

## Correspondence.

## An Anticipation of Marconi's Antenna.

To the Editor of the SCIENTIFIC AMERICAN:

I have just read in the SCIENTIFIC AMERICAN of August 9 your article on the new station at Cape Breton, erected by Marconi, of whom I am a sincere admirer. The particular form of antenna employed struck me. Indeed, I may claim to be the inventor (for I was the first to employ it) of an inverted cone or pyramid of wires to be used as an antenna in wireless telegraphy. I used antenna at the Congress of Brussels in making my experiments between Brussels and Anvers with my automatic relay (see SCIENTIFIC AMERICAN, March 8, 1902). At various times I have explained the merits of this antenna, which has been adopted by M. Ducretet, of Paris, and described and illustrated in the London Electrical Review of May 22, June 7 and 28 and July 12, 1901.

I have not the least intention of detracting anything from Marconi, the importance of whose work certain critics have sought to belittle. I desire simply to state that in 1900 I invented an antenna which worked effectively, and which seems to be the same as that employed by Marconi in his transatlantic experiments.

Brussels, August 18, 1902.

EMILE GUARINI.

## An Interesting Chess Set.

BY WILLIAM H. HALE, PH.D.

Gold mining, while it so much overshadows everything else at Nome, Alaska, and thereabout, is not the only industry. The tusks of the walrus, and those of the extinct mammoth, some of which are still found from time to time, are etched and carved by the Eskimo, and to a less extent by some white artists.

The favorite work is the manufacture of cribbage boards from walrus tusks. During my stay at Nome, however, an Eskimo brought in a mammoth tusk with etchings by a native artist. I also saw a very cleverly carved set of chessmen, made from ivory of the mammoth by Max Roth.

The pieces are carved to represent in the human figures different nationalities, in the knights various animals, and in the castles orders of architecture. The white pieces represent civilization, the black ones—indicated only by a red base—represent barbarism or lack of civilization.

The white king and queen are medieval monarchs, clad in appropriate costume, the king wearing the chain with pendent lamb, insignia of the order of the Golden Fleece, and both figures wearing ermine.

The black king is a Roman emperor with toga, laurel wreath and coronet; the queen an American Indian, with feather crown, braided hair, earrings, necklace and blanket.

The white castles are Ionic and Corinthian columns; the black ones are Doric and Gothic, the Gothic consisting of four small columns joined in one, and surmounted by a wreath of ivy. Each of the castles has a globe on top.

The white bishops are an Episcopal prelate wearing a cross above his head and another on his breast; and a Jewish rabbi, whose miter has a front-plate inscribed with the sacred name Jehovah. His breast plate is the Urim and Thummim, and he is girt with the sacerdotal girdle. The black bishops are one of the Greek church wearing on his miter the emblematic cross of that church which has two cross pieces, and on his breast the crucifix; and a Roman Catholic bishop of the Italian type, with curled hair and simple costume, having a plain cross on his breast.

The white knights are the horse, as in ordinary chess sets, and the dog, domesticated animals, and both utilized in Alaska for the same service; the black ones are wild animals, the bear and the lion.

The white pawns are an American and an Englishman, each wearing a high hat, the Scotchman with a feather in his cap, the Irishman with a slouch hat, a Jew wearing a high hat, a Hungarian with a feather in one side of his slouch hat and pipe in the other, a Spaniard with slouch hat and earrings and a Japanese with a straw hat and an enormously elongated mustache.

The black pawns represent four continents and are an Amerind (to adopt the new nomenclature of anthropologists) with feather headdress, and an Eskimo of Alaskan type with mustache and fur hood for America; a Frenchman with felt hat and beard trimmed as Napoleon, and a German peasant for Europe; a turbaned Turk with crescent on his brow, a Persian with fez and a Chinaman with long queue on his back for Asia; and a thick-lipped negro for Africa.

The Pennsylvania Railroad Company has ordered from the Baldwin Works 250 high-class freight locomotives, worth \$3,250,000, to be delivered within the first six months of 1903. This is probably the largest order ever given by a railway company to a single firm. The entire number of locomotives to be ordered from various manufacturers will probably be increased to 400.

