ultimate load is always much less than the ratio of those loads, and therefore this method of design seems to lead to a satisfactory beam.

Conclusion.

The author does not claim to have put forward any original theory with regard to the strength of reinforced concrete beams. The paper is in the main a record of more exact and more detailed measurements of the actual deformation of concrete beams than have hitherto been made, and it embodies a plea for a simpler treatment of the question from its theoretical side, than has been usual in much of the recent work on the subject. This point has been kept in evidence throughout, and needs little recapitulation here. All existing theories of the strength of reinforced concrete beams are based on the assumption that the deformation of the various layers of the beams follows the same law as that for an ideal homogeneous substance, *i.e.*, that it is proportional to the distance of the layers from the neutral surface. This law is not *absolutely* true for all steel sections. Exact extensometer measurements will indicate slight discrepancies, not of such a magnitude however, as to mar the practical accuracy of calculations based on the law of linear strains. Concrete does not possess the same degree of homogeneity as steel, and the localization of a large proportion of the internal tensile stress of the beam in the isolated steel rods must set up in the surrounding concrete conditions of stress not absolutely determinate, and in any case differing from those of an ideal beam in which the steel is supposed to be distributed through the entire width of beam. The extensometer measurements made at five layers of the beams tested, show that the actual deformation curve may be (*a*) linear, as assumed in the theory (*b*) concave towards the compression side (*c*) concave towards the tension side. In no case can the exact form of the curves be known without actual testing. The concavity, when it appears, is quite distinct. The fundamental assumption of linear deformation is therefore inexact in many cases. Reference to the curves will show that if a straight line be drawn joining the points representing the compression at the outer layer of the concrete, and the extension at the reinforcement line, it would locate a layer of zero strain, *i.e.*, the neutral surface, in a position differing materially from that obtained by considering the five actual observations. This difference is a very appreciable fraction of the effective depth of the beam in many cases, and is quite comparable with, even if it does not exceed, the difference in the position of the neutral surface which results from comparative