RAILWAY WONDERS OF THE WORLD

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By

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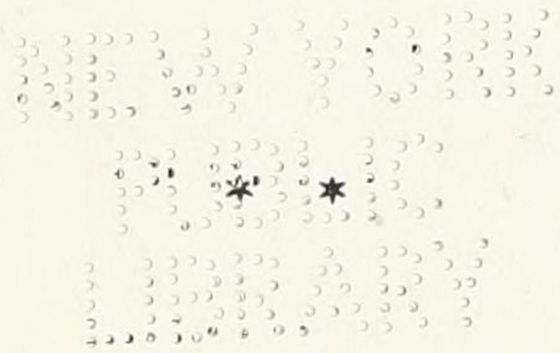
Illustrated with Colour Plates and Photographs



Cassell and Company, Limited

London, New York, Toronto and Melbourne

ONE OF THE ELECTRIC GIANTS WHICH "WORKS" THE ST. CLAIR TUNNEL
These locomotives are of 2,000 horse-power, and weigh 135 tons

The Opening-Up of Canada—II

HOW THE ST. CLAIR RIVER WAS TUNNELLED AND NIAGARA BRIDGED

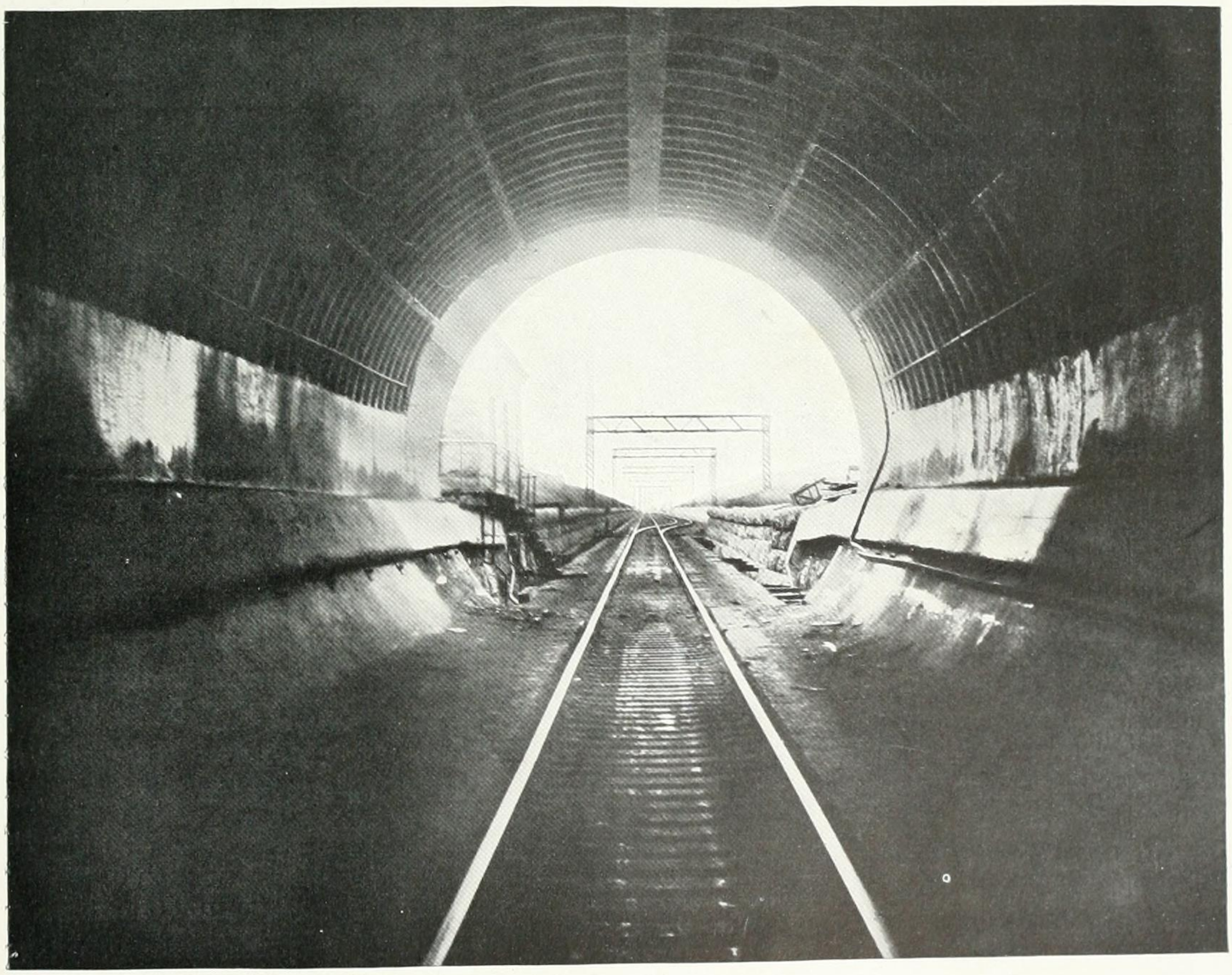
UNFORTUNATELY, for several years the international trade suffered from physical interruptions owing to the lakes and rivers forming Ontario's southern boundary. One of the most harassing of these was the St. Clair River on the main line between Chicago and Montreal. The trains had to be brought up to one bank, pushed on to steam ferries, transported intact across the river, and landed on the opposite bank to resume their journey. The delays, from ice in winter and heavy marine traffic on this narrow neck of water during the summer, rendered some easier link between the two nations imperative.

