

# THE TEHUANTEPEC RAILROAD VS. THE ISTHMIAN CANAL.

BY OUR ENGLISH CORRESPONDENT.

The reorganization of the railroad across the Tehuantepec Isthmus of Mexico, connecting the Atlantic and Pacific seaboards, and the construction of adequate steamship accommodation at both the port terminals is proceeding rapidly. The line will be in thorough working order by May, 1903, in the contracted time. When completed this railroad will offer serious competition to the projected Isthmian Canal.

The necessity of a trade route from Europe to the Far East via Central America has long been considered expedient. When De Lesseps commenced the Panama canal its completion was anxiously anticipated by shipping owners and merchants in Europe as a short, quick route to the Orient. But this scheme has so far resulted in ignominious failure, and exasperating procrastination has ensued in connection with the construction of the Nicaragua canal. Meanwhile the traffic between Europe and the East has developed so abnormally that accelerated communication between the two sides of the world has become imperative in the interests of trade. The situation became so critical that Sir Weetman Pearson, Bart., the well-known London civil engineer and contractor, visited Mexico to discover if railroad connection could be established between the two oceans as a solution of the problem.

The Mexican government some seven years ago constructed a railroad across the Tehuantepec Isthmus connecting the two oceans, and it was known as the Tehuantepec National Railroad. But it was built in the most primitive manner, and proved totally unfit for heavy traffic. But Sir Weetman Pearson immediately realized that this route could be developed and could easily be made to fulfill nearly all the same requirements as a canal. He thereupon approached the Mexican government on behalf of his company,

offered to take over the whole of the Tehuantepec railroad, lock, stock and barrel, and to reconstruct it. The Pearson company has completed several great engineering contracts in Mexico, and has done much to increase the welfare and prosperity of the country. This company constructed the harbor at Vera Cruz at a cost of \$12,500,000, and has now commenced to carry out a complete modern sanitary system and a water supply at a cost of \$2,500,000. This company

free of interest \$5,000,000 (Mexican money). For the additional rolling stock, working equipment and haulage facilities the Mexican government and the Pearson company provides equal amounts to be called up as required.

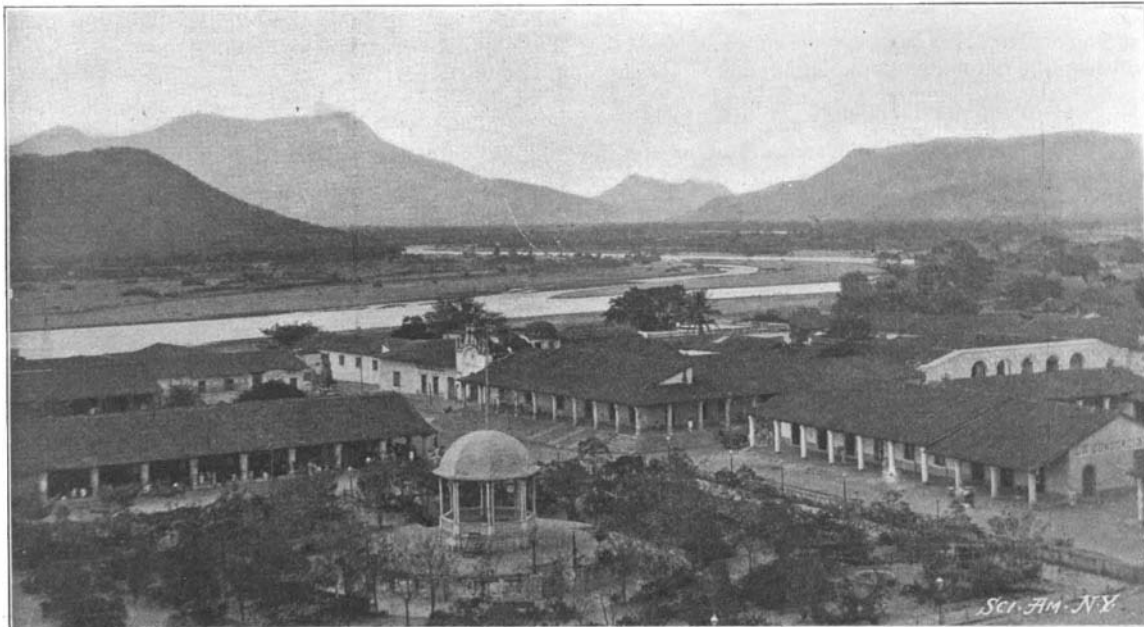
The Pearson company undertakes to construct and properly equip at the cost of the government a port at each end of the railroad capable of accommodating the largest ships in all weathers, and of giving quick and cheap dispatch. By May, 1903, the port works both on the Atlantic and Pacific coasts are to be sufficiently completed to enable traffic to be handled with celerity and facility, but the works will not be completely finished until 1905.

