Correspondence.

The Double-Deck Car.

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of this date, in an article on "A Double-Deck Car for Rapid Transit," page 228, you say that such a car "is practically unknown in this country." Double-deck cars have been in use on the electric roads of San Diego, Cal., for a number of years past. I saw them in use there in December, 1902, and am informed by friends that they were in use there some time before that date. They were different from the car described in your article, the upper deck being inclosed only with curtains, the seats running crosswise and being reached by outside stairways.

C. P. CARPENTER.

Northfield, Minn., March 19, 1904.

Javanese Casting.

To the Editor of the SCIENTIFIC AMERICAN:

In the SCIENTIFIC AMERICAN of December 19, 1903, under the title "An Odd Casting," I read the sentence: "No molder who has examined it has been able to solve the riddle of Mr. Galvin's discovery in the line of castings."

Probably you never heard of the methods employed by the Javanese in casting. They make their model of wax, place it in a box, and then fill the box with molding sand. After drying, holes are made in the sand clump, which is then placed on a fire. The wax melts and flows through the holes, leaving a correct copy of the model in the sand. After this explanation, I think, the casting of Mr. Galvin can no longer be considered an unsolved riddle. B. F. LOUST.

Souerabaja, Java, February 9, 1904.

Warships Compared.

To the Editor of the SCIENTIFIC AMERICAN:

In one of your late editions of the SCIENTIFIC AMERICAN I noted with interest your comparison of the British cruiser "Drake," battleship "King Edward VII.," and the American cruiser "Tennessee" and battleship "Connecticut." The fact that you take our very latest designed ships and compare them with ships that the English have greatly improved on, is not doing justice to the British. For instance, the "Drake" (and her sister ships) has been completed a great many months now, and the new armored cruisers of the "Duke of Edinburgh" class are smaller but much more powerful than the "Drake" class. Furthermore, the "Duke of Edinburgh" class will be finished long before our "California" class are ready, to say nothing of the "Tennessee" and "Washington."

The *improved* "King Edward VII." class of British battleships, with their four 12-inch, eight 9.2-inch, and six 6-inch guns, would have been the proper ships to compare with our "Connecticut." They too will be finished long before our ships. English ships are noted for carrying light armaments; but suppose you compare the "Duke of Edinburgh" and "California," the "Connecticut" with the improved "King Edward VII." class, which, by the way, will have been finished a long time when the "Connecticut" is put in commission. I understand that the "Drake" and her sisters have made 24 knots speed, which looks to me as if their 6,000 to 8,000 extra horse-power engines did them some good. F. SAUNDERS.

Treat Avenue, San Francisco, Cal.

The Boll Weevil.

To the Editor of the SCIENTIFIC AMERICAN:

Owing to the fact that the boll weevil is becoming a menace to the cotton raisers of the South, it behooves those interested to take active measures to eradicate this pest which bids fair to devastate the cotton fields of the South. Now I have been informed by competent authorities who have used the remedy that the boll weevil, the pest of the cotton plantation, can be positively eradicated by planting cow-peas broadcast over the lands where they existed last year.

It is stated that they cannot live where the peas are grown, and if such is the case, and as the remedy is so cheap, every cotton planter should provide himself at once, because it is worth trying, and in addition there is no better fertilizer in the world than cow-peas. I suggest you publish this in the interest of the cotton planters, as I believe you will be doing them a great service. E. D. FOSTER.

[Mr. L. O. Howard, Chief of the Division of Entomology of the United States Department of Agriculture, to whom the above letter was referred, writes the Editor that it is true that the cotton-boll weevil will not breed in cow-peas. Therefore, in land planted one year in cotton and the next year in cow-peas, if examined the second year, the boll weevil will not be found. If cotton is grown in an adjoining field, the weevil will be found in its usual numbers. The cow-peas exert no deterrent effect against the cotton. They are probably not as valuable for rotation purposes as other crops.—ED.]

Electrical Notes.

