the river gradually narrows, runs at the rate of twenty-five miles an hour, with breakers dashing and foaming in the current. The efforts which have been made to fathom the river at this point have been unsuccessful.

The accompanying admirable representation of the Niagara Suspension Bridge, is the only true one which has yet been published. The point of view is on the American, or right bank of the river, looking down the stream. Under the bank, above the bridge, may be seen the little steamer, "Maid of the Mist," which plies between that place and the Falls; while further down the stream, and close beside the grand structure, may be seen the building which contains the wheels of an hydraulic power used in driving a mill. This mill is built of stone, and situated upon the upper bank, to which an immense and extended line of shafts is led up the precipitous acclivity from the water-works below.

Far above the water—stretching over the fearful chasm, and apparently suspended by gossamer threads, whose graceful curves describe lines of true sublimity as well as beauty—appears the last great triumph of human genius and engineering skill. The distant observer is struck with surprise at its apparent frailness. Everything in nature, which surrounds it, is in such majestic proportion, that the bridge itself seems a mere network of threads and lines, buoyed up by its own inherent lightness, and the elasticity of the surrounding air. And yet, when we descend to a mathematical calculation of its size and materials, its strength and capacities, we feel that even its grace and beauty is lost in its great utility.

The bridge is sustained on four towers,—two of them 88 feet and two 78 feet high. From the base of the towers to the outside enclosure of the bridge, at either end, the ground is nicely laid out and planted. Thus strength, beauty, and sublimity are united. The anchorage of the towers is formed by sinking eight shafts into the rock, 25 feet deep. The bottom of each shaft was enlarged for the reception of cast-iron anchor plates, of 6 feet square. These chambers have a prismatical section, which, when filled with solid masonry, cannot be drawn up without lifting the whole rock to a considerable extent. Saddles of cast-iron support the cables on the top of the towers. They consist of two parts—the lower one stationary, and the upper one moveable, resting upon wrought-iron rollers. The saddles have to support a pressure of 600 tons, whenever the bridge is loaded with a train of maximum weight. The compact, hard limestone, used in the masonry of the towers, will bear a pressure of 500 tons upon every foot square.

The following table exhibits the proximate, if not the absolute, capacities, dimensions, and cost of the Suspension Bridge:—

Length of span from centres of towers	882 feet.
Height of tower above rock on the American side	88 "
" " " Canadian side	78 "
" " floor of railway	60 "
Number of wire cables	4
Diameter of each cable	10¼ inches
Number of No. 9 wires in each cable	3,659
Ultimate aggregate strength of cables	12,400 tons.
Weight of superstructure	800 "
" " and maximum loads	1,250 "
Maximum weight cable and stays will support	7,300 "
Height of track above water	258 feet.
Base of towers	16 ft. sq.
Top	8 "
Length of cables	1,256½ feet.
Depth of anchor pits below surface of rock	20 feet to 80 feet.
Outside width of railroad floor	24 "
Total length of wire in miles	4,000
Cost of structure	400,000 dollars

The passage-way is divided into two parts, or floors—one above the other. The upper is used for the transit of cars, and admits of three gauges, viz., the New York Central, Great Western (Canada), and the Canandaigua and Niagara Falls—the latter being the New York and Erie gauge. The rails of two of the roads are so laid, that one of each track forms the third—and this saves the necessity of multiplying rails. The lower floor is the passage-way for pedestrians and for carriages.

Neither the cost of the bridge nor the magnitude of the undertaking is a matter of surprise or wonder. There are very many mechanical structures, even in this country, already completed, which cost immensely more money; and the tubular bridge at Montreal, now in process of erection, will exceed it in this respect more than twenty times over; but it is the boldness and the originality of the adventure, and its complete success, in the face not only of natural obstacles, but also of the discouraging prophecies of the most celebrated scientific men, which render it remarkable.

The distinguished English engineer, Stephenson, is said to have pronounced adversely to its security; and the public generally regarded it at the best as a very doubtful experiment. But that experiment has proved eminently successful; and thousands of passengers, with immense quantities of freight, pass over it daily, and in perfect security.