A contract of partnership and lease was also drawn up between the Pearson company and the Mexican government, by which the former is to manage the railroads and ports and the drydock for 50 years from May, 1903, and to receive 37½ per cent of the net proceeds for 35 years, diminishing to 26 per cent in the remaining 15 years.

The length of the Tehuantepec Railroad is 192 miles. The whole of the roadbed is being over-

hauled, leveled where necessary, and re-embanked at sections to afford security, so that when completed the track will be as even and smooth running as that of any railroad in this country. It is a single line track, and it is being relaid throughout with heavier steel rails. The whole of the bridges are being demolished, and modern steel structures built in their stead. This task alone is a stupendous one. Before this renovation there were only six steel bridges throughout the whole 192 miles of the railroad, the bridges being constructed on the timber trestle principle. There were 900 of these trestle bridges, and the whole of these have been swept away and either culverts or steel bridges substituted.

Owing to the possibility of seismic disturbances in this country the bridges are being built principally of steel girders. This is more economical than the



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The City of Tehuantepec, through which the Railroad Passes.

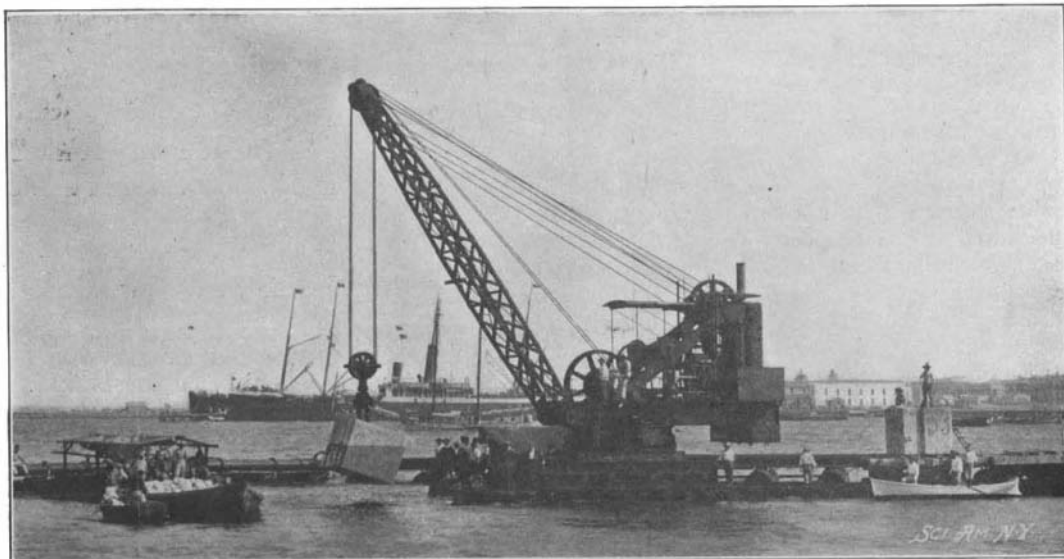
owns the tramways of the city, which are to be converted to electricity, a railway running to Alvarado, and a fleet of steamers plying upon 400 miles of navigable rivers, and a new railroad has been built from one of the rivers to join the Tehuantepec trunk railroad, by which the interior of the country will be opened up.

