current test with two electrodes in the bath. 3. Is a single cell battery sufficient to do electrotyping at all? A. Yes. 4. What should be the respective sizes or weights of the metals in the battery? A. There is no fixed ratio. See SUPPLEMENT, No. 310, for details of electro-plating.

(5816) C. R. H. writes: I have a six candle power lamp which I would like to light for four hours each evening. 1. What kind of batteries should I use and how many? A. Use a secondary battery of 5 or 6 cells. 2. Would large size plunge battery described in "Experimental Science" do, or would it have to be replenished too often? A. It would require replenishing too frequently. 3. How long would plunge battery of same pattern run simple electric motor described in same book? A. It might run it for a couple of hours.

(5817) C. F. M. asks (1) how to make a spark coil? A. Make a bundle of pieces of iron wire, the whole one-half inch thick and eight inches long. Wind it with No. 22 wire to a total diameter of two inches. 2. How many batteries sal ammoniac will it take to light three burners? A. Two or three.

(5818) M. asks: Is there any way of communicating by the voice between places 250 feet apart, other than by a regular Bell telephone? Would a string telephone such as I have seen boys use answer for the purpose? And if so, how are they made? Will they work if the string rests on anything, or must it hang clear between the transmitters? A. An acoustic telephone can be used. Picture wire is good for the line, and for receiver and transmit er use parchment drum heads to whose center the wire is attached. The wire must touch no inflexible object. Lea it by loops of muslin around corners, etc., so as to keep a strong strain on it.

(5819) B. M. C. asks: 1. Is it true that the Bell telephone patent runs out January 30? A. See the SCIENTIFIC AMERICAN, February 3, 1894. 2. Is the Burnleydry battery suitable for running the Blake transmitter? A. Yes. 3. Is it any better or any cheaper to maintain than the Disque Leclanche battery? A. The cost of either is trivial, and one is about as good as the other for the purpose. 4. Would one cell of either battery operate the Blake transmitter one mile and a half? A. Yes. 5. Is a cipher called a figure? A. According to recent authority, the cipher 0 is not a figure.

(5820) J. A. B. asks: Does electricity travel on the surface of a wire, through the center of it, or is it equally distributed in every part of the wire? A. The current intensity for given conditions varies directly with the cross section of the wire. The best illustration of the action of the wire is to assnme that it opens a path through the ether, a path in which there is no restitutive medium for wave formation. As the transfer or electric energy involves no transfer of matter, and as electricity is not matter, we cannot directly answer your query. The best theory of the transfer of energy assumes that the ether surrounding the wire does the work. Electricity as such can only be stored on the surface of conductors.

(5821) C. G. W. asks: Is a copper wire woven (flexible) cable as good a conductor of electric current as a solid wire? A. Very nearly as good, if of the same aggregate cross sectional area. The bending of the wires would tend to increase the specific resistance of the copper.

(5822) H. asks: I wish to know if the common rubber belting would be a good and safe insulator between conductors carrying high power and the metal supports for the same. Cannot use covered wire, and the insulator must be flexible. If belting will not do, can you name an article of moderate cost that will answer the conditions? A. Rubber belting will be a very good insulator, especially if shellacked to prevent the accumulation of hygroscopic moisture. 2. What is the width of slot in cable subway? Is it sufficiently wide to allow the grip to be taken out at any point? A. About ¾ inch, not enough to permit the grip to be removed.

(5823) G. L. H. asks: At what meridian does the day begin? A. The meridian at which the day changes is 180 degrees from Greenwich, England; from which place longitude for navigation is reckoned. The day meridian is an ocean line from just west of Behring Strait, passing east of New Zealand to the southern continent.

(5824) H. W. asks: What is the difficulty of the underground system of electric car traction? A. In securing good insulation. Water, dirt, ice, and snow work into the conduit and occasion great loss of current.

(5825) S. H. asks: Is there any method of determining the voltage of a magneto-electric battery? A You can get at the average by a Cardew voltmeter or similar apparatus depending on the expansion of a metal by the heat produced by the current. The current is alternating and the voltage varies from zero upward.

(5826) T. R. asks how to construct a dry battery. A. For dry batteries we refer you to our SUPPLEMENT, Nos. 157, 767, and to the SCIENTIFIC AMERICAN, No. 2, vol. 67, and No. 7, vol. 68.

(5827) E. S. S. asks: 1. When I heat my soldering iron with natural gas through a Bunsen burner, a deposit is left by the flame, which of course has to be scraped off before the iron is used, causing great inconvenience. Can you tell me of any way I can prevent this deposit and still use gas? A. We can only suggest that you try a regular solderer's gas furnace, or use a brass tube kept hot by the flame and place the iron in it. It may be very thin and fit the iron closely. If surrounded by fire brick, giving about an inch space, you will get better heat. 2. What are the principal reasons that the electric cars cannot be supplied with current from below instead of from the overhead wire? A. Leakage of current owing to grounding caused by water, dirt, and condensed moisture. 3. What is the main point preventing economical use of the storage car system? A. The batteries are too heavy. 4. I have heard that in the human body there is some chemical that is worth nearly four hundred dollars an ounce. Can you tell me its name and the reason it cannot be extracted from a corpse? A. The metal calcium is quoted at $310 an ounce. This is present in the cheapest materials also. 5. When two trolley cars are fed by the same wire and are both between the same feeders, why does not the current all go through the car nearest the power house? A. This would be contrary to the law of branch circuits. The current follows all possible paths and is distributed in proportion to their respective resistances. 6. What is the reason that the block system on railroads is not more extensively used? A. It is very expensive. 7. I have the dynamo described in SUPPLEMENT, No. 161. With the H armature I get scarcely enough current to ring a bell. What should be the voltage and amperage of that dynamo, if properly constructed and run at the speed stated? Would a drum or laminated armature give any better result? A. It should give sixor eight volts, and a laminated drum armatnre would give better results. See our SUPPLEMENT, No. 599. 8. Does not the number of ohms resistance of a piece of wire increase as the pressure and amount of current is increased? A. No. Your ninth query admits of no answer.

