of the structure. The curved upper outline of the trusses thus combines the excellencies of an economic system with a remarkably graceful appearance.

As the bridge carries a double-track railway, with two trusses 26 feet apart between centres, it is readily seen to be a very heavy structure. The end and centre depths (20 and 40 feet respectively) are so taken in connection with the panel length of 17 feet 5½ inches, however, that the greatest economy is attained.

The turn-table is wholly rim bearing, and the drum, 28 feet 2 inches in diameter, is carried on forty-two 24-inch rollers.

This type of structure is peculiarly adapted to the purpose of securing that degree of economy in construction and ease and stability in turning which are so essential in a long and heavy drawbridge.

A further description of this bridge will be found on another page.

**DESIGN "L"**

The most economical method of carrying a railway across a wide gorge in which firm pier foundations are easily secured at all points, is illustrated in a remarkable manner by this structure. The total width of gorge is divided into twenty-one open spans and twenty tower spans, the former of about 60 feet, and the latter of about 40 feet. The greatest height is about 300 feet.

Each of the towers are thoroughly braced longitudinally and transversely in order to resist not only the wind pressure, which acts with great severity on a structure of such extreme height, but also the thrust and vibrations caused by the moving loads.

The lateral pressure of the wind against a passing train at great elevations produces an overturning effect of unusual magnitude, which in this case has been amply provided for by the inclination of the columns and the anchorage at their feet.

The wind pressure on the structure and its train-load was taken at 30 pounds per square foot, and 50 pounds per square foot for the unloaded structure. Subsequent tests on large surfaces, at the site of the Forth Bridge, have demonstrated that these values give abundant security against wind stresses.

The towers are divided into stories of about 33 feet each, at the extremities of which the column sections are joined by interior wrought-iron sleeves, forming a complete cylinder. By means of these cylindrical sleeves each column is made absolutely continuous from the top of the tower to the masonry at its base.

The lattice-girders forming the superstructures are of the deck variety and 10 feet apart centres, but possess no special characteristics other than being remarkably substantial structures.

**DESIGN "J"**

This design shows a highway bridge built by us for the Pottstown Bridge Company, of Pottstown, Pa., and the structure crosses the Schuylkill River at that place. There are two spans of 179 feet each from centre to centre of end-piers. The trusses are 21 feet 4 inches apart centres, with two sidewalks about 5 feet each in the clear. This bridge is typical of our usual highway construction.

It will be observed that the marked advantages of long panels and a single system of triangulation are secured by the use of a system of intermediate transverse iron beams, one resting at the centre of each panel on a pair of main longitudinal iron stringers. The latter are supported on the main floor-beams a short distance from the points of support of the latter, thus adding very little to their bending movements. 6-inch eye-beams and the two main stringers just mentioned form the joists which carry the floor-plank. Two lines of light timber joists, one outside of each main stringer, receive the spikes which hold the plank in place.

The sidewalk railing acts as a truss, with a span of one panel length, for half the sidewalk and its load. The sidewalk plank are spiked to the top of the guard-timber as shown; in this manner the footwalk is raised an agreeable distance above the roadway.

By this method of construction a permanent, light, and economical iron-floor system is obtained, the only inflammable portion being the necessary plank floor.

Efficient systems of upper and lower lateral and transverse bracing give in themselves complete stability against moving-load vibrations and the wind, though they are very materially reinforced by our system of floor construction.