A bridge was out of the question, so in 1886 it was decided to lay a single-track tube beneath the water, between Sarnia on the Canadian shore and Port Huron on the American bank. Mr. Joseph Hobson, who was chief engineer to the undertaking, completed the work without incident by recourse to the Greathead shield, whereby the London tube railways were rendered

possible. The St. Clair Tunnel is 19 feet 10 inches in diameter, and is lined throughout with cast-iron segments representing 25,000 tons. From end to end it measures 6,932 feet, with long steep approaches on either side, owing to the flatness of the country, and cost £540,000.

The tunnel was brought into service in September, 1891, and the advantages over the ferry were instantly apparent. But there was one serious disadvantage: the trains hauled by steam locomotives choked the tube, so that after one had passed some time had to be allowed to permit the bore to clear itself somewhat. This practice brought about such serious delays that it seemed as if another tube would have to be built, unless the capacity of the original tunnel could be improved. The weight of the steam-drawn trains could not be increased with safety. The engines used were the largest then in existence, but, despite their power, they could not handle more than 760 tons, and on the up grades the progress was very slow.

Why not electrify the tunnel? The query was raised but the project seemed so stupendous at the time that there was justifiable hesitation as to its feasibility. Still, such a panacea was worth trying. There would be no danger from smoke and fumes; more trains could be passed through in a given time. The project was handed over to Mr. Bion Arnold, an accomplished electrical engineer, to thresh out. It demanded most searching investigation. However, Mr. Bion Arnold at last evolved a practical scheme whereby the weight of



