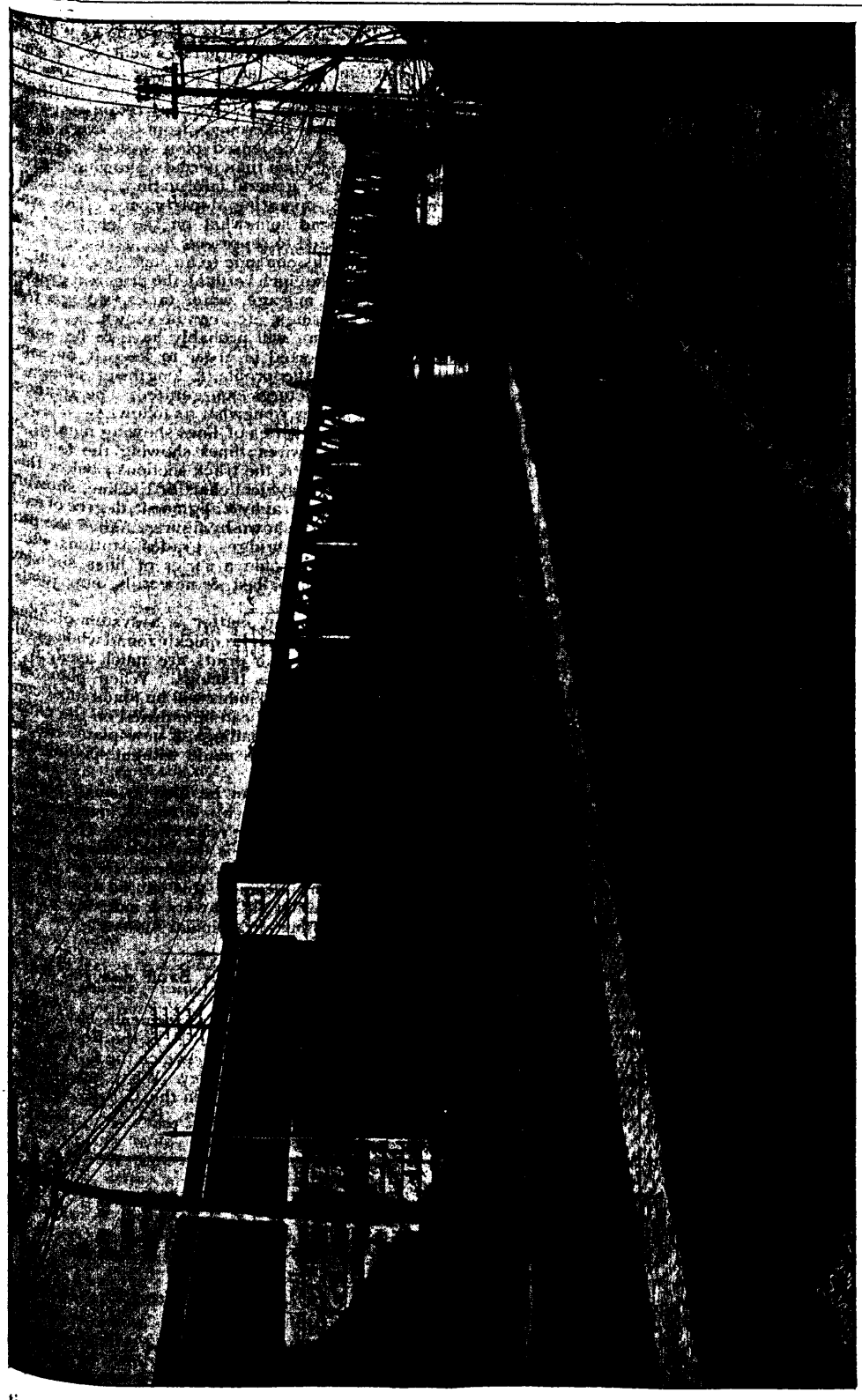

KING STREET SUBWAY, TORONTO, LOOKING WEST.

tive have said that in place of a railway to carry ships & their cargoes bodily from one bay to the other, a canal would be far cheaper & more profitable in every way than the railway project. It has been pointed out that a river already parallels the railway, & it would only require deepening to enable it to offer a splendid waterway across the Isthmus of Chignecto. It is claimed that a railway constructed on the lines laid down by the old company, whilst practical, from an engineer's point of view, could not be operated cheaply enough to make it necessary for vessels to employ its aid, whereas a canal would be a natural pathway, inexpensive to maintain & of immense value in the development of interprovincial trade. It seems certain that in time some proposition of the latter description will make its way by the process of natural selection & as the result of conditions which are now felt strongly by the coastwise trade of the Maritime Provinces.—Maritime Merchant.

On the new branch of the Northern Pacific up the Clearwater valley the water tanks will be of the submerged type. These tanks are the invention of Chief Engineer McHenry. Water is taken into the tender by admitting steam into a closed well, through a temporary connection with the locomotive, which forces the water out of the well through another pipe.

Engineering Records in the Railway Operating Department.

By C. E. Cartwright, M. Can. Soc. C. E.

The following paper was read before the Canadian Society of Civil Engineers recently :

When, on completion of construction, a railway is turned over to the operating department, it is generally found that the maps, profiles & other records are far less complete than generally supposed. Even with very careful location, the unevenness of the ground, obstructions from trees & changes made during construction, introduce inaccuracies in distance, breaks in chainage caused by changes of alignment, increase or decrease length of line, & are difficult to keep account of. The profiles also have been made with differing datum & changes of grade made at the last moment are often unrecorded. Sidetracks, buildings, water tanks, &c., are seldom definitely located until construction is nearly complete, & not generally until after the general construction work is finished. Altogether, even at the best, the plans & records are more or less deficient.

Sometimes, also, a railway company acquires an old line from another company, or several short lines are amalgamated ; in these cases it is often found that the records are almost altogether lacking, or are in a very incomplete & unreliable condition. Often the engineer in charge will find that he will have to get along the best way he can with the information available, making special surveys as the necessity arises ; these surveys will be made in a hurry for some special purpose, & will be of little or uncertain value for other uses. Surveys of this kind accumulate, made by different parties for different purposes, with varying degrees of accuracy, & after a time it is seldom known how much reliance can be placed in them ; in consequence it is often necessary to revisit the ground & make new surveys ; a great amount of work has to be done, which would have been unnecessary if reliable plans existed. The remedy for this state of affairs is a complete re-survey of the whole road, especially when it is an important road in a thickly settled country, with towns & villages at short intervals.

On a railway in the Central States, with which the writer was employed, it was decided to make a complete re-survey, the line having been recently acquired from another company ; the few existing plans were incomplete & disconnected, a great amount of uncertainty existed as to the company's title to right of way & other property, & it was also proposed to expend a considerable sum in improving alignment & grades, accurate plans & profiles being needed for this purpose.

The railway was first carefully measured from end to end, starting with zero at one terminus ; a 100 ft. steel tape was used ; each hundred-foot station was marked with white paint on the inside of the rail ; every tenth station was referenced by an oak stake, 3 ins. square, set 7½ ft. from the centre line ; stakes were also set at every mile, to be afterwards replaced by standard mile posts. After the measurement was completed, the line was gone over by the transit party. This party made a traverse of the line, not stopping to run tangents to intersection & put in curves, simply