

of each individual pile, stating the dimensions. On the Larkin job the Aberthaw Company found it best to build two distinct saw mills, since 90 per cent. of the dressed stock had to be cut to exact length. Both mills had practically identical equipment, but were laid out slightly different. The most used piece of machinery in those mills was a cut-off saw, on either side of which was a table, where the stock was placed before being cut. The other equipment consisted of a rip-saw, boring machine, planer, and emery wheel.

To illustrate the methods employed in making up a complete form from the blue print as received from the central office it may be desirable to follow in detail a single operation.

The form details, as previously mentioned, stated exactly the boards which would constitute a particular form and the number of forms required. Cards were made out at the route clerk's office stating for the labor foreman the number of pieces of stock and sizes to be taken to one of the mills. The mill men in return received orders from the route clerk stating the length to cut off the stock, and, if ripping was required, to what width to rip. It was the duty of the labor foreman to tag this stock according to the M number indicated on his order card. When all the stock required for a certain form had been cut and delivered to the proper bench, orders were issued by the route clerk to the two carpenters, who worked at the same bench, to make the number of forms required as indicated on the blue print.

In order that the forms were made up in time to erect as planned by the office, eight benches were used, with two carpenters at each bench. The carpenter having been given his orders by the route clerk, telling him what lumber would be tagged to make up a certain specific form, and having been given blue print of the same form, he merely laid his stock on the bench and nailed it together. When the forms were completed a laborer oiled the same and stenciled them according to the symbols printed on the forms by the carpenters. If not required for immediate use the forms were piled systematically back of the bench at which they were made. When needed, teams carried the forms to that part of the building for which they were designed. Since it was previously determined at which point of the building the erection was to be started, a clerk was given the duty of listing forms as required for erection, and seeing that labor foreman received orders to have these forms delivered to the exact part of the building where and when needed.

TORONTO STREET RAILWAY AND THE CITY OF TORONTO.

Under the terms of the franchise granted to the directors of the Toronto Street Railway a certain percentage of the cash receipts must revert to the citizens under the care of the corporation financial department. The amount received for two years past and the various proportions are as follows:—

1911.		1912.	
Total receipts.	City's share.	Total receipts.	City's share.
\$1,000,000.00	\$ 80,000.00	\$1,000,000.00	\$ 80,000.00
500,000.00	50,000.00	500,000.00	50,000.00
500,000.00	60,000.00	500,000.00	60,000.00
1,000,000.00	150,000.00	1,000,000.00	150,000.00
1,643,651.94	328,730.38	2,176,170.87	435,234.27
\$4,643,651.94	\$668,730.38	\$5,176,170.87	\$775,234.27
Mileage rent	83,140.00	Mileage rent	88,329.40
	\$751,870.38		\$863,563.67
Average mileage	103.92	Average mileage	113.50

CONSTRUCTION OF A WOOD STAVE PIPE.

In discussing a recent paper given before the American Society of Engineering Contractors on the construction of a 48-inch continuous wood stave pipe, Mr. Willard D. Lockwood gave some interesting facts regarding the laying of a 24-inch machine-made wooden pipe, five miles in length.

The pipe was made by the A. Wyckoff & Son Company, of Elmira, N.Y., of selected Canadian pine, cut into lengths of 8 to 12 feet. The speaker found it advantageous to use the shorter length, as it permitted piling the pipes crosswise in a box car.

On good ground a foreman and eight men could easily lay 1,000 feet of 24-inch pipe per day. With the cost of \$5.50 for the foreman and \$1.75 for the men for 9 hours, the cost of laying the 24-inch pipe for four miles across wet meadows was about 4½ cents per lineal foot for labor alone.

The manner in which the pipe was made at the mills is described by the manufacturers as follows:

"The wood from which our wood-stave pipe is made is selected Canadian pine. As the staves are run through the finishing machine, which cuts the double groove and tongue and planes the faces to circular and radial lines, a competent inspector of many years' experience handles every stave just at the time when its defects can best be detected. This inspector culls out about fifteen per cent. of the timber which comes to our factory and these culls are used for other purposes foreign to wood-pipe. The winding machine used for banding the wood staves together is so arranged that the band can be wound at any desired tension, according to the set of the machine, which is regulated for each class of pipe according to diameter and pressure specified. The tension can be made great enough to crush the wood in the large size pipe. During the manufacture of one standard a uniform tension and spacing is absolutely assured.

"The pipes are made in maximum lengths of 12 feet. We have found that sections of 12 feet require a minimum expense in handling at factory, loading and unloading in and from box cars, by which means they are always shipped, hauled to work and placed along the conduit line. The shorter sections permit of the pipes being laid in a curve with perfect satisfaction. As each stave is made, two grooves are cut into one edge ⅜ inch deep and ⅜ inch wide at the base of groove. On the opposite edge two tongues or heads are cut 3/16 inch high and 3/16 inch wide at base of head. Each of these is cut ⅜ inch from the outer and inner face of the stave. When the staves are banded together the head, being a little larger than the groove, is squeezed into it and thus makes a thoroughly water-tight joint. The shorter sections of pipes are always used to make up the curves.

"The coating is heated in tanks by steam to a temperature of between 250 degrees and 300 degrees Fahrenheit and applied to the steel bands as they are being wound around the wood by running them through the tank which stands upon the winding machine; this method insures a full and complete coating between the steel and the surface of the wood, thus preventing the moisture, which may sweep through the outside of the wood, from coming into direct contact with the steel bands.

"After winding, the chambers and tenons are cut on the pipe, each being four inches in depth by one-half the total thickness of the shell of the pipe, which is usually 1½ inches thick. After leaving the finishing machine the pipe is placed on the top of the two-grooved roller, set parallel and horizontal, with one-half their diameters submerged in a tank of the hot Hydrolene. As these rollers revolve, the pipe revolves, and the coating which adheres to the rollers is thus applied to the outside surface of the pipe, covering the bands and wood. After all is applied that the surface will hold, the pipe is rolled on to a table filled with saw-dust, the sawdust adheres to the hot coating and protects it from being knocked off or abraded in shipping or laying."