The beauty and grandeur of Niagara and its neighbourhood are by no means felt and enjoyed without a special visit to this great triumph of the professional skill and ingenuity of John A. Roebling, the engineer.

It is said that there are now few points in Canada or the United States where a larger custom-house business is transacted than at the Suspension Bridge. The amount of duties collected from December to the period in March when the Reciprocity Treaty went into effect, was $50,000. The imports into Canada, from December to May, were $125,000. The amount entered as in transition for Western States for the same period was $12,000,000. The amount of foreign bonded goods passing into Canada at this point, from January to May, was $2,000,000. We must also add that during the winter months 150,000 barrels of flour were sent through, in bond, to New York. It must be borne in mind that the Railway Bridge was not opened until about the opening of navigation, and as last winter was merely initiatory to the business, which will hereafter be transacted at this point, some idea may be formed of what will be done the coming winter. The business is largest of course during the winter months.

[For the New York Commercial Advertiser.]

THE FALLS OF NIAGARA.

Much has been written in relation to the Falls of Niagara, and in reference to the probable length of time they have existed. It is less than three hundred years since this stupendous waterfall became known to civilized man. It is situate in the bosom of a plain, about equi-distant between two great lakes—Erie and Ontario, in a river thirty six miles long.

One thing is certain, and that is that it could not have existed prior to the universal deluge; and from that great event to the present time, is not half as many years as some imagine these Falls have continued. I have made several visits to the Falls for the purpose of geological exploration in connection with the examination of greatly extended districts in every direction around them.

On my first examination of the Falls, in descending the cliff from the Clifton House, by the boat path, on the Canada side, I came to a point exactly opposite the American Falls. Here I worked among the rocks for a considerale time, and on turning to the left, on the the very margin of the water, I found a strata of red and green shale, underlying the entire limestone cliffs, and extending to and under the "Horse Shoe Fall." This strata also extends across the river and under Goat Island, and many miles in every direction. It is the same strata in which the salt wells of St. Catherine's were sunk, and the same as forms the cliffs of the Niagara, at and above and below Queenston and Lewiston. It is a fractured and shattered strata; contains water as dense and as salt as the Sea of Sodom; and abundance of mineral waters and elastic gases of great force. This strata is the foundation of the great limestone walls which form the great cataract of Niagara—a frail structure it is, and it is in this strata that the Niagara has the whole of its bed below the Falls; and, being soft, the water which falls over the Horse Shoe and over the American, north of Goat Island, has had no difficulty in sinking chasms of vast depth, into which the broken rock of the limestone walls, which compose the cataract, falls.

I have examined minutely the entire saline district of that portion of the continent,—the borings of the deep wells at St. Catherine's, at Clyde, Lockpit, Montezuma, Geddes, Syracuse, Salina, Liverpool, Little Soda Bay and Canastota, and the Salt Springs in the wilderness between Lake Ontario and the river Ottawa, in connection with the great chain of lakes which discharge their surplus waters through Oswego on one side, and the Trent on the other side of Lake Ontario river, with that great volcanic basin in which Lake Ontario has its bed. The northern shore of Lake Ontario, where the bituminous fossiliferous limestone strata exists, was an ancient *salses*, and since 1844 has three times been excessively convulsed, producing a tidal flow over the land for many rods, and a subsidence of the water from the shore for a great distance. One of these occurred on the 20th of September, 1845; another on the 8th of January, 1847; and the other on the 5th of July, 1850. Each was accompanied by terrific storms of thunder, lightning, and wind; and one of them—that of July 5th, 1850—was attended by a water-spout of great power, which moved over Lake Scugog, and at one time threatened to drain it of its water; but in a moment a cloud of most dismal blackness arose, and from it issued a vivid discharge of electric flame, attended at the instant by a fearful crash of a broken thunder bolt. The spout fell at the instant—it was broken; the cloud was sundered by the struggle, and instantly winged its way in different directions—one part passing to the east, and coming to the ocean by way of the Hudson river and its tributaries; and the other passed down the St. Lawrence, to Quebec, and thence to the ocean—and having thus filled its circuit in the sea of waters, was at rest.