The London Electrical Engineer says that the system of wireless telegraphy which is the joint invention of Sir Oliver Lodge and Dr. Alexander Muirhead, has been the subject of some exhaustive experiments by the War Office during the past six months. The results obtained are said to have fully satisfied the government experts, who have declared the system to be a reliable method of signaling without lines. The Indian government, who have made independent tests of the system, have, we understand, decided on an installation being made for establishing communication between Port Blair, in Andaman Islands, and the Diamond Island, at the mouth of the Irawaddy, a distance of 300 miles, the apparatus for which will shortly be sent out.

Mr. Hospitalier has published in a recent issue of L'Industrie Electrique an account of a series of tests which he has made with the Edison nickel-iron storage battery, and which were carried out in conjunction with other tests made by the Central Laboratory of Electricity in Paris. In his experiments Mr. Hospitalier made a series of twenty-one charges and discharges partly under so severe conditions that a lead cell would have been put out of service, while the Edison cell was not hurt. From his tests and those of others the author concludes that the Edison battery can be used with charge and discharge rates which would be excessive for the lead cell, while the Edison battery is not hurt, nor does it lose any considerable amount of capacity. From curves, given by the author, it appears that the ampere-hour capacity was about 175, 162, 160, 155 for discharges at 30, 60, 90, 120 amperes respectively. The difference between the mean voltage at the terminals for discharges at 30 and 120 amperes was less than 0.2 volt. The durability of a storage battery is indicated by the total energy given by the battery during its life per kilogramme of its weight. The best lead cell—i.e., the Fulmen cell—tested in the accumulator tests of the French Automobile Club in 1899 gave 1.5 kilowatt-hours per kilogramme. The tests of the Edison battery have shown that it has a capacity at least twice as great. The disadvantages of the Edison cell are its higher price and the fact that its useful voltage is about 1.1, against 1.9 for the lead cell. This means more cells, more connections, etc. The efficiency of the lead cells in the Automobile Club tests, for the low charge and discharge rates used, was between 70 and 75 per cent. The efficiency of the Edison battery, when charged at 60 amperes and discharged at varying rates, was 50 per cent. The author states, however, that this superiority of the lead cell is only apparent, since a fair comparison would require equal rates of charge and discharge. The volume of the Edison cell per normal watt is smaller than that of the lead cell; the volume per watt-hour, however, is greater. The author concludes that the Edison accumulator represents an important and incontestable advance for electric automobile purposes.

There have been introduced within the last year or so two or three systems of single-phase railway working, which have attained a measure of success in the experimental field sufficient to give strong ground for belief that the single-phase method will mark a new era in electric railway operations before very long. Those we call to mind at the moment are known as the Finzi and the Arnold systems respectively, and the latter, we believe, is being installed as an experiment on an extensive scale on one of the American roads. As to its performance under practical operations it is as yet too early to speak, but many eulogistic accounts of the Arnold system have appeared in the pages of the American technical press. Yet another single-phase system, about which excellent reports are at hand, is the invention of Messrs. Winter and Eichberg. This system has been taken up by the Union Electricitäts-Gesellschaft, and has been operated experimentally on the Continent. The principal trials have been made on the line between Johannesthal and Spindlersfeld. It is a part of the Prussian State Railways, 2½ miles long, and a car equipped on the Winter-Eichberg principle has been in regular operation on it since August last. Of the total weight of this car of 52 tons, the electrical equipment accounts for six tons. There are two motors mounted on the same truck, each of 120 horse-power, and the car can be controlled from either end. A small transformer on the car supplies current for driving the braking air-pump, for the controllers, and for lighting. The voltage on the line is 6,000 volts, with a frequency of 25 cycles. The Winter-Eichberg motor, in common with all recent variable-speed alternating-current motors, is of the commutator type. It possesses two windings, the primary and the secondary, the latter being joined to a commutator, and supplied with current at low E.M.F. by means of brushes connected to the low-potential side of a variable-ratio transformer. In practical operation the line voltage of suitable value for transformation is impressed directly upon the primary windings, while a low E.M.F., suitable for commutator operation, is derived by transformation for the secondary circuit. Messrs. Winter and Eichberg have recently taken out a patent for various improvements in details of construction, and we hope that some reliable information will be forthcoming before very long with regard to the practical operation of the system.