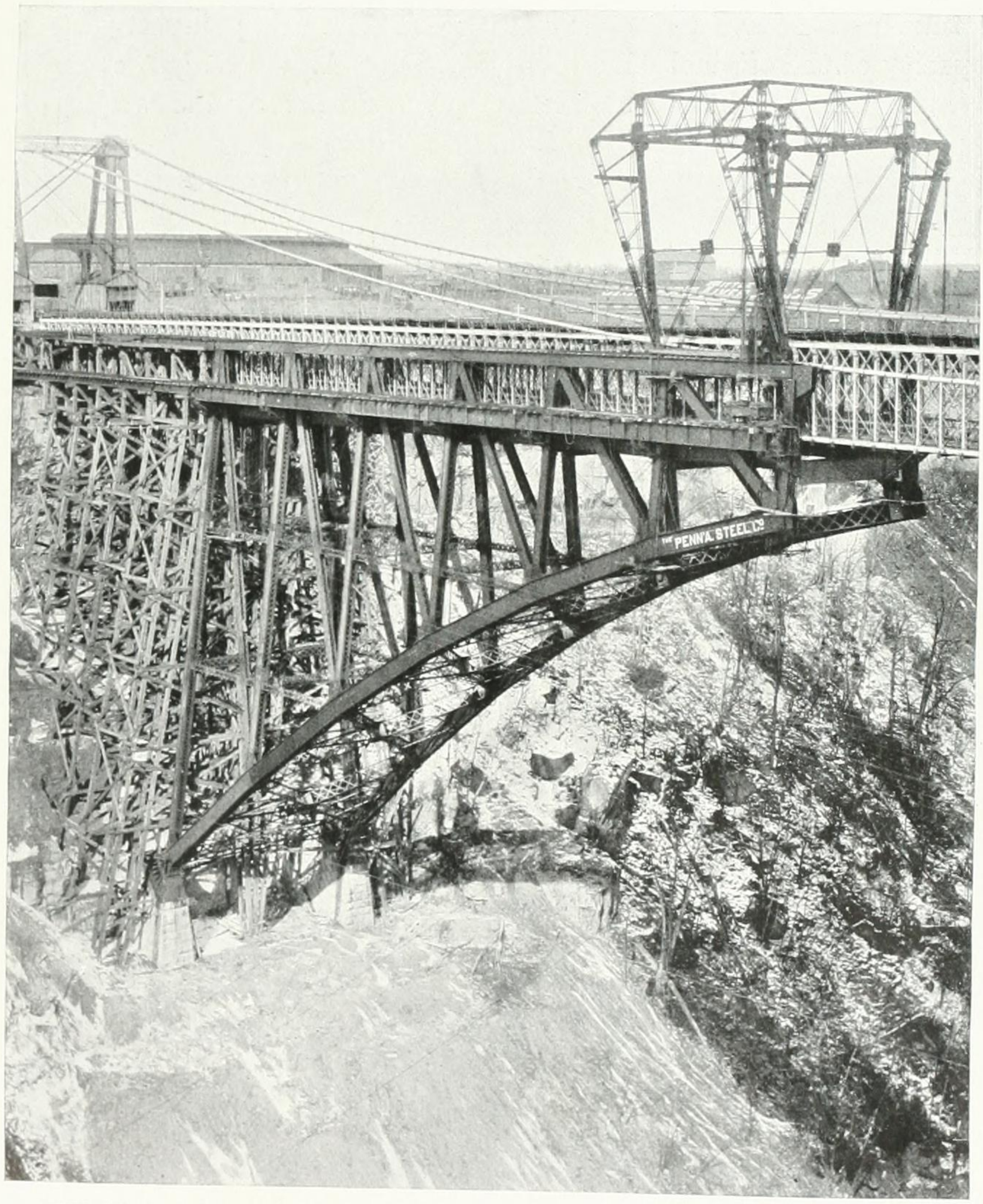
THE ST. CLAIR TUNNEL.

An iron tube 19 feet 10 inches in diameter, through which passes all the main line international traffic, under the St. Clair River.

the trains might be increased to 1,000 tons, and capable of passing through the tunnel in 15 minutes with a maximum speed of 25 and a minimum speed of 10 miles per hour. The time occupied in transit includes movements at each end of the electrical section, which would not be entailed were the whole railway worked electrically.