In view of these circumstances the Mexican government did not hesitate to enter into an arrangement with the Pearson company regarding the Tehuantepec Railroad. The terms of the agreement are mainly as follows:

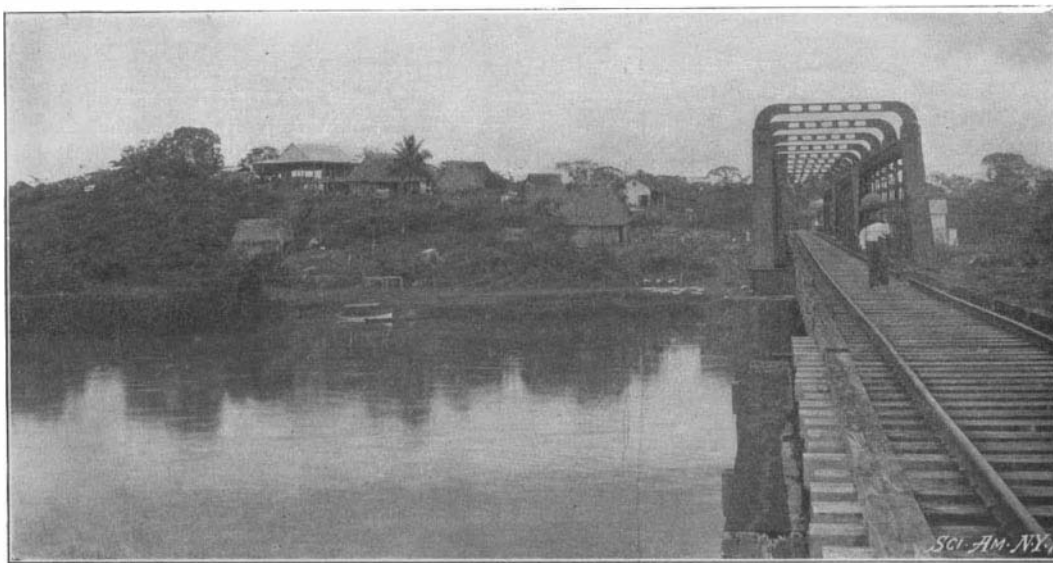
The Pearson company to put the railroad by May, 1903, into first-class and permanent working condition, in which it would be capable of handling traffic expeditiously and at low tariff. For the cost of these improvements the Mexican government contributes



The West Breakwater Crane.



The Coatzacoalcas Crane.



Junction of the Vera Cruz and Pacific Railroad with the Tehuantepec Railroad.

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THE CONSTRUCTION OF THE TEHUANTEPEC RAILROAD.

erection of arch bridges, since in the event of an earthquake a steel bridge will give somewhat, and if seriously disturbed the damage can be quickly repaired, whereas with an arch it will crack and have to be rebuilt. The spans for the most part are of about 85 feet, but in one or two cases they rise to 100 feet span, and in one instance to 110 feet. The girders are supported upon steel caissons sunk into the bed of the river and filled with concrete, thus assuring a solid and rigid foundation. The bridges are of sufficient strength to carry a load of 20 tons per axle.

But the most important part of the undertaking is in connection with the dock facilities and harbor accommodation at the terminal ports—Salina Cruz on the Pacific coast, and Coatzacoalcos on the Atlantic seaboard, respectively.