## Engineering Notes.

A comprehensive estimate of the amount of silt removed from the estuary of the River Mersey at Liverpool to maintain an open channel for the large Atlantic liners is afforded by the last annual report of the Mersey Dock Board Engineers, which shows that 28,000,000 tons of sand have been removed by dredging from the Mersey River, and 35,000,000 tons from the estuary channels since the operations were commenced, ten years ago. During the past year 27,000 cubic yards of material were dredged in the vicinity of the new river entrances to the deep-water docks. A much larger amount of general engineering work has been carried out in the docks during 1901 than during any previous year, the expenditure for the twelve months being nearly \$7,500,000.

The government of New South Wales has received tenders for the new huge bridge that has been designed to span the harbor of Sydney, and which when completed will rank as one of the finest bridges in the world. The structure is to be 3,000 feet in length, not including approaches, and the latter are not considered in the estimates for the bridge itself. The tenders for the contract, which were as follows, are remarkable for their variation:

Joseph Bentley, Leeds, England, \$38,602,390; Alex. Findlay & Co., Motherwell, Scotland, three tenders ranging from \$7,619,185 to \$8,309,330; William Arrol & Co. and Head Wrightson & Co., \$8,553,440; the Cleveland Bridge and Engineering Company, Darlington, England, \$8,970,590; Compagnie de Fives, Lille, France, \$15,253,750; E. & C. Bridge Company England, three tenders ranging from \$8,330,000 to \$9,719,375; J. Stewart & Co., Sydney, six tenders ranging from \$5,564,295 to \$9,665,970; Gilbert Weaver, Sydney, \$8,876,035; Henning & Hildebrand, New York, \$10,000,000.

The Census Bureau has issued a report on the manufacture of locomotives, which shows a capital of \$40,813,793 invested in the twenty-eight locomotive works reporting for the United States. The value of the products is returned as \$35,209,048, to produce which involved an outlay of \$10,899,614 for wages, \$1,369,341 for miscellaneous expenses, and \$20,174,395 for materials used. At the twenty-eight establishments 2,774 locomotives of all classes were built, with an aggregate value of \$27,121,063, compared with 2,409 locomotives, valued at \$19,752,465, built in nineteen establishments in 1890. In addition, 272 locomotives, valued at \$3,276,393, were constructed at twenty-six railroad shops, making a total of 3,046 locomotives, valued at \$30,397,456, built in fifty-four establishments during the census year 1900. There was a considerable increase in the value of locomotives during the ten years. The 2,409 locomotives built in 1890 had an average value of \$8,199, while the 2,774 built at locomotive works in 1900 averaged \$9,777 in value, an increase of \$1,578, or 19.2 per cent, due in part to changes in size and construction. The increase in the number of locomotives built in 1900, as compared with 1890, was largely due to the foreign demand, the number exported in 1900 being 525, compared with 161 in 1890, an increase of 364. Pennsylvania led in the manufacture of 1900, with 48.2 per cent of the total value of products. In 1890 that State also led in value of products, with 44.6 per cent of the total. New York was second, with 27 per cent. New Jersey was third.

The utilization of petroleum for fuel and other commercial purposes is being more widely adopted, comparatively speaking, in the little European state of Roumania than in many other larger and more important countries. Nearly all the sugar mills, distilleries, gas works, hospitals and manufactories in Roumania now use petroleum refuse as fuel, as well as the state railway, upon which it is employed largely for the locomotives. During the last two years the price of British coal, which was formerly almost exclusively used in the manufactories, has mounted to about \$10 per ton. Considering that the heating effect of petroleum residue is about one and a half times that of coal, and taking the price of coal at \$10 per ton, the comparative value of petroleum residue is equivalent to \$15 a ton. The average price of residuum, however, is about \$8, and crude petroleum \$7 per ton. It is proposed to hold a Petroleum Congress at Bucharest in 1903. Before this congress will be laid geological maps of Roumania, showing the petroliferous zones, worked and unworked; maps showing the salt, lignite, coal and quarries existing in the country; tables explaining the growth and development of the petroleum industry, a series of geological sections of the most important works and soundings, analyses of the chemical and industrial properties of the petroleum, photographs of the chief refineries and workshops, a series of geological sections of the valleys, plans of injectors in service for the use of petroleum as a combustible as employed by the Roumanian state railways and navigation societies, and a map showing the geographical position of Roumania in regard to other countries, buyers of petroleum, the means and cost of transport, besides other matters of importance bearing on the subject of petroleum.