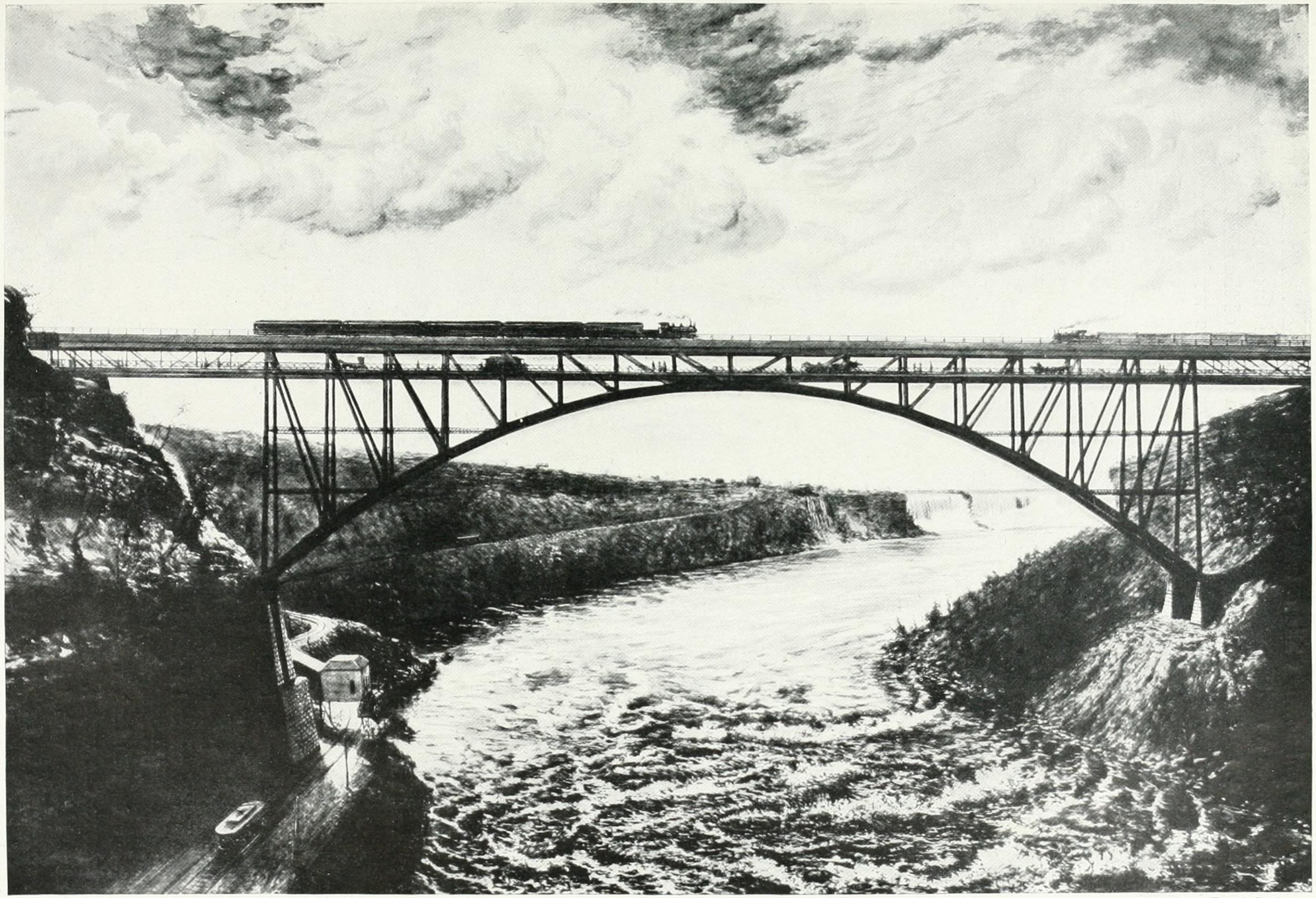
The contract was sanctioned, and fulfilled by the Westinghouse Company at a cost of £100,000. The locomotives, weighing 135 tons, and developing 2,000 horse-power, are among the heaviest in the world engaged in such work. Although their introduction accelerated movement through the tunnel, and eased the traffic situation very appreciably, the growth of business is increasing at such a rapid rate that the laying of a second tube cannot be delayed many years. As it is, the St. Clair Tunnel is one of the busiest two miles of main line in the world.

The number of links which the Grand Trunk Railway has forged between Canada and the United States is a conspicuous feature of its energetic operations. In the 'fifties it became necessary to connect the State of New York with Ontario. But the Niagara River and rapids thundered through a gorge separating the two countries. Mr. John A. Roebling threw a suspension bridge across the chasm, carrying a single pair of rails on the upper, and a roadway on the lower, deck. It was a striking piece of work, 821 feet 4 inches in length between the towers, carried by four cables each 10 inches in diameter, and was completed for £80,000.



BUILDING THE SINGLE-SPAN STEEL ARCH BRIDGE AROUND THE OLD SUSPENSION BRIDGE ACROSS NIAGARA'S GORGE.