Coatzacoalcos is a thriving and prosperous town of about 2400 inhabitants. Owing to its exposure to the turbulent storms characteristic of the Atlantic Ocean the harbor works are of the most solid description to insure safe anchorage to vessels. The River Coatzacoalcos is conveniently adapted for extensive wharfing arrangements, the river being very broad at its mouth and having a great depth of water. The river is also navigable for several miles from the sea. The only real engineering difficulty encountered has been in connection with the sand bar extending across the estuary. The contractors, however, are constructing a heavy training wall by which means an open channel will always be maintained. Extensive dredging operations are being carried out whereby the depth of the water alongside the wharves will be made about 35 feet at low water.

At Salina Cruz, owing to the entire absence of natural conditions for protection, a complete harbor is being built. This port is somewhat exposed to the Pacific Ocean, but an adequate idea of the peaceful nature of its situation and the absence of heavy surf may be formed from the fact that the houses of the old town were only five feet above high-water mark.

At this port the harbor works being constructed are very extensive. A breakwater about 3300 feet long is being built, by means of which a large harbor of 90 acres' extent will be formed. Entering from this there will be a dock with over 4000 feet of quay space. In connection with this scheme a new town is being erected a little further removed from the water's edge, since the land upon which the existing town stands will be submerged to form the central basin. This new town is being built upon modern principles, the streets being laid out with regularity, numerous open spaces provided, and a complete up-to-date sanitary system and water supply provided.

The breakwaters are being built upon the telescopic principle. Rubble is thrown overboard and continued to water level, the superstructure consisting of concrete blocks each weighing 40 tons. The material for these blocks is being excavated from the quarries nearby, and consists of tough limestone and granite. The concrete blocks are made by electric mixers, and laid in position by a traveling Titan crane. This latter appliance, which is second only in size to that specially constructed for use at the new naval harbor works at Dover, England, which are being carried out by the Pearson company, cost \$50,000. It was specially designed for the construction of the breakwater at Vera Cruz, also completed by this company, and has a jib radius of 95 feet. The concrete blocks are conveyed from the mixing department to the crane in cars.

At the present time the engineers are carrying out trials with three different types of locomotives to ascertain the most economical and best adapted for haulage purposes upon the road. This country is represented by the Baldwin and Pittsburg locomotive companies respectively, and England by Kitson, of Leeds. Three engines from each firm have been supplied so that the tests may be most thorough. The English engines each cost \$19,000, while the Baldwin and Pittsburg each cost \$13,500. The locomotives each approximate the same weight. The result of the trials, however, is at present in favor of the English locomotive, since, though its initial cost was \$5500 greater than the American engines, this sum is saved in coal consumption and in increased haulage power.

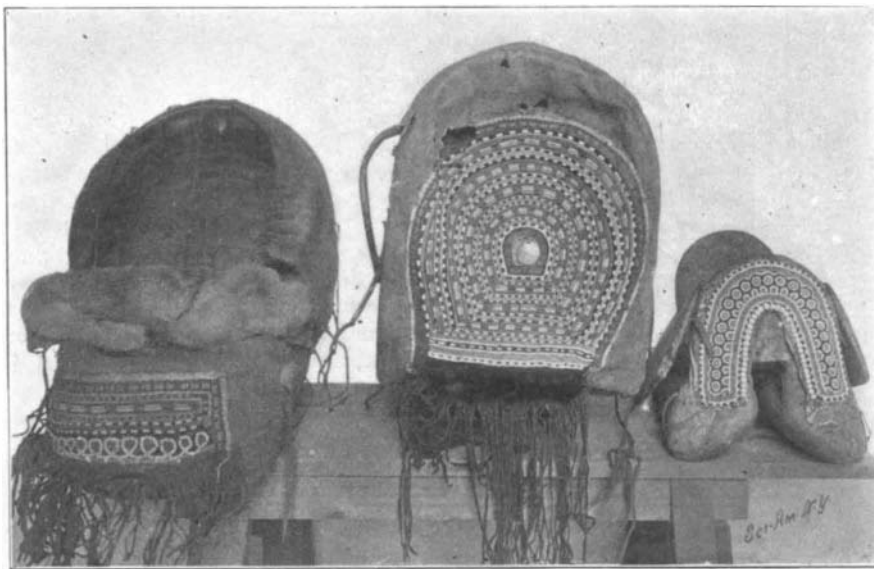
The completion of this railroad will result in a tremendous acceleration of communication between Europe and the East, and also San Francisco, and the distance will even be shorter than via Panama, as the following table will show:

