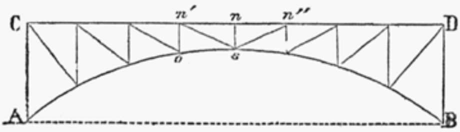
The importance of this fact renders it worthy of a separate consideration.

Effects of counter-bracing upon an arch.

FIG. 68.



Let $A\,s\,B$ represent an arch, supported by resisting abutments at the points A and B, and suppose a heavy uniform load to be distributed along the roadway $C\,D$. The effect of this load is to depress the arch, and the amount of the depression will be greatest in the centre, diminishing towards the abutments, where it is zero. In consequence of this difference of depression, any point (n) near the centre will sink more than (n') nearer the abutment; by this change of figure the diagonal $n'\,s$ is lengthened, and $n\,o$ is shortened. Consequently, if, before the application of the weight, the counter-brace $n'\,s$ was exactly in contact with the joint, it must now be at such a distance as to leave an interval.

When the weight is removed, the arch will return to its original figure, and the interval will be closed; but if wedges be driven into all the intervals, their reaction when pressed will prevent the arch from regaining its figure, and it is forcibly held in the position in which the load placed it, and, as a necessary consequence, continues subject to the same strain as when the weight was upon it. It certainly needs no lengthy explanation to convince any one that, if a spring or a beam be bent, either by a weight or by the resistance of fixed points, if the flexure is constant the strains must be precisely the same, and, consequently, the counter-braced arch is not more strained when the weight is upon it, than it is when that weight is removed, the effect of the weight being simply to relieve the counter-braces, which are not strained when it is acting.

If any should regard the above explanation as unsatisfac-