## Electrical Notes.

It has been announced that Ernest Ruhmer, of Berlin, has succeeded in carrying on a telephonic conversation, the impulses having been transmitted along a ray of light. The facility of a light beam to carry sound was first discovered by Alexander Graham Bell, the inventor of the telephone, while he was at work on some features of the telephone, over twenty years ago. He abandoned experiments on this line, as the discovery seemed to have little or no practical value.

A power plant is now in operation utilizing the water from the Cauvery Falls of India. The current is being carried ninety miles away, and there made use of in gold mining. The difficulties attending the erection of this plant and the transmission line were enormous, nearly all of the material being conveyed to the point by trained elephants or on the backs of mules and bulls. A path had to be cut through a jungle, infested by fierce animals, serpents and dangerous insects. One of the most serious difficulties to overcome, notwithstanding these terrors, was the superstitions of the natives, who regarded the river as sacred, and with great difficulty could be induced to work on the project.

The electro-chemical industry of this country has grown up since 1890. But its growth has been rapid in that decade, indeed, so rapid as to make serious inroads on the older processes. As an example of this movement may be cited the electric production of calcium bisulphid. The substance is made by one of the most ingenious chemical applications of electricity. The process in question is the invention of Edward R. Taylor, and was put in operation in 1900. The process is continuous, the current being regulated either by the amount of conductive carbon introduced into the furnace or by reducing the working surface of the electrodes by partially submerging them in the molten sulphur.

Prof. M. I. Pupin, of Columbia University, in a paper on "The Law of Magnetic Hysteresis" read at a recent meeting of the American Philosophical Society, presented an account of a mathematical and experimental research upon the magnetic properties of iron which resulted in the discovery of a new law in magnetism. This law can be stated as follows: "The heat generated per unit volume of iron during a cycle of magnetization is proportional to the cube of magnetic intensity." This law holds true within the first of the three well-known intervals of magnetization. It was discovered by determining accurately the resistance of the magnetizing helix, employing vibratory magnetizing forces of about 1,000 periods per second, and then separating the various components of this resistance by means of mathematical analysis. This investigation is an extension of the researches of Prof. Ewing, of Cambridge University, England, and of Lord Rayleigh, employing a new and very much more sensitive method. Its results have a very important practical bearing on the manufacture of inductance coils. From its purely scientific aspect the new law derives its principal interest from the fact that it will materially assist in the formulation of the physical theory of magnetism.

Discussing European practice in electric traction in the Street Railway Journal, Mr. H. Vellgath says the most notable departure in European practice from American standards is in the use of the bow instead of the trolley wheel. During the last few years the former has grown steadily in favor, although it is not as generally used as the wheel. It is claimed on behalf of the bow trolley that it eliminates all danger of loss of contact, and that there is no necessity for reversing the bow when the direction of the car is changed. Greater contact surface is afforded and much easier spans in curves are secured. The bow, while improving the appearance of the overhead construction, greatly decreases the cost of maintenance. In order to allow the bow to turn over automatically when the car changes its direction, the distance between the rail and the trolley line ought to be as constant as possible. European engineers who favor this form of construction contend that there is no difficulty in doing this, and even many users of the trolley wheel favor the bow for higher speeds and heavier traffic where heavy currents are used. The writer states that many changes and improvements have been made in the bow in recent years, and in its present form it is favorably considered by the engineers of many systems who, however, adopted the trolley wheel when the bow was not in so efficient a state as it is at the present time. Further discussing European practice, the writer notes that the slotted conduit with complete metallic circuit has been found satisfactory, but it is only used in large cities where the traffic is very dense, where the difference in cost between it and a modern first-class trolley construction is very slight, and where the undertaking may be expected to pay good interest. On the Continent it has been installed only where the trolley has been forbidden. Thus, the system is extensively used in Berlin, Brussels, Paris and Budapest, and on a smaller scale in a few other cities.