

**English Criticism of American Railroads.**

In a paper read recently before the Cleveland Institution of Engineers, England, Mr. Jeremiah Head, of the Society of Civil Engineers, compared the methods of construction, maintenance and operation of English and American railroads. The paper was prepared after two long and careful railroad pilgrimages through this country and careful and unprejudiced study of the subject in hand.

The author looks with favor upon the American drawing room, dining and sleeping car; he approves of the American bogie trucks (principally because he considers them better adapted to our less perfect roads), and he prefers the flat-bottomed American rail, but there are seven points where he insists that England excels America. These are summarized by Mr. Head as follows:

"Among the directions in which we may congratulate ourselves on still keeping ahead of American practice, the following are the most conspicuous, viz.:

"1st. We operate our railways more cheaply than they do, we requiring 56.6 per cent and they 70.4 per cent of the gross earnings for that purpose.

"2d. The net earnings of our railways are over four times as much per mile of line, and over three times as much per mile of single track as those of the States.

"3d. The average return on capital employed is in our case from 20 to 28 per cent more than in theirs, notwithstanding our far more profuse expenditure in construction and operation.

"4th. Users of our railways have the option of three times as many trains as have the Americans.

"5th. Trains in England travel at a much higher speed on the average than they do in the States or in any other country.

"6th. The railway passenger here runs less risk of accident than there, in the proportion of 1 to about 4.5, notwithstanding the higher speed at which he travels, and he is conveyed, if he is content with ordinary accommodation, at a lower rate per mile.

"7th. He has almost everywhere better station accommodation, and better facilities for getting himself and his baggage from stations to his destination."

**Antimony and Bismuth in Bolivia.**

The consul-general of France at La Paz, in Bolivia, has recently made a special report on the mines of bismuth and antimony in that country. The only deposit of bismuth ore actually known is that of Quechisla (also known as Chorolque), though some exploration for others has been made, but without success. The returns show that the production of this mine is about 500 Spanish quintals, or 23,000 kilogs., per month. This production, however, is regulated in concert with the European producers. In addition to bismuth, the Quechisla mine yields some tin and a little silver. Antimony is found in many places in the department of Potosi, generally in connection with gold and silver ores. In the province of Chayantla there are many veins of the sulphuret of antimony, which have become more accessible than formerly since the building of the Antofagasta Railroad. Owing to the present low price of the metal, however, it does not pay to work the poorer deposits. The Amayapampa Company, a recently formed Bolivian corporation, is now producing and exporting 100 metric tons a month of 65 per cent ore. The mine is eighteen miles from the railroad, over a difficult mountain trail. With better transportation the output could be largely increased. It is said, however, that all the veins so far found diminish in richness with depth. The industry is just begin-

reaches from thirty to forty pounds per square inch, the water is seen at the end of from one to three minutes, according to the kind of wood used, to make its exit from the other extremity of the trunk—at first in drops, and then in fine streams. The water thus filtered is potable, having been freed from every particle of saline taste. The tree trunk measures fifteen feet in length by from five to six inches in diameter.

**THE OPENING OF THE NORTH SEA CANAL.**

One of the most important engineering works of the nineteenth century will be inaugurated June 20, when the Baltic and North Sea canal, which cuts across the base of the peninsula formed by Jutland



and Schleswig-Holstein, will formally be declared open to the commerce of the world.

Eight years have now passed since Emperor William I laid the foundation stone of the Holtenau lock, near Kiel, on June 3, 1887. Now his grandson will open the canal with imposing ceremonies. It will be the occasion of a naval pageant which has never been equaled. From eighty to one hundred war vessels, representing the principal navies of the world, will be present. Germany leads with about forty vessels, then England with ten war ships, followed by Italy, Russia, the United States and Austria in order of their strength. The United States will be represented by four ships, the Columbia, the New York, the Marblehead and the San Francisco. The United States fleet is under the command of Admiral Kirkland.

The Hamburg banquet will be held on the evening of June 19. The international fleet will pass through the canal from the western end on June 20. In the afternoon the Emperor will give a reception on board the royal yacht Hohenzollern. In the evening there will be a grand ball at the naval academy at Kiel. On the 22d there will be a naval parade followed by a grand banquet in the evening. The United States fleet will be brilliantly illuminated by thousands of electric lights and special fireworks.

The completion of the canal is of far-reaching importance to Germany, Russia and Denmark. Thirty-five thousand vessels now annually pass around the peninsula, representing 20,000,000 tons. The chief value of the canal will consist in saving mariners from the perilous voyage around Denmark, whose rocky channels and reefs taken in connection with the storms and ice floes have been a constant source of danger for centuries. Nearly three thousand vessels have been wrecked and three thousand five

naval station on the Baltic. The average time of transit through the canal will be 12 hours.

