONS IN ELEMENTARY PHYSIOLOGY. By Thomas Huxley. Edited by Frederic S. Lee, Ph.D. New York: Macmillan Company. 1900. Octavo. Pp. 577. 177 illustrations. Price $1.40.

Thomas Huxley's "Lessons" are too well known to require any extended notice here. The new edition which lies before us has been carefully revised and brought up to date by Prof. Lee, of Columbia University, so that it now forms a complete modern, elementary text book on physiology admirably adapted for school and college use.

FOGNATURA DOMESTICA. By Attilio Cerutti. Milan: U. Hoepli. 1900. 16mo. Pp. 421. 200 Illustrations. Price $1.

An excellent little book on plumbing in the "Manuali Hoepli," of which series 600 volumes have been issued. It is to be hoped that at some time we may have in English a technical series which will compare with this one. The Weale series was an excellent one, but the volumes became superseded.

LE CONSTRUZIONI IN CALCESTRUZZO ED IN CEMENTO ARMATO. By Giuseppi Vacchelli. Milan: U. Hoepli. 1900. 16mo. Price $1.

The author has prepared a valuable technical book on concrete and cement construction. It is one of the best treatises we have ever seen in any language upon the subject. It is profusely illustrated by 210 engravings.

INTRODUCTION TO SCIENCE. By Alexander Hill, M.D. New York: Macmillan Co. 1900. 16mo. Pp. 140. Price 40 cents.

One of the admirable little volumes of "Temple Primers." This little book aims at giving an account in popular language of the scientific problems which are most prominent at the present time, and attempts to portray the attitude of the mind of those engaged in solving them.

L'INCANDESCENZA A GAS. By Dr. Luigi Castellani. Milan: U. Hoepli. 1900. 16mo. Pp. 144. Price 50 cents.

We have never before seen a work on the manufacture of mantles for incandescent burners. The little volume before us is a thoroughly practical treatise on the subject, and our only regret is that it is in the Italian language and, therefore, cannot be of much use to those who do not read Italian.

HEMP. A Practical Treatise on the Culture of Hemp for Seed and Fiber, with a Sketch of the History and Nature of the Hemp Plant. By S. S. Boyce. New York: The Orange Judd Co. 1900. 12mo. Pp. 122. Price 50 cents.

Few plants adapt themselves as readily to cultivation and in as varying climates as does hemp. It was one of the first plants introduced into America by the Colonists, and there seems to be no reason why it should not again take its proper place among our national industries. The author has given great attention to the study of the hemp and his book is a most excellent one.

KELLY'S DIRECTORY OF MERCHANTS, MANUFACTURERS AND SHIPPERS AND GUIDE TO THE EXPORT AND IMPORT SHIPPING AND MANUFACTURING INDUSTRIES OF THE WORLD. London: Kelly's Directories, Limited. 1900. 14th edition. 8vo. Pp. 3,488. Price $10.

The portly volume before us is about the most satisfactory work of this kind that we have ever seen. Its index of trades is most exhaustive, and the large list of cities and towns is most comprehensive. As an example of that way in which the work is compiled, take Holland: First comes general information relative that country, then follow particulars as to the extent of commerce and imports to Great Britain; a long list of the various cities, principal manufacturers and merchants in each city, custom tariffs of all nations, a section devoted to trade marks, a large business directory of London, and a business directory of England, Scotland, Wales and Ireland. We notice a most amusing letter in the preface relative to Her Majesty's Secretary of State for Foreign Affairs. This letter is on a par with many of the British consular reports, and affords a painful contrast to our remarkably efficient Consular Service of the United States, our consuls not being deterred from making searching inquiries in regard to trade in foreign countries.

SOME STRANGE CORNERS OF OUR COUNTRY—THE WONDERLAND OF THE SOUTHWEST. By Charles F. Lummis. New York: Century Company. 1898. 12mo. Pp. 207. Price $1.50.

The book is handsomely illustrated, many of the cuts being wood engravings. The author deals with such subjects as "Grandest Gorge in the World," "The Forest of Agate," "The American Sahara," "Montezuma's Well," "Montezuma's Castle," "The Greatest Natural Bridge on Earth," "Stone Autograph Album," "The Navajo Blanket," and others equally interesting. The author tells his stories in a most pleasing style.

Business and Personal.

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will 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.

