

was the only material met. Driven forward by hydraulic pressure, the tunnel was bolted to its fellow-

bed, as well as the general bed of rock, and in some



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moved through it, and the enormous expenditure of the enterprise is due to the success of undertaking the crossing of the river, as heretofore presented

The St. Clair Tunnel, aside from its commercial importance, may truly be regarded as a monument to the engineering and mechanical skill of all engaged in its construction. The fact that unforeseen obstacles were successfully met and conquered, and that every requirement in the progress of the work was provided for by the ingenuity of the engineers and artisans whose services were called into requisition, is a tribute to the ability of Canadian and American mechanics well deserving of a record in these pages. In the brief space necessarily allotted to this chapter, we name the firms and individuals to whom, in detail, this great enterprise owes in a large measure its success.

After much preliminary experimenting as to the most desirable method of construction, the shield system was finally decided upon. Engineer Hobson conferred with Mr. Teiper, consulting engineer of the HAMILTON BRIDGE COMPANY, and under their supervision, this Company constructed the great cutting shields, patterned somewhat after the Beach shield, used in an experimental tunnel under Broadway, New York, but with many



VENTILATING DEVICE, FOR REMOVING SMOKE.

vital improvements. The shields were forced ahead by twenty-four hydraulic rams, furnished by WATSON & STILLMAN, of New York City.

As fast as the cutting progressed the cast-iron segments were inserted and bolted, each to its fellow segment. An ingenious segment hoist was employed for rapidly lifting the segments into place. This was designed by Mr. Teiper, and constructed by the HAMILTON BRIDGE COMPANY. The bolts used were furnished by the ONTARIO BOLT CO. for the Canadian side, and by the MICHIGAN BOLT AND NUT WORKS for the American side. A portion of the castings were furnished by the Grand Trunk shops, but the larger share were from the DETROIT CAR WHEEL CO. These were planed on their radial surfaces, with a planer built for the purpose, by Manning, Maxwell & Moore. The packing used in joining the segments at their sides was furnished by the STANDARD PAINT CO. of New York, and is known to the trade as the famous "P. & B." brand.

The stone used in the construction was from the quarries of WILLIAM GIBSON, who also supervised its setting. The brick was furnished by R. H. HALL, of Detroit, for the American side, and JAMES RICHARDSON, of Kenwood, for the Canadian side. The cement used was furnished by the Estate of JOHN BATTLE, proprietors of the well-known "Thorold" brand. All the lumber used in the tunnel was creosoted at the EPPINGER &