

your to show its relation to Painting and Decoration, Sculpture and Carving, and generally treat of the *Poetry of Architecture*.

### THE ATLANTIC AND PACIFIC SHIP RAILWAY.

The railway for carrying ships between the Atlantic and Pacific Oceans, projected by Mr. James B. Eads, across the Isthmus of Tehuantepec in Mexico, unquestionably takes a foremost place among the engineering and commercial enterprises elaborated during this century, and as the work was formally commenced last year at Minatitlan, its northern terminus on the Coatzacoalcos river, some account of its leading features will possess unusual interest.

Tehuantepec is the most northern of the several isthmuses which, with the States of Central America, form the connecting link between North and South America. Being twelve hundred miles nearer the former continent than Panama, the route over it possesses immense climatic as well as geographic advantages over the latter one. No less than five states of Central America lie between these two rival routes, viz., Yucutan, Campeachy, Guatemala, Nicaragua, Costa Rica, and also parts of the Mexican states of Oaxaca and Vera Cruz, and the Columbian state of Panama. In considering, therefore, the great superiority of the Tehuantepec route for all commerce between the British Islands and the North Pacific Ocean, Japan, China, and the Orient, the fact should be kept in mind that between the locality where M. de Lesseps is striving to cross the American isthmus, and that where Mr. Eads has commenced to construct the ship railway, there exists a territory twice the length of Great Britain. To go by the ship railway to California, British Columbia, Japan, the Philippine Islands, or China, we would pass through the Gulf of Mexico, but to go by Panama we must sail south to the Caribbean Sea, cross the lower end of the isthmus, and then sail 1200 miles along its Pacific Coast to the Bay of Tehuantepec where the ship railway crosses it.

That the ship railway project is one fraught with the most stupendous results, may be readily seen when we consider the fact that the American isthmus separates about 100,000,000 of the most enterprising, industrious, and enlightened people on the earth, inhabiting the North Atlantic Coast of Europe and America, from 600,000,000 souls who inhabit the Orient and islands of the Pacific.

It is true that the sailing distances which separate England, France, Germany, and Italy from India, China, and other Oriental nations, have been greatly lessened by the Suez Canal, but these distances are almost insignificant when compared with those which the ship railway will annihilate. For instance, the greatest saving effected by the Suez Canal between London and Calcutta is about 4500 statute miles; whereas the sailing distance by the ship railway from London to every port on the Pacific Coast of North America will be lessened by nearly twice this vast distance, or about 8250 miles.

The Suez Canal brought London and Canton about 3500 miles nearer together by sea. The ship railway will save more than three times this distance between the Great American metropolis and every port in British Columbia. It will lessen the sailing distance which to-day separates the Atlantic and Pacific ports of British America by a distance but little less than half of the circumference of the world, and give a sea route between the Gulf of St. Lawrence and Vancouver's Island only 50 per cent. longer than the railway across the American continent.

The American isthmus and the Cordilleras of North America constitute a narrow but almost impassable barrier to the interchange of the manufactures and productions of 40 millions of people in the Mississippi Valley and Atlantic States, not only with those of 10 millions of their countrymen to the west of them, but with the products of nearly a hundred million others on the islands and coasts of the Pacific, who are seemingly their nearest neighbours.

The ship railway will give to these descendants of the British Isles a sea route between their Atlantic and Pacific ports scarcely a thousand miles longer than the railway between New York and San Francisco, and it will give to the vast valley of the Mississippi a gateway equivalent to the discharge of its mighty river directly into the Pacific.

A work designed to effect such enormous benefits to the commerce of the world should commend itself with especial

force to this country, which to-day is carrying more than 60 per cent. of that commerce. We learn, therefore, with great pleasure that Mr. Eads intends within a brief period to present this subject to the attention of British capitalists and ship-owners, with a view to soliciting their aid in carrying out this great work. Of course the difficulty which stands in his way lies in the fact that large ships have never been carried any considerable distance overland, although ancient history refers to the fact, we believe, that the Athenian fleet was carried over the Isthmus of Corinth more than 2000 years ago, whilst numerous instances of similar achievements are authentically recorded since then, and to-day canal boats and small steamers weighing between 100 and 200 tons are being transported by rail in America and Prussia.

The voluntary endorsement of the entire practicability of Mr. Eads' plan of ship railway transportation, by the most eminent engineers and shipbuilders in England and America during the last two years, the exhaustive examination of the subject by the United States Senate Committee, and its unanimous report in favour of it, have commended the enterprise to the confidence of a number of capitalists who have formed a syndicate or provisional company and supplied the necessary funds to make a thorough examination of the route from ocean to ocean, and to execute such portions of the road as are required by the terms of the concession which they hold from Mexico. This is one of the most liberal ever granted by any Government, and gives practically the entire control of the isthmus for ninety-nine years to the company which Mr. Eads is authorised to form.

Under the direction of Mr. Eads, president of the provisional company, a number of distinguished engineers have been engaged on surveys of the route, and they are now preparing estimates of the entire cost of the work, so as to enable the enterprise to be presented intelligently and reliably to capitalists and the public. Mr. E. L. Corthell is the chief engineer of the provisional company, and Mr. M. Van Brocklin its resident engineer. Mr. Corthell was Mr. Eads' chief assistant at the Mississippi jetties; he has examined the entire route across the isthmus, and has given especial attention to the harbours, making at the time a careful hydrographic survey of the Coatzacoalcos river. The first surveys made for Mr. Eads were conducted by Mr. Garay, a distinguished Mexican engineer, educated in France, and who was sent by the Mexican Government to present the merits of the Tehuantepec route in 1869 to the international canal convention at Paris. Mr. J. J. Williams was engaged by Mr. Eads on another part of the line with Mr. Garay. Mr. Williams surveyed the Panama route for the Panama Railway Company, more than twenty years ago and discovered the lowest summit on that isthmus, over which the railway is now located. Thirty years ago he assisted General Barnard of the United States Army in surveying the isthmus of Tehuantepec for a canal, and has since devoted several years in making surveys of that isthmus. The resident engineer, M. Van Brocklin, spent over two years on the isthmus as chief engineer of the railroad commenced in 1880, under the concession to Mr. Learned. Guided by the results of the surveys of other engineers, and the knowledge he had then acquired, Mr. Van Brocklin undertook the survey last March of a new route across Tehuantepec, which he completed recently, from harbour to harbour, with greatly improved results.

This engineer was also four years engaged on the celebrated railroad in Peru, which cross the Andes at an elevation of 15,600 ft., the highest railway in the world. He was assisted in the recent survey of the isthmus by Mr. Deming J. Thayer, a young American engineer, who built a railway in Columbia from the Pacific coast to the Cauca Valley. We mention these facts to show that Mr. Eads has had the good fortune to secure the aid of very experienced engineers in his great work. All of these gentlemen speak in glowing terms of the healthfulness of the Isthmus of Tehuantepec. Mr. Van Brocklin had four surveying parties in the field from March last until November, not one of whom was sick at any time, and none of his assistants or men were invalided during his previous surveys. Mr. Williams, Mr. Garay, and Mr. Corthell all give similar testimony.

The heaviest gradient on the Atlantic side does not exceed 42 ft. per mile, while that on the Pacific is only 52 ft. for about eight miles, the remainder of the route will have no grades exceeding 26 feet per mile. No exceptionally heavy work will be encountered either in cuts or embankments, and the entire road from the Coatzacoalcos river to the Pacific harbour will be only 134 miles long.