THE ST. CLAIR TUNNEL.

AN ENGINEERING PROJECT IN WHICH NEITHER BRICK NOR STONE ARE USED.

Six hundred men are now digging the railway tunnel under the St. Clair River, at Sarnia, at the rate of 15 feet each day. This means that before the year is out one of the most important pieces of civil engineering in the country will be completed. More than 1,200 feet of the tunnel proper is now ready for trains on the Michigan side and 900 on the Canadian. The remaining 4,000 feet will be finished at a wonderfully rapid rate, considering the nature of the work, if no accident intervenes. It has taken six months to do the work thus far, but workmen are now more accustomed to the task and can work with greater facility in the use of the machinery, so that the engineers in charge place the completion of the work not later than the end of the year.

The tunnel itself is over 6,000 feet long. The approaches are equally long, so that the entire length will be more than two miles. Of this distance 2,310 feet are under the river, 2,390 on the Michigan land side, and 2,100 on the Canadian. The grade is one foot in every fifty, except under the river bottom, where it is substantially level. It is an iron cylinder tunnel—the only one of the kind in the country. There is neither brick nor stone used in its construction. Neither are there any stays or supports—simply a mammoth iron tube built in sections underground. It is designed for a single track.

Electric lights make it as light as day, air engines keep the atmosphere as healthy inside as above, and steam pipes hold the temperature at the proper point. It is as dry as a street in summer, and the disagreeable features common to subaqueous work are entirely absent. Work is pushed from both ends. The method of construction is simple. A great cylinder, weighing more than 60 tons, 20 feet in diameter, and 16 feet long, is driven into the blue clay, which constitutes the entire bottom of the river, by the use of hydraulic power with as much ease as cakes of soap can be carved out of a general mass. Inside this cylinder, which is called a shield, 22 men are at work removing the dirt. As fast as the shield is pushed forward, which is about two feet at a time, the clay thus brought inside the shield is dug out to the edge of the great cylinder. Then the hydraulic jacks are again started, and slowly but irresistibly the immense iron tube moves another two feet into the solid earth ahead of it. Each jack has a power of 3,000 tons, and the combined power behind the shield is more than 400,000 tons.

Another ring of iron lining is put into place, and each foot of tunnel is ready for track laying as fast as the work progresses. There is no mason work, as already stated, and when done the tunnel will practically be a continuous iron tube, 20 feet in diameter and nearly 7,000 feet long. The iron plates that form the lining are of such curvature and length that any 13 of them, with a small key apiece, will make a circle 20 feet in diameter. The edges and ends are turned up, each piece being bolted by a dozen large bolts to its neighbor. Each one is 18 inches wide, and weighs as near 1,000 pounds as the foundries can make them. Those for the Michigan side are made in Detroit, and those for the Canadian in Hamilton, and thus the payment of duty is avoided. These great sheets are handled with cranes, and so rapidly that a complete circle is put up in about half an hour. The lining is about 6 inches thick, so that there is no danger of collapse from pressure. The ground through which the tunnel has passed thus far has been uniformly stiff blue clay. No water has yet been struck, and an occasional pocket of surface gas has been quickly disposed of by turning on a powerful air current. The precaution has been