it may be opportune to say that a turnout consists of the combination of a pair of points or switches, with necessary connections for operation and support, a frog and guard rails. Turnouts are either right or left hand, depending on the direction in which they transfer the traffic when running towards the switch point. This point must be borne in mind when spring rail frogs are used, but is not so important with rigid frogs.

At the crossing of 2 tracks, 4 frogs are required. The manner of constructing them depends largely upon the angle at which the tracks meet and on the traffic to which they are subject. In a general way 4 styles of crossing construction are recognized. 1, For crossings of small angles—15° or less—the usual way is to use 4 frogs connected up with intermediate rails. 2, For angles 80° and less, the middle frogs are replaced by movable point frogs, operated mechanically from the signal tower. 3, For angles between 15° and 35° the crossing is made in 4 sections, the end and middle frogs meeting at joints all round. 4, For angles 35° and up the rails on the tracks subjected to heaviest traffic are continuous throughout the length of the crossing and grooves are slotted out to allow flangeway through them. These four styles are again subdivided into guarded and fourth rail types, depending on traffic conditions.

The advantage of using manganese steel for crossings is at once apparent, as the numerous bolts used in crossings will stretch in service, allowing the crossing to loosen, and unless track men are continually tightening the bolts the crossing will quickly wear out. A manganese crossing should not be used as a wear economic for angles of from about 75° to 90°, as between these angles it is not a question of wear, but of metal fatigue. On checking over failures of diamonds, I have found that after about 1,500,000 wheel impacts a manganese crossing is about ready to scrap, and the results obtained are no better than a built up crossing. For angles below 75° manganese can be used economically, and the smaller the angle the longer will be the life of the crossing.

In designing manganese castings, it is advisable to have the sections checked by those familiar with the action of the metal, and numerous failures could be avoided by following these few suggestions: Make the section of uniform thickness. Avoid abrupt changes in thickness. Use parallel ribs, instead of transverse. Arrange ribs to offer the least resistance to shrinkage. Shrinkage of managnese castings will go about ⅜ in. per ft. A bead along the thin edge of casting will prevent cracks and makes for sound castings.

The foregoing paper was read before the Engineering Institute of Canada's Montreal branch recently.