(5828) H. L. asks: 1. How many cells of Edison-Lalande battery, phonograph motor type, would be required to run the motor described in SUPPLEMENT, No. 759? A. Twenty cells should give good results. It would probably be better to wind it for lower resistance. 2. How many hours will it run with one charging? A. It gives 300 ampere hours. Dividing by 6 gives 50 hours. 3. How coupled? A. Couple according to the resistance of the motor, which is determined by the winding. 4. How many and what size cells of storage battery will it take? A. Three or four 35 ampere cells. 5. How many and what size cells Crowfoot battery to charge the same? The motor to be nsed say 5 to 8 hours, and balance of time to be spent in charging. A. Eight in series and forty in parallel would charge 3 cells. 6. Which will be the least expensive to maintain, counting only the cost of materials used, not allowing for labor? A. Probably, all things considered, the Lalande-Edison battery would be the best and cheapest. 7. Have you a description of a storage battery that I could make myself? A. For a description of a storage battery see our SUPPLEMENT, Nos. 838 and 845. The diagram of connections you send is all right.

(5829) H. B. writes: Are there sufficiently correct surveys of Florida to enable you to determine whether artesian water could be had by boring at Tampa or not? Could a heater for a forty gallon water boiler be successfully constructed and operated from a 500 volt street railway current, and who could furnish such a heater? In a steam dry kiln for drying brick, at what intervals should a fan be capable of having removed or removing the cubic contents of the moist atmosphere in the kiln, or at what periods should it be removed in order to insure a proper state of atmosphere? Has colonization or missionary efforts done more for civilization? Is colonization induced by a Christian spirit or desire of pecuniary remuneration? Would a ball fired directly upward go a greater distance from the muzzle of the gun (on account of decreasing resistance of atmosphere, etc.) than if fired at 45 degrees? A. We have no record of artesian wells in the southern part of Florida, but from the well known slope of the water-bearing strata of the Cretaceous period, on the Atlantic border from New Jersey to Florida and along the Gulf and its supposed extension under the Atlantic Ocean and Gulf of Mexico out to the deep sea border, there can be but little doubt as to the flow of artesian wells up to or near the surface in all the northern and central parts of Florida. It may require considerable depth at Tampa, probably over 2,000 feet, to obtain a large quantity at a near surface flow, with also a possibility of a mineral characteristic, arising from its great distance from the source of supply, which are the uplands of Georgia. An electric heater can be made for the purpose described, but would be very expensive in cost of plant and for running. They are now used on a small scale by the Electric Heater Company, Havemeyer building, N. Y. The moist air in a drying kiln for brick should not be removed until the brick are thoroughly heated, so as to drive the moisture from the inside before the outside becomes dry enough to crack. The ventilation may then proceed to a degree not to lessen the temperature until there is no more evaporation or moisture arising from the brick. Fan blowers are not needed where natural draught for ventilation can be had. Intermittent ventilation as named is liable to make surface fracture and poor brick. Colonization has proved itself the great basis of civilization, and with few exceptions pecuniary gain has been the essential aim. A ball fired from a gun will rise higher on the vertical than at 45°.

(5830) Y. says: What is the composition of the bath to remove from engravings the water stains that they get from hanging on damp walls, and what length of time are the engravings left in the bath? A. Ozone can be used for removing mildew and other stains from engravings that have been injured by hanging on the walls of damp rooms. The engraving should be moistened and suspended in a large vessel. The ozone may be generated by putting pieces of clean phosphorus in the bottom of the vessel partially covered with water, or by passing electric sparks through the air in the vessel. Keep the engravings exposed to the ozone until thoroughly bleached. Phosphorus is very dangerous.

(5831) L. T. asks: 1. Are the stars commonly called second magnitude those between magnitudes 1 and 2, between 1·5 and 2·5, or between 2 and 3? A. The magnitudes of stars as generally designated are that all above 1½ are designated as of first magnitude, and those between 1½ and 2½ as second magnitude and so on. Astronomers now designate the magnitudes by differences of one-tenth of a magnitude. 2. Suppose a person to be moving away from the earth at a speed faster than light travels. A says that to see the earth he must be looking toward it, B claims that he must be facing away from it. Which is right? If B is right, would he not see an inverted view of it, as if reflected from a mirror? A. A person moving away from a light faster than the velocity of light would see no light in either direction. 3. In a house heated by the hot water system, if all the radiators but one are shut off, will that one become hotter, or does the circulation of the water and consequent heat of the radiator depend only upon the rapidity with which the latter is cooled? A. The shutting off of all but one radiator would slightly increase the temperature of the water in the circulating radiator, due to the saving of heat radiated by the closed radiators

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