siderable length, although all the bridges built upon this plan, were troublesome and expensive.

Thus, this method of combining the arch and truss, like all previous attempts, proved a failure, and even if a perfect adjustment of the two systems were possible, in this particular case at least, the structure must have failed, in consequence of the great disproportion existing between the amount of material subjected to a crushing strain, and the imperfect application of the material in the lower chord, rendering it incapable of resisting the tensile strain thrown upon it by the united action of the arch, upper chord, and braces.

This question of combining the arch and truss, has been thus treated minutely and particularly, for reasons that will be apparent as we proceed in the discussion of this subject. In doing so, facts rather than theory, have been presented, and these facts can be substantiated, by those who will take the trouble to examine the class of structures referred to.

The failure of these bridges caused great alarm to the management, direction was immediately given to support by means of “trestle work,” such as exhibited evidence of failure, until some means could be devised to meet the exigencies of the case. As the locomotives upon this road were generally much heavier than those in use upon roads of a narrower gauge, it seemed doubtful whether the most approved bridge structures upon the latter, would be successful upon this.

At the suggestion of the writer, permission was given him to institute a series of experiments with models, in