The Canadian Society of Civil Engineers

INCORPORATED 1887.

ADVANCE PROOF—*(Subject to revision)*

THE DISTRIBUTION OF STRESS IN CERTAIN TENSION MEMBERS.

By C. Batho, A. M. Can. Soc. C. E.

It is becoming generally recognized among engineers that a correct knowledge of the strength of structural members cannot be obtained by breaking tests alone. This is more especially the case with built up members in which it is probable that, as soon as some part reaches the elastic limit, the distribution of the load may change, so that the breaking load and the appearance of the specimen at fracture may not give any true guide to the action of the parts under working loads.

The most satisfactory way of obtaining a knowledge of the latter is by measuring the actual strain distribution under working loads, or, at any rate, at loads within the elastic limit of the parts, by means of some form of extensometer. Unfortunately, most forms of extensometers are open to many objections for this kind of work; some are inaccurate, others only measure the average strain over a long length, and nearly all are more or less complicated, take up a great deal of space and cannot be used in positions which are difficult of access, such as the interior of a built up column or between two angles. The writer knows of only one form of extensometer which, when proper precautions are taken, may be said to approach the ideal for this purpose. This is the Martens Extensometer, invented by Professor Martens, director of the Königliche Material Prüfungs Anstalt at Grosse Lichtefelde West, Berlin. This instrument is extremely simple in construction, easy to calibrate, and may be used in the most confined positions. (See Fig. 4.) It does not appear to have received the attention it deserves, possibly because of its simplicity, or because of inaccurate results obtained by lack of certain necessary precautions in its use. Under the conditions of the experiments described later, it was found to be capable of accurately estimating the strain over a length of 4" to $\frac{1}{100,000}$". The