	Via Panama.	Via Tehuantepec.
New York to San Francisco	6,270 miles.	5,005 miles.
Plymouth, England "	9,103 "	7,767 "
New Orleans "	5,596 "	3,586 "

At both ports the facilities for handling cargo will

be of the most up-to-date labor-saving description. Electric cranes replete with all the modern time-saving equipments will be erected at the wharves at both Coatzacoalcos and Salina Cruz. By this means a vessel arriving at either port will have its cargo discharged into the train, transshipped across the Isthmus, and reloaded upon the opposite seaboard within 24 hours. This is far less time than would be occupied in crossing the Isthmus by canal. The cost of crossing the continent will also be far less by the railroad than by the waterway. Freight will be carried from one vessel to another at \$4 per ton, including discharging and reloading at the ports. Facilities for handling and transshipping 1,000,000 tons each way per year are being made.

Already arrangements are being prepared in England and the East to establish Tehuantepec as a great trade route. Negotiations are in progress for a regular Japanese steamship service from Salina Cruz, the Pacific terminal for the line, direct with Yokohama; another to Yokohama via other ports; and also a direct steamship line to San Francisco; while the Pearson company are also contemplating the inauguration of other steamship services to other ports. On the Atlantic side, English steamship companies trading with the East have arranged for a regular steamship service direct from Liverpool to Coatzacoalcos, immediately the dock accommodation is provided. From these facts it will be recognized that the success of the Tehuantepec Railroad is assured. The most salient advantage of this route for trade over the Isthmian canal is that it will be both cheaper and quicker. Then again its cost of maintenance will not be so great. Owing to the peculiar seismic nature of the country there is a great liability of the traffic upon the canal being seriously interrupted by earthquakes, and since it does not require a very severe disturbance to throw a lock gate out of gear this is a serious con-



SIBERIAN REINDEER SADDLE AND CRADLE.

sideration. Any damage inflicted upon the railroad from this cause can be sufficiently remedied in a few hours to permit traffic being resumed.

#### PRIMITIVE REINDEER SADDLE AND CRADLE FROM NORTHEASTERN SIBERIA.

BY WALTER L. BEASLEY.

The American Museum of Natural History has just received a noteworthy collection of objects obtained by the Jesup North Pacific Expedition from northeastern Asia. From the wealth of material gathered this is considered one of the most important ethnological investigations yet made by the institution. The purpose of the expedition was to study those tribes of northeastern Asia which are supposed to be closely related in custom and culture to the northwest coast natives of North America; also to obtain utensils, weapons, dresses and miscellaneous household articles, which would fully illustrate the material life of the people. A comparison of these, it is thought, will do much to clear up the great problem as to the history and origin of the people of northeastern Asia. Some ten thousand specimens were collected by Mr. W. Bogoras, connected with the Academy of Sciences, St. Petersburg, while Mr. W. Jochelson, his partner, collected the same number of objects from different territory. A year was consumed by Mr. Bogoras in traveling by dogs and reindeer teams over a vast area. He visited six tribes, the most of whom were extremely primitive and had never seen a white face before. Among the unique and striking objects brought back were a reindeer saddle and several cradles, constructed of a framework of birch boards, covered with reindeer skin. The leading feature of these specimens, aside from their novel shape, is their beaded decorations. They belong to the Lamut tribe of hunters and Asiatic Eskimos. Though primitive and living nearly in a barbarous state, the women,

