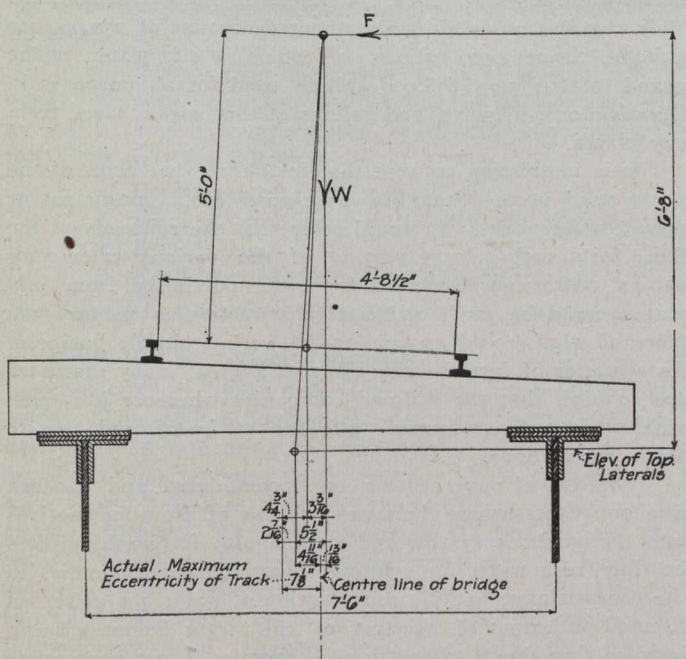
ment, neither the vertical direct load of a stationary train, nor the direction of the resultant force of a train at high speed, pass through the centre line of track, and these conditions are all taken care of in the calculations. Mr. Baldwin also finds the centre of gravity of the segment, and uses it as the effective position of the centre of the track throughout the length of the span for deck girders. He then arrives at the effective eccentricity for either a fast or slow moving train. The worst condition is used in the calculations, and both girders are made the same section. The extra load which is figured to come on one of the main girders is given as a percentage of the applied load. It is used in the stresses



Length of Chord = Overall length of Girder = 62'-0"
Arc = 62·06 ft. Radius 406·424 ft.
½ Versine = 7/8" Elevation of Outer Rail = 3"
C.G. of Arc from vertex $\frac{62\cdot06}{62\cdot00} \times 406\cdot424 \times 12 = 4\frac{3}{4}$"
Required Eccentricity for Equalized Stresses, train standing $3\frac{3}{16}" + 4\frac{3}{4}" = 7\frac{15}{16}"$
Velocity of Train 30 feet per second
F = ·0688 W Couple due to F = ·0688 W x 80" = 5·504 W
Eccentricity, due to F = −5½"
Required Eccentricity, train moving $= 7\frac{15}{16}" - 5\frac{1}{2}" = 2\frac{7}{16}"$
Actual Eccentricity = 7/8"
Effective Eccentricity, train moving $4\frac{11}{16}"$
Effective Eccentricity, train standing $\frac{15}{16}"$
Train moving, outer girder has excess $4\frac{11}{16}/90 \times W = 10{\cdot}42\% \frac{W}{2}$
Train standing, inner girder has excess $\frac{15}{16}/90 \times W = 1{\cdot}8\% \frac{W}{2}$

Maximum Bending Moments.			
	Live Load	1,950,000	3,169,000
	Impact	1,219,000	
	Eccentricity	10·42 %	330,000
	Dead Load		458,000
	Total		3,957,000

Assumed Loading L.L. Coopers E60
D.L. 1017 lbs. per lin. ft. of Girder

Fig. 9.—Distribution of Loads for Bridges on Curves.

in connection with the live load plus the impact. The above method of determining the centrifugal force stresses, combines all the assumptions made by other engineers, and suggests new ideas which merit consideration. It was the first time, so far as the writer knows, that it had ever been used and it is the more interesting on that account.

The same theory applies in the calculations of the floor system and girders of through spans, with the exception that the position of the centre line of the track at the various panels is used in the calculations, and it is not necessary to assume an effective position of the track over the length of the bridge. In through bridges, too, the stringers should be made to follow the line of track as near as practicable.

When the track is on a spiral, the degree of curvature at the centre of the span is considered constant over the whole length of the bridge in figuring the centrifugal force.

The traction stresses are caused by the momentum of trains either starting or stopping, the amount being dependent upon the coefficient of friction between the wheels and the rails, which is usually considered .20. This force is not considered in connection with the main girders at all, but it does affect the lateral bracing in through plate girder spans. The best construction, to provide for this force, is to connect the bottom of the stringers to the lateral angles at the points where they cross, and to add a diaphragm between the stringers at these points, which will take the resultant of the stresses in laterals and stringers. This diaphragm will also act as a lateral support for the top flange of the stringers. The reason for the above detail is to prevent the traction from producing any horizontal bending moment in the floor beams.

NEW RECORD FOR GREAT LAKES.

A contract has been awarded by Montreal interests to the Western Drydock and Shipbuilding Company at Port Arthur for constructing the largest freight-carrying vessel ever built on the Great Lakes. It will have a capacity of 450,000 bushels of grain. Its length will be 625 feet; width, 59 feet; depth, 32 feet, with bulk-freight pattern, engines of latest type and of sufficient power to lead in speed, and Isherwood construction system, with five bulkheads, thus dividing the ship into six compartments. Work will commence this month and the vessel is to be ready for the 1914 season, operating between Port Arthur, Fort William and Collingwood, Ontario.

VANCOUVER HARBOR PROPOSAL.

The report of inspecting engineers on the feasibility of converting the harbor of Greater Vancouver into a strategic war base has been favorably considered by the British Admiralty in conjunction with representatives of the Canadian Government, according to the Manchester Guardian. The great increase in general shipping which is expected to take place at Vancouver renders it desirable that adequate measures for its protection should be taken without undue loss of time, and it is understood that when the permanent naval policy of Canada is announced a statement will also be made on the Pacific Coast defences of the country. There is already a naval base at Esquimalt, to the south of Vancouver Island, which possesses an admirable harbor with large docks and fortifications. The Government also have under consideration the question of establishing a naval base at Port Nelson, which is to be the tide-water terminus of the Hudson Bay Railway, a project that is to open up direct communication between Liverpool and the northwest of Canada, and to effect a saving in distance of 1,800 miles over the existing routes via Montreal, St. John and New York. Owing to this great natural advantage and to the fear, lately emphasized by the Canadian Minister of Public Works, that grain passing through the warm, humid climate of Panama would be in danger of heating, it is expected that vessels trading by the Hudson Bay route will have an immense advantage over those using the Panama Canal, and that in consequence the shipping interests of Port Nelson will rapidly develop.