wards, when imported by the manufacturers of skates, for use exclusively in the manufacture thereof in their own factories.

Steel, under one-half inch in diameter, or under one-half inch square, when imported by the manufacturers of cutlery, or of knobs, or of locks, for use exclusively in the manufacture of such articles in their own factories.

Steel of number twelve gauge and thinner, but not thinner than number thirty gauge, for the manufacture of buckle clasps, bed fasts, furniture casters, and ice creepers, when imported by the manufacturers of such articles, for use exclusively in the manufacture thereof in their own factories.

Steel of number twenty-four and seventeen gauge, in sheets sixty-three inches long, and from eighteen inches to thirty-two inches wide, when imported by the manufacturers of tubular bow sockets for use in the manufacture of such articles in their own factories.

Steel for the manufacture of bicycle chain, when imported by the manufacturers of bicycle chain for use in the manufacture thereof in their own factories.

Steel for the manufacture of files, augers, auger bits, hammers, axes, hatchets, scythes, reaping hooks, hoes, hand-rakes, hay-rakes, hay or straw knives, windmills and agricultural or harvesting forks when imported by the manufacturers of such or any of such articles for use exclusively in the manufacture thereof in their own factories.

Steel springs for the manufacture of surgical trusses, when imported by the manufacturers for use exclusively in the manufacture thereof in their own factories.

Flat spring steel, steel billets and steel axle bars, when imported by manufacturers of carriage springs and carriage axles for use exclusively in the manufacture of springs and axles for carriages or vehicles other than railway or tramway, in their own factories.

Spiral spring steel for spiral springs for railways, when imported by the manufacturers of railway springs for use exclusively in the manufacture of railway spiral springs in their own factories.

Steel strip and flat steel wire when imported into Canada by manufacturers of buckthorn and plain strip fencing, for use in the manufacture of such articles in their own factories; and barbed fencing wire of iron or steel after January 1st, 1898.

Galvanized iron or steel wire number nine, twelve, and thirteen gauge, after January 1st, 1898.

Stereotypes, electrotypes and celluloids of newspaper columns in any language other than French and English, and of books, and bases and matrices and copper shells for the same, whether composed wholly or in part of metal or celluloid.

Surgical and dental instruments (not being furniture) and surgical needles, after January 1st, 1898.

Tagging metal, plain, japanned, or coated, in coils, not over one and a half inch in width, when imported by manufacturers of shoe and corset laces for use in their factories.

Tin, in blocks, pigs, bars and sheets, tin plates, tin crystals, tin strip waste, and tin foil, tea lead.

Tubes, rolled iron not welded or joined, under one and one-half inch in diameter, angle iron, nine and ten gauge, not over one and one-half inch wide, iron tubing lacquered or brass covered, not over one and one-half inch in diameter, all of which are to be cut to lengths for the manufacture of bedsteads, and to be used for no other purpose, and brass trimmings for bedsteads, when imported by or for manufacturers of iron or brass bedsteads to be used for such purposes only in their own factories, until such time as any of the said articles are manufactured in Canada.

Wire, crucible cast steel.

Wire, rigging for ship and vessels.

Wire, of brass, zinc, iron or steel, screwed or twisted, or flattened or corrugated, for use in connection with nailing machines for the manufacture of boots and shoes, when imported by manufacturers of boots and shoes, to be used for such purposes only in their own factories.

Steel wire, Bessemer soft drawn spring, of numbers ten, twelve and thirteen gauge, respectively, and homo steel spring wire of numbers eleven and twelve gauge, respectively, when imported by manufacturers of wire matresses, to be used in their own factories in the manufacture of such articles.

