

twelve-inch pipe. By using the largest gasket that will permit the pipe to enter to the full depth of the socket and having it well filled with cement you will make a good tight joint, although the pipe layer may neglect, as he often will, to fill the lower part of the socket with mortar.

As the joint is the weak point in all pipe sewers and the cause of most of the trouble, I considered it advisable to eliminate as many joints as possible, which was accomplished by adopting the three-foot lengths of pipe with deep, wide sockets in place of the standard pipe in common use. A local pipe dealer informs me that the long pipe, of twelve inch diameter, cost about three per cent. more per foot than the standard pipe. We still permit the use of standard lengths of pipe, to some extent, when they are cemented together in pairs for about four days before laying. The difficulty of safely laying a piece four feet long was carefully considered, and in order to have it evenly bedded in such a position that it will not break, the contractor is required to make a soft bed in a hard bottom trench, remove the earth from beneath each collar, and in back filling have a man stand on the pipe to detect and prevent any moving of the pipe while he tamps the earth around it, alternating from side to side, with an iron tamper similar to that used in railroad track work.

An argument in favor of laying the longer sections of pipe, aside from the fact that there are a less number of joints to be made in the trench, is that owing to their increased weight they are less liable to crawl under the weight of a sliding back fill, which, no doubt, is the cause of many open joints in wet, heavy soils.

As the greatest difficulty in producing a tight joint occurs in a very wet trench where the best possible joint is most necessary, I have devoted more time in an effort to accomplish the desired result under such conditions, and have finally adopted and required the use in very wet trenches, of the W. S. Gasket, which, I believe, is a patented article. These are made for various sizes of pipe and consist of a narrow bag of cheese cloth, slightly longer than the outer circumference of the pipe, with a strand of oakum passing through one side. Then the bag is divided into pockets by means of pasted seams, and filled with cement. The paste is readily dissolved by the water, permitting the cement in the pockets to unite as the gasket is driven into the annular space. The use of this gasket runs the cost, per joint, up to about three times that of the common oakum and cement-filled joint, but an amount equal to that difference is allowed the contractor on each joint. The city furnishes the gaskets to the contractors at cost.

Another method of making a good tight joint in the water is by the use of a mixture of one part coal tar and three parts of Portland cement thoroughly mixed into a putty. After an oakum gasket is placed this putty is forced in by hand. The operation is simple and effective against the water. The workmen, however, object very seriously to the tar on their hands. The material required for one joint for a twelve-inch pipe with deep and wide socket depends largely on the size of the gasket, but ordinarily one pint of tar and three pints of cement completely fills the joint. The material best suited for this work is called hydrated tar, which is crude coal tar with the ammonia water removed.

In several instances, when repairing breaks in sewers carrying a large amount of water, where it was found impossible to stop leaks at the joints with oakum and cement. I have used plaster of paris with oakum with fair success, afterwards finishing the joint with cement mortar. The plaster is made in a thin paste and worked into the gasket until it contains all it will carry. As the plaster sets very quickly the work of preparing and placing the gasket and setting the pipe must be performed with great rapidity.

The methods outlined above have thus far proved satisfactory. Of course time alone will prove whether they are the best or not. It is, however, an indisputable fact that the success of any method depends largely upon the intelligence of skill of the workman. Also, that the average man working in the trench to-day is a very different speci-

men from the one of twenty years ago. The foreigner of to-day cannot be depended upon to understand or follow verbal instructions. I find, however, that he learns quickly by sight, and will follow a given line. It is to this fact that I attribute the success of my methods.

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

Copies of these orders may be secured from the Canadian Engineer for a small fee.

5524—Oct. 22—Authorizing the C.N.R. to open for carriage of traffic portion of line on its railway from Brandon, Man., to Regina, Sask.

5525 and 5536—Granting leave to the British Columbia Telephone Co. to erect, place, and maintain its wires across tracks of the C.P.R. at Wentworth Street and Fifth Street, Nanaimo, B.C.

5527 to 5535—Oct. 30—Granting leave to the Manitoba Government Telephone Commission to cross the tracks of the C.N.R. at various points in the Province of Manitoba.

5536—Sept. 18—Directing the C.P.R. to carry freight traffic over portion of its line known as "Moose Jaw Branch" from mileage 14.5 to mileage 63, provided trains are not run at a greater speed than thirteen miles (13) per hour.

5537—Oct. 16—Granting leave to the Manitoba Government Telephone Commission to erect, place, and maintain its wires across the track of the G.T.P.R. at Carberry, Man.

5538 and 5539—Oct. 29—Granting leave to the B.T. Co. to cross the G.T.R. and C.P.R. at Strathmore Station, Ont.

5540 to 5545—Oct. 30—Granting leave to the rural municipality of Strathcona to cross the C.N.R. at various points in the municipality of Strathcona.

5546—Oct. 29—Approving "La France" fire extinguisher for use on the C.P.R. in the Province of British Columbia.

5547—Nov. 3—Authorizing the C.P.R. to use and operate various bridges on its Ignace section.

5548—Nov. 3—Approving location of V.V. and E. Ry. from the New Westminster District Line to the West Line of Township 26, New Westminster District, B.C.

5549—Granting leave to the C.P.R. to operate various bridges on its Kenora section.

5550—Nov. 3—Granting leave to the corporation of the city of Toronto to construct sewer under tracks of the C.P.R., near Rosedale Creek, Toronto, Ont.

5551—Nov. 3—Authorizing the C.P.R. to construct, maintain and operate branch line to and into the premises of the Gordon Pulp and Paper Co., Lot 4, Concession 5, Township of Van Horne, Rainy River District.

5552—Oct. 29—Authorizing the corporation of the town of Hespeler, Province of Ontario, to lay water pipe under G.T.R. at Avenue Street, Hespeler.

5553—Oct. 29—Authorizing the Peterboro' L. and P. Co. to lay gas pipe under G.T.R. tracks at Smith Street, Peterboro', Ont.

5554—Nov. 3—Granting leave to the B.T. Co. to cross the T.H. and B. Ry. at public crossing, Trolley Street and Barton Street, Hamilton, Ont.

5555—Nov. 3—Granting leave to the G.T.P. Telegraph Co. to erect, place, and maintain its wires across the track of the Pheasant Hills Branch C.P.R. at Nokomis, Sask.

5556—Nov. 3—Authorizing the G.T.R. to operate its trains over the crossing of the Toronto Railway Company at Front Street, Toronto, Ontario.

5557 to 5563 Inc.—Oct. 30—Granting leave to the British Columbia Telephone Company to cross the C.P.R. at various points on its Cascades Section in the Province of British Columbia.

5564—Nov. 3—Approving Standard Passenger Tariff of the O. & N.Y. Railway, No. C.R.C. 131, covering rates over bridge section of the St. Lawrence River Bridge, Cornwall Ont.

5565—Nov. 3—Authorizing the Municipal Corporation Town of Welland, Ont., to lay sewers across the G.T.R. at various points in the town of Welland, Ont.