however, are capable of doing excellent beadwork. These designs are placed on their wearing apparel, cradles, and deer saddles. Reindeer herding and the pursuit of game is the sole occupation of this tribe. All clothing is made from reindeer skin. The animals bred by the Lamut tribe command a double price, as they make the best teams. The neighboring tribes are willing to pay this bonus, as the half-wild animals from other sources are slow and indifferent for traveling purposes. The reindeer is also a main source of food supply. The flesh, blood, rims of the horns, hoofs and the gristles of the ears and nostrils are all consumed raw or cooked. Even the half-digested moss taken from the paunch is cooked with fat and roots as a porridge. Transportation is mostly done by the reindeer. Having a tender back and a peculiar swaying motion, said to be greater than that of the camel, the saddle is shaped to fit a certain portion near the shoulder. In place of stirrups a wooden flap board is used to hold the rider in place. The inside is padded with moss and covered with several layers of deerskin. The cradle, having a young child tied within in a seated position, is strapped to the side of the animal while on its journey. A heavy fur covering is tightly drawn over the cradle to shut out the cold. It was found that the folklore and traditions of many of the Siberian natives were similar to those of the North Pacific coast tribes, especially the legend of the Raven, who is regarded as the creator of the world and man in both countries. Mr. Bogoras is now at work at the Museum on a memoir, which will cover some 2000 pages. In this will be set forth the mythology, as well as the daily life of the people of northeastern Asia. Some 190 tales of the Chukchi tribe, obtained by Mr. Bogoras, are now being printed by the Academy of Sciences, St. Petersburg. According to Dr. Franz Boas a study of the natives of north-eastern Siberia seems to reveal the fact that these

tribes are more closely associated in culture and in physical form with the Indians of the North Pacific coast than with the Eskimo of Alaska, which justifies the conclusion that the latter are probably recent occupants and not the pre-historic dwellers of this district.

#### What is "Lloyds"?

Primarily "Lloyds" is a corporation employed in marine insurance and having a world-wide agency for the collection of marine intelligence. Incidentally other insurance is taken. "Lloyds" had its origin in the enterprise of Edward Lloyd, a London coffee house keeper, whose place, opened in 1688, became a resort for shipowners and ship captains. So much was learned of marine matters, and so general became the interest in this information, that in 1692 an office was opened in Lombard Street, and shortly afterward Lloyd's News, a paper issued three times a week, and devoted to shipping news, made its appearance. Adverse criticism by the paper of the British government, coupled with a demand for an apology for an item of news which appeared in the paper, decided Mr. Lloyd to discontinue the publication. The insurance feature of "Lloyds" originated from a method of mutually insuring or "underwriting" each others' shipping risks by the owners frequenting Lloyd's establishment. Their method of doing this was to subscribe or "underwrite" their names to a document which stated the amounts that each was willing to give in the event of disaster to the risk. The present system of "Lloyds" does not differ in any essential particular from the method employed at the beginning, but it is much better organized and the business has been vastly increased in volume. Its radius of operation now practically covers the whole world.

#### Launch of a Seven-Masted Schooner.

On the afternoon of July 10 the seven-mast schooner "Thomas W. Lawson" was launched from the yards of the Fore River Ship and Engine Company. A full description of the vessel has already appeared in the SCIENTIFIC AMERICAN. It will be merely necessary to recapitulate her chief dimensions, which are:

Length over all, 403 feet; beam, 50 feet; depth, 36 feet; height of masts, deck to truck, 150 feet 6 inches; total sail area, 43,000 square feet; cargo capacity, 8100 tons; displacement, fully laden, 11,000 tons.

Foreclosure proceedings instituted by first-mortgage bond-holders have resulted in the sale of the St. Lawrence Power Company's plant at Massena, N. Y., described in the SCIENTIFIC AMERICAN for November 17, 1900. More than \$10,000,000 is said to have been spent in the Massena power scheme. The financial failure of the project is due principally to inability to dispose of the power generated.