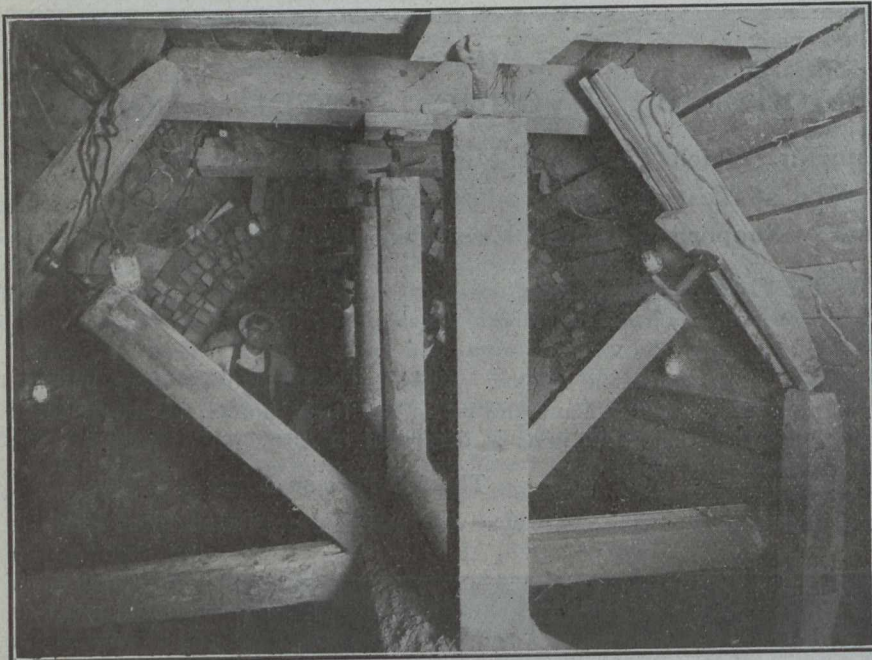


sides of the posts 3 inches. A 3-in. decking is then placed overall, leaving the tops of the posts exposed.

The sewer in this section is culvert-shaped outside with a semi-circular top, while the inside is circular. The crown and invert of the sewer are built of reinforced con-



Needle Beam Method of Supporting Sheet-piling—Taken from Heading

crete with a half ring of paving brick in the invert for a wearing surface. The concrete in the bottom is 1:2:4 mix and is provided with a layer of .3 square inches per square foot mesh 2 inches from the bottom. At the springing line of the arch the concrete is 18 ins. thick and gradually reduces to 12 ins. thick in the crown. Two layers of mesh of the same weight as used in the invert are used in the crown, one near the outside and the other near the inside. The outside layer extends around the top and down the side walls to the flow line, while the inner layer extends only to the springing line of the arch.

The 1,650 Feet in Open Cut

The part of this section as far as Humberside Avenue was at an average depth of 22 ft. and was built of three rings of brick. At this point, a 4-ft. ramp was provided, but in spite of this, the average depth from Humberside Avenue to Annette Street was 29 ft. and this part was built of four rings of brick. At Annette Street, another 4-ft. ramp was provided. From Conduit Street to Humberside Avenue the grade is 1 ft. in 185 ft. Two lateral sewers, a 12-in. and a 15-in., are picked up. From Humberside Avenue to Annette Street the grade is 1 ft. in 195 ft. At Annette Street a chamber was designed to pick up five laterals, a 12-in. and a 24-in. pipe, a 2-ft. x 3-ft. and a 2-ft. 8-in. x 4-ft. (all brick).

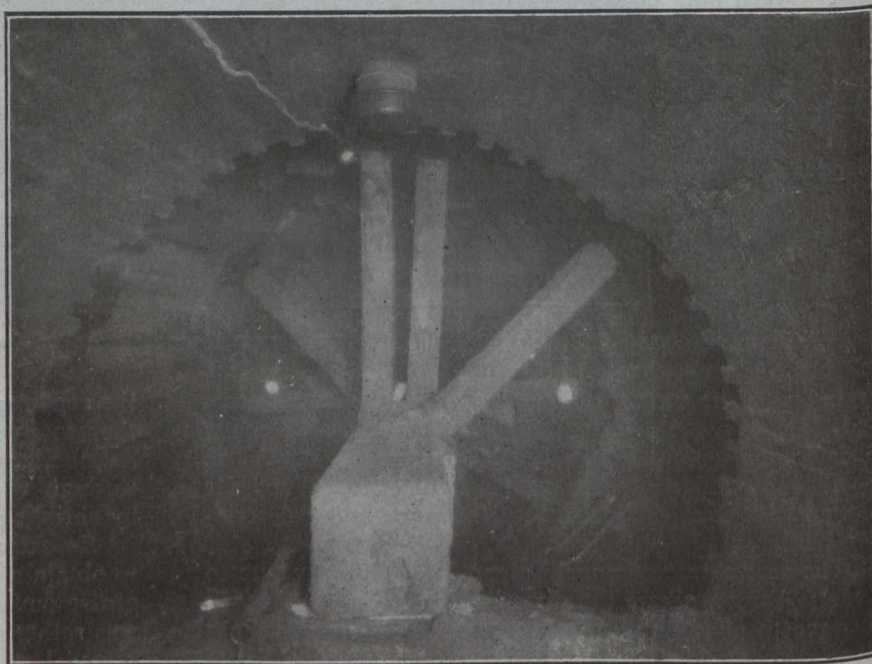
As an aid to handling the material from this excavation a cableway 250-ft. in length was provided. The excavated material was raised from the bottom of the trench in one-half cubic yard buckets by the cableway and

carried to the rear, part to be used as back-fill over the completed sewer, and the rest to be hauled in wagons to the nearby ravine. At first, the bottom of the excavated trench was dry and the work proceeded rapidly, but as the trench was continued northerly and became deeper, the bottom became soft and wet. It was necessary then to square the bottom and use decking. This extra labor of course delayed the work, but it was, nevertheless, well managed and quickly accomplished. The bricks were hauled to the job in wagons and piled along the trench, whence they were lowered as required in iron baskets, each holding about twenty bricks.

North of Humberside Avenue, the contractor intended to construct the sewer in tunnel, but the ground was found to be too wet for tunnelling without the aid of compressed air. It was found, after investigation, that this could not be economically used for two reasons. One was the presence of a badly cracked old storm sewer about five feet above the crown, and the other was the fact that about ten feet or twelve feet of the ground on the surface was filled, and therefore of a loose nature. The open cut was accordingly continued to Annette Street.

Tunnel Portion

We have already stated that 3,890 ft. of this sewer were planned to be built in tunnel. It was now certain that the ground would be very wet. This had been suspected from borings taken, but it was thought that these might indicate merely a local condition. Accordingly, it was decided that compressed air



Heading a 6-inch Iron Pipe Used in Testing Line of Sewer

would be necessary to drive out the water and a pair of compressed air pumps of 1,000 cubic feet capacity were provided and a plant erected. It was later found that these two pumps did not supply sufficient pressure and a third and later a fourth were added to the plant. South