

Fig. 1.—Swing Bridge Across the Calumet River, Chicago—C., L. S. & E. Ry.

to us in which an advance in the rates was contemplated, but we have declined to approve those tariffs, as we were impressed that such demands were unreasonable. We regret to report that we have in several cases ascertained that higher rates on some classes have been charged than those approved by the board. We have in such cases directed that the approved rates be restored and that no deviation from the rates on file in our office will be allowed if an advance is made. We believe that corporations should share alike with individuals the burdens of the times. In order that the ruling of the Commissioners in this matter should be made known to all the carriers, we have issued circulars of instruction to the freight department of all railroads and admonished them against future violation of law.

**Double Track Swing Bridge Across the Calumet River—Chicago, Lake Shore & Eastern Railway.**

The bridge shown by the accompanying illustrations crosses the Calumet River at South Chicago and was built by the Chicago, Lake Shore & Eastern Railway Company, whose road runs through the South Works of the Illinois Steel company, and over whose tracks all deliveries to the latter Company are made. Before this bridge was built, access to these works was difficult and dangerous, owing to the network of tracks and the congested condition of the streets crossed. These tracks were used by a traffic often reaching 2,000 cars a day. A continual decrease in the earnings of the railroad rendered necessary the most economical handling of freight possible, for which reason the President, Mr. W. G. Brimson, and the Board of Directors, decided to make a poing yard on the line of the road in Indiana, about 10 miles distant. This yard is now under construction, and the bridge illustrated was built on the new line.

The Calumet River is 329 ft. wide at this point, and the War Department requires a channel 200 ft. wide and 20 ft. deep. The bridge consists of two approach girder spans and one swing span 246 ft. 6 in. long, center to center of end bearings, permitting two channels 100 ft. wide in the clear on each side of the center pier.

The substructure was built by Messrs. Morris & Wait, general bridge contractors, of St. Paul and Chicago, and consists of first-class masonry laid in Alpha Portland cement. The open caisson method was used in building the piers which rest on piles cut off 16 ft. below Chicago City datum, which is an arbitrary point of zero elevation established by the Trustees of the Illinois and Michigan Canal as the low water mark of Lake Michigan in 1847. The bottom of the caissons consisted of three courses of 12 in. by 12 in. hemlock timber thoroughly drift-bolted and caulked. Masonry constructed of stone obtained from Joliet, Ill., was used up to an elevation of 2 ft. below datum and from this point to 3.5 ft. above datum Portland sandstone quarried at Vigo, Ind., was substituted. The center pier is 39 ft. in diameter

and the coping 40 ft. in diameter with a 6 in. chisel draft.

The superstructure was built by the Edge Moor Bridge Works, Wilmington, Del. Soft steel is used throughout, except for the eyebars and pins, which are of medium steel. The swing bridge was proportioned as a continuous girder, having four points of support, but incapable of transferring sheer across the center panel while the moving load consisted of 4,320 lbs. per lineal foot of track, headed by two 100.5 ton locomotives, this weight including the tenders. These trainloads are actually attained while the locomotives are sufficiently heavy to do the work required of them, as the grades are light.

The swing bridge consists of eight panels, each 27 ft. 2 1/2 in. long, and one center panel 29 ft. long. The trusses are 29 ft. apart, center to center, and 28 ft., 30 ft. and 40 ft. high, center to center, while the steel stringers are spaced 4 ft. each side of the center line of the track. The trusses are carried by a square framework of plate girders 29 ft. long each, which in turn are supported on eight girders radiating from a common center to a circular drum 36 ft. in diameter. In this way a little over one eighth of the load concentrated upon each radial girder is transmitted to the center, and the remainder of the load is transmitted to the drum. The live ring consists of 78 cast-steel wheels, 14 in. in diameter, with 7-in. faces. The ends of the swing bridge are supported, when closed, by wedges operated from the engine-house.

The bridge is operated by an 8 1/2 in. x 12 in. double-reversible engine furnished by the Vulcan Iron Works, Chicago, who also furnished the boiler and all machinery on the engine-house floor.

The engine turns the bridge swinging shafts through a geared equalizer. These in turn drive four pinions meshing with the circular rack below through two other equalizers attached to the circular girder. In this way the stress is so distributed as to reduce the liability of

accident to a minimum. Steel castings are used throughout. The bridge has been in use nearly one year and is operating satisfactorily, on an average of 150 times each day.

This bridge was designed and constructed under the direction of Mr. W. L. Stebbings, Civil and Consulting Engineer, Monadnock Block, Chicago.