(7909) F. L. asks: 1. What causes the hummmg in electric street railway motors? They are noiseless when new, but after about six months or a year, they begin to hum. A. If this statement is true, we are not able to give a reason for it. There is no electrical cause which after this or any other period will develop a humming noise, nor any mechanical cause for such a universal effect. We suggest a broader investigation to see if all motors hum at the end of six months. 2. In cast-welding rail joints do they allow for any expansion or contraction? If so, how? A. No. If the joint is made stronger than the force of contraction, the rail will not break. If the rail is held down more rigidly than the force of expansion, it cannot break away from its fastenings. Hence, it will stay in its place both in winter and in summer. This is the theory. 3. Is there any direct incorporation of the metal, in the rail and in the cast? I have heard some claim there is not, while others claim that the rail is fused at one or two points, generally about the size of a half dollar, where there is a direct union of the two metals. A. There is firm adhesion. We do not know whether there is incorporation or not of the two metals. 4. We have made a box-kite, with 2 cells, 16 inches long, and 15 inches square, with about 10 inches clear between them. When we try to set it up it will dive down, after going up about 25 or 30 feet, sometimes hitting the ground and breaking some of the sticks. A. We advise you to apply to the Weather Bureau at Washington, D. C., for the plans and construction of a box-kite.

(7910) J. B. P. asks: 1. Will you please advise me of some compound, or chemical, that will clean scales from a boiler, while boiler is in use, without any risk of burning the boiler, by water foaming? A. For keeping a boiler clear of incrustation there is nothing so easily managed as caustic soda or potash lye. Dissolve about a quarter pound of the soda or lye for each horse power of the boiler in a barrel or tub of water and connect it with the suction of the feed water pump. Use the boiler for a day with the soda in. Then blow out from the boiler after the fires are drawn or banked or when the engine stops, to the level of the lower gage cock or bottom of water gage and pump up with fresh water to high water mark. Use the boiler next day as usual and at night after fires are drawn and walls cooled below the temperature of injury to the boiler, blow out all the water and clean out the boiler. This may be repeated according to the condition of the boiler, once or twice a month. See Davis' book on "Boiler Incrustation," $1.50 by mail. 2. Can I charge a set of storage shells by connecting them in series, in main circuit, batteries having the same capacity in amperes and voltage, as the circuit, and will the batteries cause the lamps to burn dim? Would an ammeter connected in the circuit answer to tell when the batteries were fully charged? A. Connect the cells in series and to the line through the ammeter and a rheostat by which the amount of current can be adjusted. A good charging rate is 2½ amperes per square foot of positive plates, reckoning both surfaces. The final voltage should be 2½ volts per cell. This you must determine by a voltmeter in shunt with the cells. Stop the charging when this is reached. As you must put the cells in shunt with the lamps on the circuit, the charging of the cells cannot affect the light if the dynamo has capacity enough to charge the cells and light the lamps at the same time. A good book for one having charge of a storage battery is Treadwell's, price $1.75 by mail.

(7911) E. L. C. writes: Kindly inform me how to copper-plate—a good heav plate. I wish to plate some steel and iron wire, 2 feet long and about 12 gage. I would also like to plate some wood a good heavy copper plate. I have tried a receipt from some book, but with little or no success, as the plate will not stay on the iron or steel when I rub or try to polish it, and some will not take at all. A. Your trouble probably is not due to the defects of the description in the book which you have followed, but to your own inexperience. The only way to become an electroplater is to learn the trade from some one who understands it practically. No description can prevent you from making mistakes, or tell you how to recognize the proper working of the process and the proper condition of the bath and the article to be plated. Had yours been all right, the coating would have formed properly and adhered. Such points must be learned by actual experience in actual work. We are not electroplaters and cannot teach electroplating. We recommend Watt's book, price $1.

(7912) G. A. H. asks: Can you give a description of a sketching camera that reflects direct from the photograph and not from a transparency or negative, and how to arrange the reflectors and lens in a lantern to do the same? A. We think you will find what you want in a "sketching camera" in Hopkins' "Experimental Science," price $4 by mail. He there describes a camera for projecting opaque objects, so as to project them upon a screen, as slides are projected by an ordinary lantern. If you place the screen where you wish the picture to fall as you sketch it, you will have a sketching camera for the direct use of a photograph, or any opaque object.

(7913) W. S. D. writes: I wish to make a storage battery large enough to light two 16-C. P. incandescent lights for a few months, several hours a day. I would kindly ask you to please give me your opinion as to which book to get for the construction of such a battery, and if you could give me some information, I would be very thankful to you? A. We can supply you with the following books on the storage battery, "Salomon's Accumulators," price $1.50; "Treadwell's Storage Battery," price $1.75. Prices are by mail. We do not, however, advise amateurs to attempt the construction of a storage battery for real work. It is well enough to make a few cells for experimental purposes. Amateurs cannot expect to make cells which will have much endurance or efficiency, as compared with the cells made in a properly equipped factory, and by experienced workmen. In your case you wish to light 16-candle power lamps. These are rarely made for less than 50 volts. You will then need twenty-five cells with five or seven plates each. The cost will be very much greater than for the same amount of light obtained in some other way. The labor of making so large a number of cells is a great deal. You need as many cells as if you had a greater number of lamps. If you really must have electric lights from a storage battery, we would say buy the battery.