But the old, old story came to be repeated. The bridge, adequate for the traffic of 1855, when it was opened, was totally insufficient for the business of forty years later. When the suspension bridge



Photograph by permission of the Grand Trunk Railway.

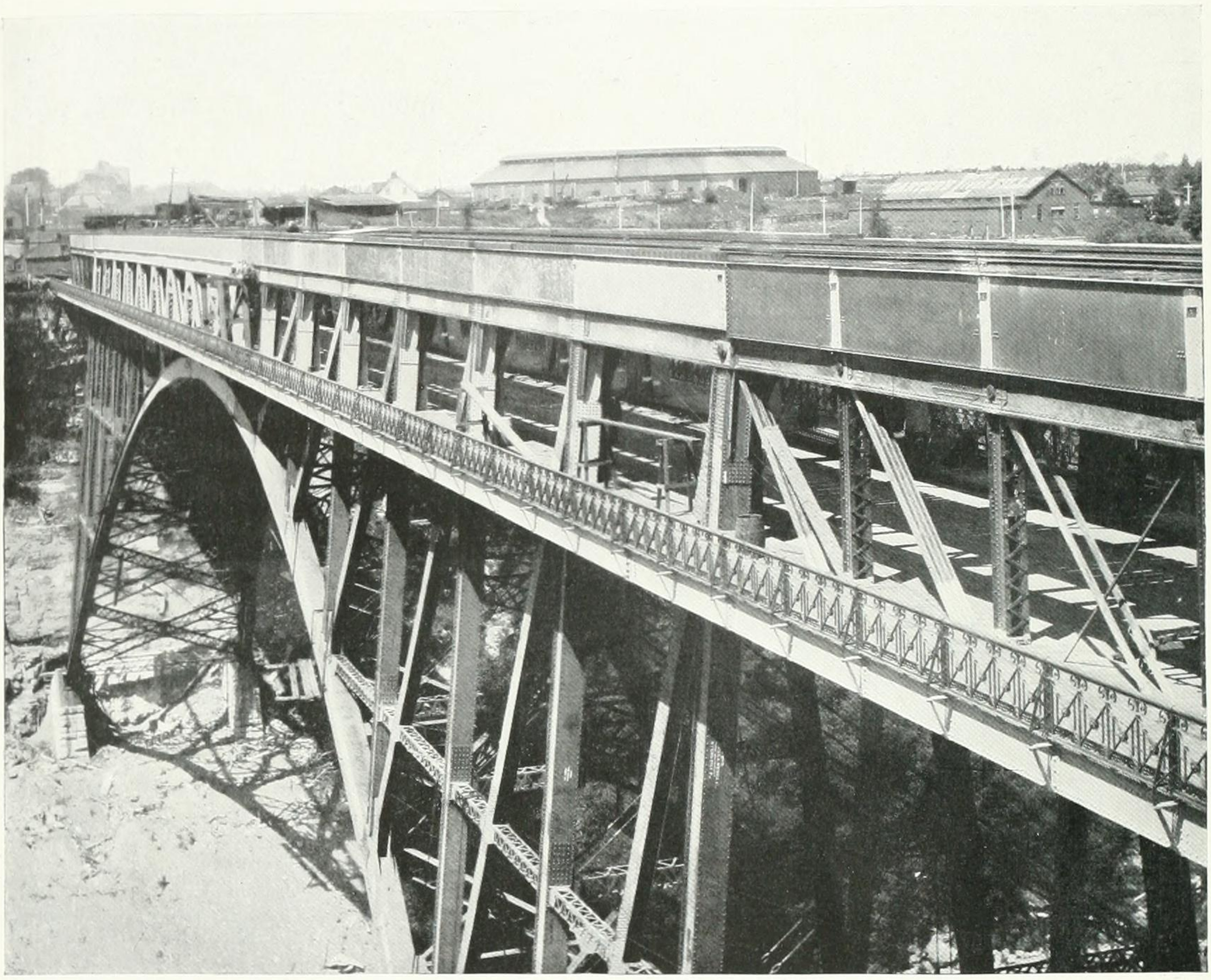
THE GRAND TRUNK SINGLE-ARCH DOUBLE-TRACK STEEL BRIDGE OVER NIAGARA GORGE.