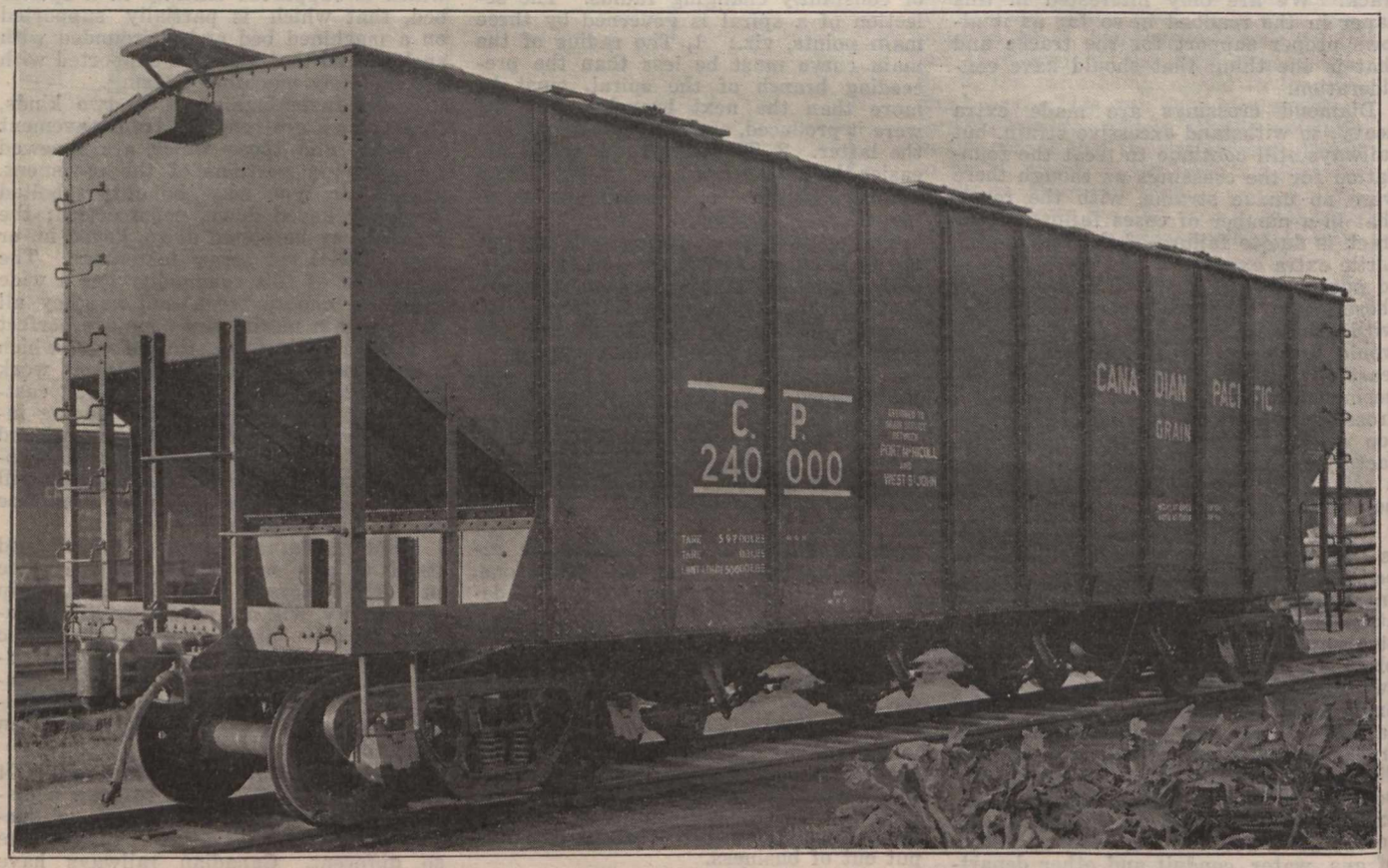
British Railway Rates—London, Eng., cablegram, Dec. 29.—British shippers are to pay the increased cost of railway labor. The new freight rates, which go into effect Jan. 15, show advances from 25 to 100%. Thus the commerce of the country, struggling to revive, foots the bill of higher wages and enhanced cost of material. The revised rates, the government hopes, will put the railways upon a paying basis.

The King Edward Construction Co., which has been formed to build an addition to the King Edward Hotel, Toronto, offered recently for subscription, $1,350,000 guaranteed 7% cumulative redeemable preference shares. The C.P.R. Co. subscribed for $75,000.

C.P.R. Steel, Hopper, 75-Ton Grain Car.

The car illustrated on this page was built recently at the C.P.R. Angus shops, Montreal, to determine, by actual service test, the net advantages to be obtained from a grain tight, self clearing, car of maximum tonnage capacity, as compared with standard box cars of ordinary capacity.

The basis of the design for tonnage is 4 M.C.B. axles, having 6 x 11 in. journals. The length was determined by the distance, center to center, of unloading hoppers in the modern elevators at Montreal and West St. John, N.B., there is one elevator having hopper centers 48ft. The height was determined by the actual cubic space required to contain the full load of wheat, plus an allowance of .at least 12 in. on top to permit of full load being placed in the car without trimming.



Steel Hopper Grain Car, 75 tons capacity, Canadian Railway.

The car is all steel, with the exception of the running board and the ridge on top of the center sill. The general design is practically the same as commonly used for coal cars of equal capacity, except that this car is built with a steel roof. The roof is provided with 3 hatch openings on each side of the running board. The hoppers are arranged 4 on each side of the center sill. The hopper openings are purposely made relatively small, and the frame and slides are machined and carefully fitted. The slides are opened and closed by a rack and pinion arrangement. The slides are locked by a sealing pin passing through the slide and hopper frame. The trucks are Vulcan type, built to U.S.R.A. dimensions.

The car, having given satisfactory performance on its initial trip between Port McNicoll, Ont., and Montreal, has been placed in regular service between the