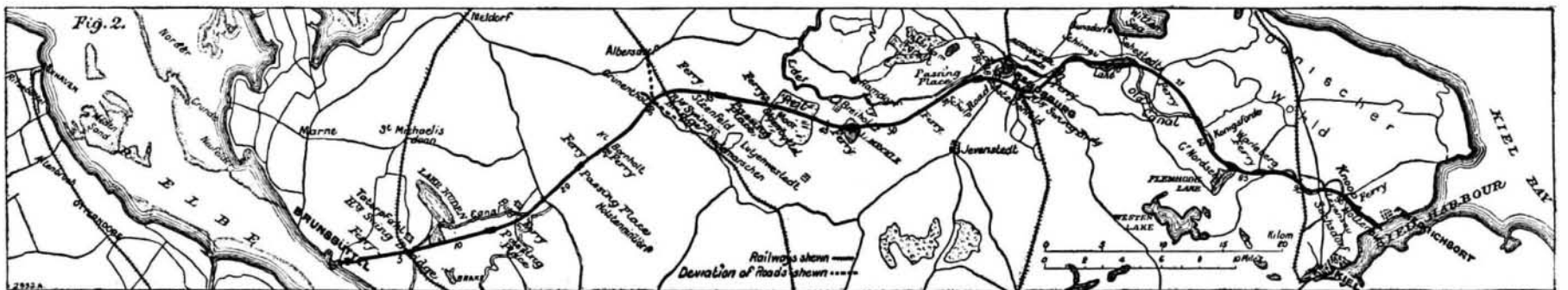
The maps we herewith present will convey an idea of the position and course of the new canal.

**Electricity and Prestidigitation.**

The powerful aid which modern magicians are able to derive from the subtle electric current, says the Electrical Engineer, London, is common knowledge, and little wonder is there consequently that from time to time these wizards startle the wonder-loving world with new and striking developments in their "black art." One of the latest efforts in this direction is that of M. Trouve, who, through the intermediary of the prestidigitator Roskoff, utilizes the telephone in the production of that interesting attribute known as double vue, or second sight. The medium, whose task, as we know, is to describe for the benefit of the audience unseen objects selected by them, receives, by the Trouve method, the necessary information by means of two very sensitive auricular telephones. These instruments—the size of a two-franc piece and from 8 to 10 millimeters thick—consist of a small metallic box, in which there is a tiny electromagnet, while the lid of the receptacle represents the diaphragm. The conductors form, in the first place, a flexible semicircle, which keeps the telephones in proximity to the ear, and they are then continued down the body, hidden in the clothing, and out by the soles of the shoes to the carpet, under which the connections are secretly disposed. The receivers and the wire semicircle are concealed by a wig which the medium should wear, together with a costume in keeping with this hirsute adornment. The public will never suspect the existence of electrical apparatus, but as an additional precaution connections should be placed at various points in the room, and the subject, blindfolded and with his back to the audience, installed successively at each of them, the telephones being connected with a battery and a microphone fixed "behind the scenes." The articles which he has to describe are then so placed on a table that a confederate at the hidden transmitter may easily see them by peering through a small orifice, and thus communicate to the medium in a low voice the necessary particulars, which he repeats for the edification and to the no little astonishment of his auditors.

**The St. Sophia Mosaics.**

The mosaics in the church of St. Sophia at Constantinople are of glass set in a plaster or cement made of lime and marble dust in the proportions of one to two respectively. The brick and stone walls and dome of the church were first made rough with mortar over which a strong, fine plaster nearly an inch thick was laid. Upon this the cartoons were sketched in. The artist began by selecting some important part of a picture—such as a face—and, knocking out a part of the plaster, laid in a few pieces of mosaic at a time, pressing them flush with the surface and fixing them with his lime and marble cement. After the more important portions were finished, the draperies, backgrounds, etc., were done by the artist's assistants. The mosaics in the dome and elsewhere, that are always seen at an angle exceeding forty-five degrees, are peculiarly set. The pieces are arranged with their upper edges set forward from the surface, and are placed in tiers at a considerable distance apart, though from the point of view they appear to be close together. In this way much labor, material and expense are spared. In some cases as much as two-thirds of the actual sur-

**MAP OF THE NORTH SEA CANAL.**

ning in Bolivia, and the government has freed the producers from all direct tax and also from export duty.

**The Salt Water Filter.**

It has been stated by the Revue Scientifique that Mr. Pfister, an Austrian engineer, has discovered a curious property of the trunks of trees, that of retaining the salt of sea water that has filtered through the trunk in the direction of the fibers. Mr. Pfister utilizes this property for obtaining potable water for the use of ships' crews. The apparatus, which has been patented, consists of a pump which draws up the sea water into a reservoir, and then forces it into the filter formed by the tree trunk. As soon as the pressure

hundred more seriously injured since 1858 off this wild coast. For large ships the coast is regarded as one of the most dangerous spots in Europe. The new waterway will permit vessels of ten thousand tons register to pass through. The canal is 61 miles long, 200 feet wide at the surface, and 85 feet wide at the bottom. The estimated cost is \$39,400,000; of this sum, Prussia contributed \$12,500,000. The work has been pushed with great energy. At times as many as eight thousand six hundred men were working at once. The strategic value of the canal to Germany cannot be overestimated, as her vessels will no longer have to pass through foreign waters. The city of Kiel will be of paramount importance in case of war, as it has a magnificent harbor and is already the most important

face is bare. The method has the artistic advantage of reflecting the light at a better angle.

**The Cape Cod Canal.**

Mr. Benjamin J. Berry, one of the incorporators of the Cape Cod Ship Canal bill, which became a law June 4 and who has been for ten years endeavoring to secure the passage of such a bill, said in an interview that the corporators, all of whom are Massachusetts men, are prepared to begin at once the work of construction at Bass River, between the towns of Yarmouth and Dennis. They feel sure of success, and say that in two years ships will be passing through the canal. The work is expected to cost from \$5,000,000 to \$8,000,000.