ted, namely, over the river Aire at Ferry Bridge. Although the similarity is not so great with this as with the Victoria tube, yet I believe it is sufficiently so to form another proof that the advantage is in favor of the solid side.

As before:

NEWARK-DYKE BRIDGE.

Span, 240 feet, 6 inches; weight, 292 tons.

FERRY BRIDGE.

Span, 225 feet; weight 235 tons.

The difference between these weights is more than sufficient to compensate for the difference of span; besides which, in the Ferry bridge, made according to my designs and instructions, I was lavish in the thickness of the side-plates, and the bearings which are included in the above weight were stiffened by massive pillars of cast iron.

For a further example, let me compare the Boyne Trellis bridge (held by some to be the most economical) with the present Victoria tubes.

The Boyne Bridge has three spans, the centre one being 264 feet, and the height is 22½ feet. It is constructed for a double line of way, and is 24 feet wide. The total load, including the beam itself, the rolling load at two tons per foot, and platform rails, &c., amount to 980 tons, uniformly distributed.

The bridge is constructed upon the principle of "continuous beams," a term which signifies that it is not allowed to take a natural defection due to its span; but being tied over the piers to the other girders, the effective central span is shortened to 174 feet; in fact, this *principle* changes the three spans into five spans. Now the effective area given for compression in this centre span is 113½ inches, which gives a strain for the 174 feet span of nearly 6 tons to the inch in comparison.

The Victoria tubes are so dissimilar in form and circumstances, to the Boyne bridge, that it is a troublesome matter to reduce the two to a comparative state. However, the Victoria tubes are known to be 275 tons in weight—242 feet in span, and of 19 feet average depth, the strain not being more than 4 tons per inch for compression, with a uniform load of 514 tons, which includes its own weight, sleepers and rails and a rolling load of one ton per foot.

The Victoria Bridge has not been designed upon the principle of continuous beams for practical reasons, including the circumstance of the steep gradient, on each side of the centre span, and the great disturbance which would be caused by the accumulated expansion and contraction, of such a continuous system of iron-work, in a climate where the extremes of temperature are so widely apart; otherwise the principle alluded to, was first developed in tubular beams, namely in the Britannia bridge.

But since we are only now discussing the merits of the sides, let the Boyne bridge be supposed to have sufficient area in its top to resist 4 tons per inch, (the proper practical strain) and let the spans be not continuous; it will be found by calculation that the area required at top will be 364 inches, instead of 113½ inches, and the weight of the span would be found by calculation to come out little short of 600 tons; whereas it is now 386 tons; and if we suppose the Victoria tube to carry a double line of *way* and 24 feet wide with a depth of 22½ feet, even if we double the size in quantity, the whole amount of weight will be certainly very little more than 500 tons for 242 feet span.

It will be necessary to conclude my remarks, with some further observations relative to the comparisons under our notice, which are of vital importance in consid-