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*Communications relating to the Editorial Department should be addressed to the Editor, HENRY T. BOVEY, 31 McTavish Street, Montreal.*

*The Editor does not hold himself responsible for opinions expressed by his correspondents.*

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**1884.**

During the year we have endeavoured to supply our readers with the most recent information in regard to industrial progress and scientific investigation. We have carefully avoided the introduction of theories so abstruse as to be interesting only to the specialist, but have rather tried to present the subject matter in a thoroughly popular form.

During the present year we are expecting a visit from the British Association, among whose members are to be found most of the leading scientific men of the day. As the result of this visit, we may surely anticipate with confidence a large increase of interest in practical and theoretic science throughout the Dominion of Canada. We shall hope to present our readers with accurate resumés of the proceedings of the meetings in Montreal, and purpose to give "in extenso" those papers which may seem of the greatest importance to the general public.

There is one department of this magazine which we would wish to make more of a specialty, and this can only be effectively done by the kind co-operation of those of our readers who may be personally interested in industrial operations. The department is one which we would desire to devote more particularly to a record of the most recent improvements and advances in machinery or in any branch of industry. We shall therefore be much gratified to receive such information from any correspondent.

This would be a most desirable supplement to the information now contained in the valuable PATENT OFFICE RECORD, which is issued with every number of this magazine, and to the illustration of which the greatest care and attention are devoted.

#### ECONOMY IN HIGHWAY BRIDGES.\*

BY PROF. J. A. WADDELL C.E., R.A.S.

(Continued from Last Number.)

Satisfactory investigations as to economy in combination bridges cannot well be made, for the best depths of trusses and best panel lengths will depend upon the ratio which the cost of lumber bears to the cost of iron.

By increasing the depth, the posts and batter braces are made longer and larger, the chords lighter and the diagonal ties heavier or lighter, according as the angle which they make with the vertical recedes from or approaches forty-five degrees. If wood be cheap, and long and large timbers be easily procured, it will be cheaper usually to make the depth tolerably great so as to save iron in the lower chord and diagonal ties, as the angles which the latter make with the vertical usually exceed forty-five degrees in single intersection bridges which are not longer than one hundred feet, and in all ordinary double intersection bridges. In deep trusses the large section required by the batter braces causes to be adopted for the sake of appearance an unnecessarily large section for the top chord. This difficulty can be overcome by using batter brace stiffeners, which permit of the batter braces being figured for half length for bending in the plane of the truss thus, greatly reducing their sectional area: these stiffeners, however, do not add to the beauty of the structure.

The outer and inner timbers of each upper chord should span two panels, therefore the best number of panels will depend upon the price and the supply of long timbers. This last is a very important consideration; for enough time might easily be lost in obtaining long timbers to counter-balance ten times the value of the material saved by using long panels.

The weight of the upper chord castings increases with each dimension of the chord, therefore, for this consideration alone, the section should be as nearly square as possible; but this would give an impracticable section for the batter braces, and might cause the exterior joints of the chord to open, when the empty bridge would be subjected to the maximum wind pressure; this is a point which should always receive attention.

The weights of some portions of combination bridges are not affected by a change of depth, nor those of others by a change in the number of panels, the principal ones that are affected can be seen by examining Table V.

\* A paper presented to the Engineers Club of Philadelphia.