and short verticals when the track is to be at the bottom.

Fig. 26, Pl. 5, shews this arrangement, one half with the track at the top, and the other with the track at the bottom. When the track is below, small suspension chains will be required to sustain the weight of the cylinders between the main bearing points, as shewn in the figure. Or there may be independent trusses, or bridges extending from one of the main bearing points to another.

I have not perfected the details of such an arrangement, but have so far considered the subject as to be satisfied of the feasibility of it, even for spans of 400 or 500 feet, not to say more. This plan admits of using wire cables to advantage.

It has been proposed by an eminent English engineer, (Mr. Stevenson,) to construct a tubular, or box bridge over the Menai Straights, out of plates or sheets of wrought iron about 1 inch thick; the box to be 15 feet wide, 30 feet high, and 450 feet long, and weighing upwards of 1,500,000 lbs, and it is doubted, even by the projector, whether this will be sufficient for the purpose.

Now, I have estimated, with considerable care, the probable amount of iron that would be required for a bridge of 450 feet on the plan shewn in Figure 26. In this estimate I have reckoned the safe load of wrought iron at 12,000 lbs. to the square inch, which is about 15,000 lbs. for that portion which sustains the dead weight of the structure, and 10,000 for that which supports the moveable load, instead of 10,000 lbs. for the whole, as I have adopted the rule of estimating for rail road bridges of ordinary lengths, for reasons to be explained hereafter. This course seems warrantable in the present case, since, besides that so large a portion of the strength of the material goes to support the dead weight, whatever effects may be due to the motion of the additional load, will be proportionately much less, acting on such a mass of material,