the structure, it will be found that the angular deformation of the lower boom is greater at the abutment than at other joints, and is sometimes such as to give rise to very serious secondary strains in the boom, when the joint at the abutment is rigid. The cause of this is the sudden reversal or vanishing of the shearing force in crossing the abutment. The same effect would occur in ordinary truss, girders at *middle*, but this is always in that case mitigated by the fact, that the web members in the middle of truss are necessarily almost unstrained from primary stresses where reversal of shearing stress takes place, being designed for maximum shearing at that section from unequal loading; and also because section cannot be reduced to almost nothing, as the stress is, and so the great stiffness (comparatively) of web relieves the booms of local distortion. The difference is that in cantilevers the shearing stress rises to maximum at abutment and then suddenly diminishes. In trusses it diminishes to a minimum at centre and then increases in opposite sense.

To those whose ideas of flexure in girders are founded entirely on the theory of flexure in beams this would not readily occur, for that theory makes the curvature depend solely on the bending moment according to the equation $\delta = \frac{EI}{M}$ This follows from the assumption that all particles of the beam lying in one plane normal to the neutral axis before strain will lie in one normal plane during strain, an assumption which is plausible enough for beams, but can have no relation whatever to the flexure of a hinged framework.

We have seen however in equations (4) and (5) how the deflexions are affected by the shearing stresses, and in that view it need not be surprising that a sudden and great change in the shearing stress causes great local deformation. The remarks apply equally, of course, to continuous girders as to cantilevers, and point to the desirability of hinging the lower boom at the abutment when practicable.

The calculation of deflection in a cantilever may sometimes be facilitated in the following manner. Suppose, by way of illustration, that the stresses on all the members of the bridge in tension are not far from 5 tons per sq. inch of gross section and that the compressional stress range from a to b tons. The form of the bridge would be unaltered by an equal compressionable stress per square inch applied in all members alike, for this would simply make the bridge shrink in all directions alike, a similar result to that produced by fall of temperature. Imagine then an initial compression of five tons per square inch applied to all members. This produces no angular deformation, but only a shrinkage equivalent to altering slightly the scale of the drawing. Now combine this uniform stress with the actual stresses in the bridge and we have the tensional stresses so nearly neutralized, that they may be neglected, and the compressional stresses varying from a + 5 to b + 5 tons per square inch. By this means we are saved the labour of calculating the effect of change of length in half the members of the bridge. If this modification is applied to the graphic method, the resulting diagram will, in its angles, be unaffected by the modification. To have the linear deformations correct, the whole diagram of deformation must be supposed expanded by the amount of the initial strain. If for instance the abutment be d ft below the end of the cantilever the deflection given by diagram or calculation will be in excess to the amount of K-d-t where k is the compression in a foot of length due to a stress of 1 ton per sq. in., and t tons per sq. in. is the initial compression supposed to have been applied.