sion bridges, using sometimes wire cables, and sometimes chains formed by connecting bars of iron. Much longer ones have been constructed in Europe, even two or three times as long as the Schuylkill bridge, some of which have endured, while others have failed.

A serious difficulty in the use of suspension bridges is, the want of fixedness or stability among the parts. The curve of the chains being left to find its own equilibrium, yields to every force that tends to disturb that equilibrium, and hence arises an undulatory motion, whenever the bridge is exposed to the passage of heavy loads, or to the action of strong winds, which is frequently attended with disastrous consequences. This quality renders these bridges utterly unfit for rail road purposes, as they are usually constructed. No plan has yet, as I believe, been devised and successfully executed, to obviate the difficulty. Similar obstacles are encountered, to those alluded to in speaking of the feasibility of sustaining the horizontal thrust of truss bridges by the action of abutments and piers.

I have a plan which is believed to be original, and which is certain to obviate the difficulties of undulation, and render the suspension bridge as applicable to rail roads as to common roads. It is not, however, to be expected, that a bridge can be built that will sustain a rail road train of hundreds of tons, at so small an expense as will suffice for a common road bridge, seldom required to support more than a few thousand pounds.

LXV. This is my plan. Divide the stretch into a convenient number of parts, of 25 or 50 feet, or any convenient length; as by the points b.c.d.e.f., Fig. D., Pl. 5. At each of these points is to be provided support for a weight, say of one ton to each foot between each two of these points, in addition to the weight of a proportionate part of the structure. The former of these weights may be represented by \( w \), and the latter by \( w' \), and their sum by \( W \).