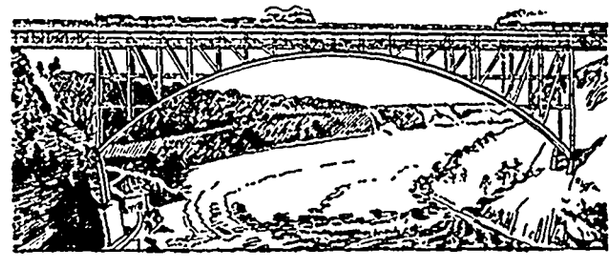
Yellow metal, in bolts, bars and for sheathing.

Zinc spelter and zinc in blocks, pigs, sheets and plates; seamless drawn tubing.

THE NIAGARA ARCH BRIDGE.

The Niagara River is now spanned by three bridges, each of which was at the time of its erection a landmark in the engineering world, not only by reason of its vast proportions, but on account of those natural features which make the Niagara Gorge one of the world's wonders. These bridges represent distinct types of structure, the suspension, the cantilever, and the arch. The construction of an arch of such proportions never was attempted before.

The bridge which the arch has replaced was completed in 1855, the first train passing over it on March 8th of that year. Seven years were consumed in its construction. The original bridge had wooden trusses suspended on stone towers. In 1880 the suspended structure was changed to steel, and in 1886 the stone towers were replaced by towers of steel, both changes being made without any cessation of train



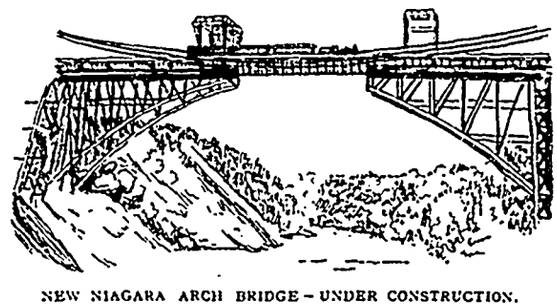
NEW NIAGARA ARCH BRIDGE.

traffic. The bridge had a span of 821 feet from centre to centre of the towers, and was suspended on four wire cables 10¼ inches in diameter, which carried a single track railway above and a carriage way on the lower deck. The engineer who designed and superintended the changes in the bridge was L. L. Buck, of New York, who also prepared the plans for the new structure.

The new arch has a span of 550 feet between the end piers, and a trussed span at each end 115 feet long connects the arch with the bluff The total length of the bridge with its approaches is 1,100 feet, and the centre of the arch 226 feet above the water. The steel ribs or main arches are four feet deep and three feet wide.

The bridge has two floors. On the upper floor there are two railway tracks, and on the lower floor a central carriageway, a double trolley track and sidewalks on each side. The width on top is 30 feet. The lower floor is 57 feet wide. The arch will support on each upper track at the same time two locomotives of the heaviest kind, followed by trains weighing 3,500 pounds to the square foot of bridge, and in addition a load of 3,000 per square foot on the lower floor. Seven million pounds of steel have been used in the building of this wonderful arch.

On the United States side of the river the bed plates of the arch rest on masonry built on the limestone rock, but on the Canadian side it was found necessary to build a foundation of concrete on which the masonry rests. The abutments are built about half way up the slope on each side. The stone for the abutment on the Canadian side was



NEW NIAGARA ARCH BRIDGE—UNDER CONSTRUCTION.

brought from the Queenston quarries. The bridge end of the shore span is hinged to the arch, and the shore end rests on expansion rollers on heavy masonry abutments. During construction the arch was supported as it was built out by a chain of vast strength made fast to a huge anchor sunk in solid masonry.

The test of the bridge was made July 29th, and R. S. Buck, the engineer in charge, said that "the test was very satisfactory in every respect. The weight which was placed on the bridge was about 2,600 tons, and is in excess of any that the bridge will be required to stand. The deflection was about an inch, which shows that the bridge is one of the strongest of its kind ever constructed. The test was in every way satisfactory to the bridge companies, the engineers, the Grand Trunk Railway, and the Pennsylvania Steel Company." This was endorsed by L. L. Buck, the designing and chief engineer. Among the officials present at the test were: Joseph Hobson, Montreal, chief