THE PHOENIX BRIDGE COMPANY.

the Hudson, looks down upon this bridge as it carries the railway line over the creek and adjacent valley.

As the plate shows, the bridge is a double-track deck structure in eight spans,—six of 170 feet, and one each of 199 and 106 feet, with a total length of 1250 feet. The depth of the long spans is 26 feet, and panel length 16 feet 8 inches, while the depth and panel length of the short spans are 21 and 171 feet respectively. The trusses are 20 feet apart centres in all the spans, and the track is 85 feet above the water. Like all constructions for the New York, West Shore and Buffalo Railway, it was required to meet in all respects specifications based on the demands of the most advanced bridge practice of the present day. By the use of an independent floor system, with transverse floor-beams resting at the upper chord-panel points, a length of panel could be selected which would be productive of economy in trusses, and leave all stresses well defined.

As the two trusses are 20 feet apart centres, with depths of 21 and 26 feet, excellent proportions for effective transverse bracing are secured. The economy of oblique endposts is attained by using vertical columns at the feet of the end-posts, which carry a panel moving load.

This bridge meets the requirements of a heavy and rapidly moving traffic, with a high degree of constructive economy.

PLATE V.

HARLEM RIVER BRIDGE.

The graceful outline of this drawbridge indicates that the demands of the location involved not only considerations of structural economy, but those of an aesthetic character as well. It is a double-track structure, crossing the Harlem River at Eighth Avenue, New York City, and connects the West Side and Yonkers Railway with the Eighth Avenue Elevated Road.

With a centre depth of 40 feet, and 20 feet at the end, the intermediate depths are so taken as to secure both beauty of outline and a proper regard for economic considerations. In fact, the varying inclination of the upper chord not only produces an agreeable impression on the eye, but is in reality a true expression of a correct distribution of material. No structure could be more admirably adapted to the complex requirements of the location.

There are sixteen panels of 17 feet 51 inches, and one of 18 feet 5 inches.

The trusses are 26 feet apart centres, and carried at the pivot pier by a wholly rimbearing turn-table fitted with the proper appliances for steam as the motive power. The diameter of the drum is 28 feet 6 inches, and turns on forty-two 24-inch rollers. Although a single system only of triangulation is used, by proper trussing the entire weight of the bridge and its load is equally divided between eight points of support on the drum, equidistant from each other.

The locking-gear and turning machinery, with engine and boiler, are of the most approved character. They are located in the turn-table, and operate with great expedition and efficiency.

PLATE VI.

ALBANY AND GREENBUSH BRIDGE.

The Albany and Greenbush bridge shown on this plate is the second one built by this Company across the Hudson River at Albany; it connects the village of Greenbush with the city of Albany at a point just south of the freight station of the A. & S. Division of the Delaware and Hudson Canal Company.

The necessities of this particular case are a combination of those usually found in separate structures; the difficulties presented, therefore, were of a correspondingly complicated character. A roadway with sidewalk on either side is carried along the lower chord, while a double-track railway is placed 19 feet above the lower chord-pins. The structure, therefore, obliged to do double duty, and, with the length of spans required, it becomes unusually heavy.

The trusses are 28 feet apart centres, and the entire structure is composed of four “through” fixed spans of 150 and 250 feet in length, combined with a “through” draw span 400 feet long, and three plate-girders at each end of 36-foot span, making the total length 1430 feet. The depth of the 250-foot spans is 45 feet, and that of the 150-foot spans 22 feet. The panel length is 16 feet 7 inches for the fixed spans, and 18 feet 3 inches for the draw, except at the drum, where there are two panels of 16 feet each.

The problem of placing a double-track railway platform midway of the depth of the long span trusses and draw presented some interesting points of design not usually encountered in bridge construction. All vertical compression members in the bridge are of the ordinary latticed channel species above the railway platform, but below the latter eye-beams take the place of the latticing, and furnish points of support at their upper extremities for the railway floor-beams. The ends posts of the 250-foot spans are eight segment Phoenix columns of the heaviest section ever rolled; they possess a cross-sectional area of 104 square inches.

The draw span has a depth of 28 feet at the ends and 59 feet at the centre. The resulting inclination of the chords produces considerable relief of stress in the web members. The four main posts at the pivot pier, with the double cancellation, made it necessary to consider each main truss as composed of two separate trusses, each continuous in itself, with one system of triangulation and two points of support at the centre.

The weight of the trusses and superincumbent load is distributed at ten points on the drum of the combined centre and rim-bearing turn-table.

This drum has a diameter of 34 feet, and depth of 42 inches.

The entire mass of drawbridge and turn-table weighs about 1000 tons, and is turned by steam in less than two minutes.

PLATES VII. AND VIII.

KINZUA VIADUCT.

The structure from which the views in these two plates were taken has attained celebrity from its great height, and stands as one of the most remarkable examples of modern construction. It carries the single track of the New York, Lake Erie and Western Coal and Railroad Company across the Kinzua Valley, in Bradford County, Pa. The superstructure is composed of latticed deck-trusses, 10 feet apart centres, and alternately of 61- and 381-foot spans. The towers vary in height from 20 to 280 feet. To this latter height is to be added the depth of the latticed trusses and height of masonry, making a total elevation of 301 feet above the surface of the water in Kinzua Creek.

The towers are each composed of Phoenix columns for the main compression members and transverse struts, with longitudinal struts of four latticed angles and diagonal