Engineering Notes.

To the Pittsburg Steel Company, of Pittsburg, with rod and wire mills at Monessen, Pa., belongs the distinction of having made a record for rolling rods that will probably stand for some time to come. On the day turn on January 14 this plant turned out 716,500 pounds of No. 3 rods, and the night turn following turned out 613,000 pounds, or a total of 1,329,000 pounds for both turns. The best previous record for rod rolling was made at the Rankin Works of the American Steel and Wire Company, and amounted to 605,440 pounds on one turn. When it is known that the rod mill of the Pittsburg Steel Company has been in operation only a little more than a year, having rolled the first rods on December 3, 1902, the above record is all the more remarkable. We may state that the output of rods made on the first day this plant was started was a record breaker, and the mill has been making splendid records right along.

The cost of water power development in France, according to Prof. Janet, varies from $21.40 per horse-power to $150 per horse-power, depending on the head to be dealt with, the lowest expenditure being upon a fall of 140 meters in Haute-Savoie, the horse-power being calculated at the turbine shaft. At Geneva, for the first group of turbines erected, of 840 horse-power, and for the river works then completed, the capital cost amounted to $300 per effective horse-power. The groups of turbines subsequently erected cost but $95 per horse-power, and the completed works would cost but $135 per horse-power. At the chlorate works at Valorbe, the capital expenditure upon the development of 3,000 horse-power amounted to only $19.45 per horse-power. At Niagara, the rates charged to ordinary consumers by the Cataract Power and Conduit Company varied from 2 cents per unit for 1,000 units per month or less to 0.64 cent per unit for 80,000 to 200,000 units per month. The cost of energy for power purposes from water power stations in France and Switzerland varied from 2.1 cents per unit for small powers to 1.24 cents per unit for large powers.

A new process of manufacturing petroleum briquettes has been invented by M. Maestracchi, so Mr. Oliver J. D. Hughes, the United States consul-general at Coburg, reports. The process is a simple one, consisting of mixing petroleum with three other chemicals in the following proportions: Petroleum, 1 liter; soft soap, 150 grains; resin, 150 grains; caustic soda lye wash, 300 grains. This mixture is then heated and well shaken, after which it is allowed to solidify. This operation occupies about 40 minutes. Care has to be observed to prevent the liquid running over, and this is achieved by pouring a small quantity of soda into the vessel and shaking it well until solidification is completed. The mixture is then run into briquette molds of the requisite size, and these are then submitted to heat in a stove for ten or fifteen minutes. The briquettes are then set aside to cool, which occupies an hour or two, and then they are ready for use. If it is desired to make the briquettes more solid, this can be accomplished by the addition of sawdust or sand to the mixture. Experiments have demonstrated that these briquettes yield three times as much heat as ordinary coal; they are lighter in bulk and easier to carry; and what is more important, after consumption, there is no ash or other residue.

The new turbine-propelled torpedo-boat destroyer "Eden," built for the British navy, recently completed her official trials. The "Eden" is one of the latest 25½-knot type of torpedo-boat destroyers, and is fitted with Parsons turbines instead of reciprocating engines. Her dimensions are: Length, 220 feet; breadth, 22 feet 6 inches; depth, 13 feet 9 inches. On the official four hours' full-speed trial with over 125 tons load on board, the vessel easily attained the speed of 26.099 knots for the first hour and 26.229 for the last three hours, the guaranteed speed being 25½ knots. The result of a previous four hours' full-speed coal-consumption trial was within the amount stipulated in the contract. The main propelling machinery consists of three turbines, one high-pressure and two low-pressure, each driving separate shafts, with two propellers on each shaft. Inside the exhaust casing of each of the low-pressure turbines, a reversing turbine is fitted. In view of the great variation in the horse-power required in modern war vessels, two additional cruising turbines are permanently coupled to the shafts of the main low-pressure turbines. When working at reduced power, the steam from the boilers passes through the cruising turbines in series, and thence to the main turbines. By this means a high ratio of expansion of the steam at all power speeds is obtained, and the loss by throttling of the steam is overcome.