**Foreign Railroad Notes.**

Prussia and the Grand Duchy of Hesse have joined in a sort of copartnership to purchase and work the Lewis of Hesse railroad, which has about 360 miles of road in Hesse, 90 in Prussia, and a little in two other German states. Hesse is too small to work economically a railroad system of its own. The road will be worked by a joint management at Mayence, under the Prussian Ministry of Public Works, and as part of the Prussian State Railroad system, but the rights of Hesse are very carefully provided for, and it will have exclusive property in the lines on its own territory, though the income will be divided in accordance with a special contract.

In the last year reported the Prussian State Railroads had in their service 107,734 regular appointed employees and 179,428 "laborers," the latter engaged and dismissed at will like our employees. The total of both kinds was at the rate of 17.1 men per mile of road worked, which is

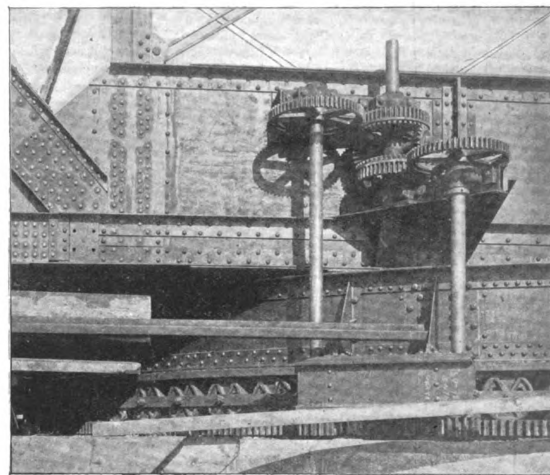


Fig. 3.—Operating Machinery—C., L. S. & E. Swing Bridge.

about 3 1/2 times the number of employees per mile in this country. For the accommodation of this force the administration had provided 28,400 dwellings and had made loans to certain building associations of employees which had built 281 houses, containing 1,254 dwellings. It provides free medical attendance, which in that year was given by 1,577 different physicians to about 90,000 persons. It had provided 271 bathing establishments and given \$15,000 in gratuities to laborers of 25, 35 and 50 years' service. The great benevolent institutions connected with the state railroads, however, were these:

- Pension fund for regular employees, the payments out of which during the year amounted to \$2,488,838.
- Laborers' sick fund, with 196,075 members (2,629 of them women), which disbursed \$1,149,925.
- Laborers' pension fund, dispensing \$304,346.
- Accident insurance, which paid out \$683,807.

In the year ending with March, 1896, the number of employees of all classes on the German railroads was 431,816, which was at the rate of one out of 120 of the entire population, and of 15 1/2 per mile of railroad, or just three times the number per mile in this country in 1883. The average yearly pay per employee was \$368 in Germany, while 10 years before it had been but \$369. The average in this country, judging by the cases reported for single railroads or states, is not quite twice as great as the German average.

Since 1885 the length of the narrow-gauge railroads in the German Empire subject to imperial supervision has increased from 238 to 806 miles; but there is a considerable number of such roads, especially among those built recently, not required to report. The average cost of the roads reporting has been \$22,406 per mile. Their net earnings averaged 3.76 per cent. on their cost.

The car ferries, which were for a long time peculiar to this country, are now commoner in Denmark than in any other country in the world, the various arms of the sea which cut up that country offering obstacles to through railroad lines. There are no less than 15 such ferries there now, all state property, and worked as part of the state railroad system. They transfer more than 100,000 cars yearly. The largest ferryboats carry 16 to 18 cars each, the small ones only six. They were first introduced in 1872.

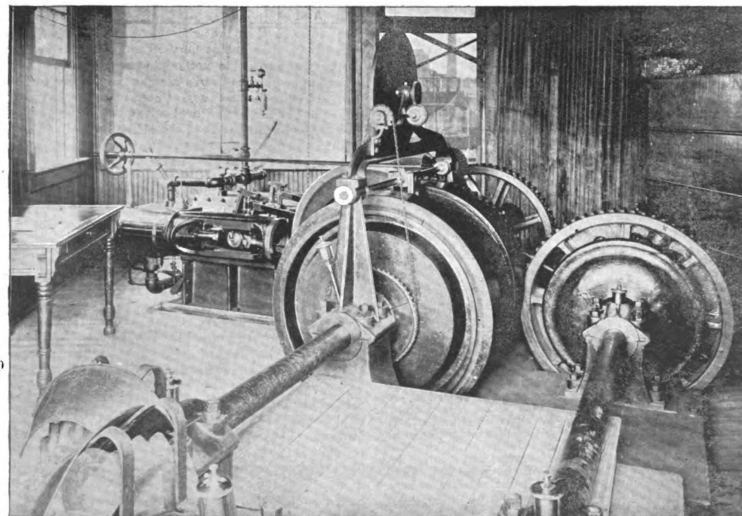


Fig. 2.—Interior View of Engine-House—C., L. S. & E. Swing Bridge.