(7914) P. G. writes: 1. My boy is desirous of constructing a telephone line between two country houses about five hundred feet apart. Will you kindly answer in the SCIENTIFIC AMERICAN whether there is any danger from lightning? A. If your house is so situated that the line can be run along the eaves of the houses, there is little danger from lightning on the telephone line your son wishes to run in the city. It were safer to use lightning arresters as is usually done. 2. Is the bright light in the western sky early in the evening during the last month a star or an electric light sent "up in a balloon" from Edison's workshops at Menlo Park? I maintain that it is a star, but my friends have scoffed at me so much that I do not know where "I am at." I have tried to demonstrate by crude trigonometry that it must be a star, but they refuse to be convinced. Therefore I seek an answer from one whose authority will be unquestioned. May I hope that you will help me out? A. The light is doubtless the planet Venus. It would be impossible to raise a balloon high enough to have the light so far above the horizon. This is a frequent question, but has little reason under it. Mr. Edison has done many wonders, but is hardly wizzard enough to raise a light which could compete with a planet in brightness. Mr. Edison's laboratory was removed from Menlo Park years ago to Orange.

(7915) J. L. C. asks: 1. Can you give details of construction of an acetylene search light that will project a narrow beam of light? A. An acetylene search light presents no peculiar conditions. Place the light in the focus of the reflector. Have the reflector adjustable so that it can be brought nearer or slid farther from the burner. You can adjust for best projection of the beam as may be required. 2. How would be the best way to reinforce the above light, to increase the size of the burner, or to add individual burners? A. You cannot obtain all sizes of burner for acetylene. To increase the illumination you must add to the number of burners. They are usually placed tandem, and not abreast, when used for projection.

(7916) J. E. P. asks: 1. How to remove the elements from a Hercules battery cell after the salts have crystallized, forming a solid mass of zinc, carbon and jar. I have about a dozen cells in this condition, and it is impossible to get the elements out of the jars. A. We would suggest that you soak your cells in water, thus dissolving the crystals which have formed. This will be a slow operation. It will hasten matters to dig out all the crystals which can be got at wit any sharp-pointed tool. Sulphuric acid will dissolve the substance more rapidly, but it will also consume the zinc, which you are probably desirous of saving. In this case prevention is better than cure. 2. Can satisfactory results be got from compressed air in an ordinary steam cylinder, and how high a pressure is necessary per rated horse power of engine to get best results? A. The best steam engine is also the best for compressed air. Only a very little higher pressure or longer cut off is needed to give the same results for air as with steam for power.

(7917) L. A. S. asks: 1. What per cent of electricity, going out through the trolley wire, gets back to the dynamo through the rails or ground? A. All the current returns to the dynamo in one way or another. 2. Would it be possible under existing conditions of insulation, to send the current out through the rails and back to the dynamo through the trolley wire, and if so, would the electrical efficiency be the same? A. The trolley wire is made plus, not as you seem to think, because the current might not go out properly if sent out by the rails, but to protect metals, water and gas pipes, etc., from corrosion at much as possible. It makes no difference to the electrical efficiency which wire is attached to the trolley, the plus or the minus. If, however, the current flows from the trolley wire to the ground on its way back to the station, it will not act by electrolysis so much upon the metal which it traverses, as if it flowed in the opposite direction. Iron and lead are positive, and tend to attach themselves to the negative pole of the circuit. If then the rails, and water and gas pipes are in the direction of the flow of the circuit, they are not reduced by electrolysis as they should be if the current were flowing the other way, from the rail to the trolley wire.

(7918) L. H. R. asks: 1. Does a static electric machine depend for its volume of electricity on the superficial size of plate or velocity, and will a sufficient series of plates at a greater speed give off very much electricity at a high speed on one large disk, at 200 or 300 revolutions? Please answer an old reader in query column next issue, to satisfy a difference of opinion. A. The discharge of a static machine depends upon several conditions, size of plates, swiftness of rotation, dryness of plates, absence of dust, etc. The spark cannot much exceed the radius of the plates in length, since it will find the distance less between the combs if the balls are separated more than half the diameter of the plates, and will pass between the combs taking the axle of the machine on its way across. This is the reason for using as large plates as convenient. Glass is the best substance for the plates. Since there is a limit to the safe speed for glass, hard rubber is now used a great deal. This can be run at any speed desired, and a very strong spark can be produced. It is better to use several smaller plates than one large one, because of compactness and neatness of appearance. A well-made machine with two 18-inch plates of hard rubber, driven by a quarter horse power motor, gives a steady stream of sparks at 1,800 revolutions per minute. It may also be driven by hand, though no one can maintain that speed very long. 2. Are mica plates superior to glass? A. Mica differs very little from glass in its inductive capacity, and would serve equally well for the plates of a static machine, if pieces of sufficient size could be had at a moderate cost.

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