There is a public highway below the railway deck. Length from end to end 780 feet, span 500 feet. The railway metals are 226 feet above the river.

was built locomotives exceeding 35 tons in weight were unknown, while a train of 200 tons was quite a rarity.

Accordingly a new structure was proposed. This assumed the form of a single steel arch, 550 feet clear in the span, springing from the cliff face on either side, the two railway tracks being laid on the top, and the pedestrian and vehicular traffic having the lower deck as before. On each side the central span is reached over a shore span, bringing the total length of the bridge to 780 feet, with the metals 226 feet above the water.

The new bridge was built around the old one, so as not to interfere with traffic, and 3,600 tons of steel were worked into position. When the new structure was completed at a cost of £100,000 it took up the traffic and the old suspension bridge was demolished. Although the exigencies of commerce brought about the supersession of one of the most famous suspension bridges in the world, its successor compels equal attention as being one of the largest single-span steel arched bridges ever built. The graceful festoon of the chains cleaving the air has been replaced by the equally graceful upward springings of the arch.



VIEW OF THE NIAGARA SPAN BRIDGE AFTER THE REMOVAL OF THE SUSPENSION BRIDGE.
Showing top railway deck and lower deck for public use.

When the railway was first opened the engines and rolling stock were brought from England. Among these locomotives the "Birkenheads," so named after their town of origin on the Mersey, achieved deserving fame. They were of the broad gauge with outside cylinders. When the gauge was changed some of these engines were converted, while others were sold.

Wood was used as fuel in the earlier days, the tender being piled up with baulks, such as are used for stoking steamers on the backwood waters of Canada to this day. Wood was cheap and plentiful in close proximity to the railway; coal was expensive and somewhat difficult to obtain. The rural population plied a thriving industry supplying the railways with cordwood, ramparts of which were piled up on the banks overlooking the line, to be measured and taken periodically to the depots by the wood trains; or the engines stopped on their journey and "bunkered" alongside a friendly cordwood pile. The railway assisted the settlers very tangibly in this direction; timber was anathema to the pioneers, as huge stacks accumulated in clearing the land for farming. The railway by purchasing the commodity in large quantities offered the settlers some compensation for their labours; while the sweat of their brow was not so wasted as it is to-day, when the scrub is piled in huge heaps and burned to waste.

The Old Cordwood Days.

Many amusing incidents are related of those old cordwood days, and railway travelling certainly possessed an air of novelty which was not encountered in Britain. Occasionally a train would break down miles from anywhere. The driver and fireman would set to work and repair the mishap sufficiently to enable them to crawl home. But while they were at work, and the passengers were amusing themselves scouring adjacent woods for excitement or killing time in conversation with neighbouring isolated settlers the engine was eating up quickly its bunker of wood. Consequently when all was ready to re-start "wooding-up" became urgent. In this task the passengers were forced to assist. If a cordwood pile were convenient the job was not particularly arduous, although packing cordwood over even a hundred yards is not child's play, as I have found from experience. But if there were no available supplies, then the driver and his mate passed axes round, and one and all had to set to bringing down the trees and splitting them up for the engine. It was useless to complain or to try to shirk the compulsory unpaid duty. If the passengers demurred, the driver and firemen wasted no words, but took a nap until such time as the travellers, thinking better of their objections, sullenly submitted to the ordeal.

Position of the Grand Trunk.

Although the financiers and railway builders who set out to open up the silent timber fastnesses of Canada some sixty years ago did not reap the reward they deserved, yet at the same time they completed a task which even now is scarcely appreciated. The Fathers of the Grand Trunk not only laid the foundations of a large and flourishing railway network, but they brought vast stretches of forbidding wilderness under cultivation and settlement, attracted people to the country, and paved the way for the realisation of the Confederation of the Provinces. The Grand Trunk has been the pioneer of Canada throughout its existence. Even to-day it is pursuing the policy which was laid down sixty years ago, by bringing further raw chunks of wilderness into development, in the hinterlands of Ontario and Quebec as well as the North-West.