whether these multiple photographs are sufficiently random and unposed to serve as a basis for the determination of individual blackout indices.

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Variation of Ground-Levels on Coe Fen, Cambridge

SOME interesting and considerable variations in level were noticed on Coe Fen, Cambridge, after the floods of 1947. A portion of the Fen is used by the Engineering Department, University of Cambridge, for practical exercises in surveying. For this purpose, concrete blocks approximately 1 ft. 0 in. square by 1 ft. 6 in. deep have been sunk into the ground to form the survey stations, the actual station being taken as the centre of a steel tube cast solid with the concrete block and projecting slightly above the surface of the block. These stations are grouped into closed polygons.

Small vertical movements of these blocks are known to take place, and have usually been attributed to frost heave. For this reason, the differences in level between all these blocks are carefully checked before the surveying course begins each summer, so that the accuracy of the students' levelling may be checked.

After the floods of 1947, during which practically the whole of this area was inundated, this check was carried out as usual, and very much larger movements than had hitherto been found were encountered. Unfortunately, the absolute levels of these blocks have never been measured with respect to some fixed and stable bench-mark, so that only their relative movements can be measured. However, between the summers of 1946 and 1947, either the south end of the Fen has lifted, or, more likely, the north end has sunk about 0·2 ft., a considerable amount in a distance of about 2,000 ft. The levels were rechecked in April of this year, and little difference was found from the previous year's figures, only slight movements, of the order of 0·03–0·04 ft., having taken place.

The nature of the ground was investigated in an endeavour to shed some light on the cause of these movements. Borings were made near three of the stations. At all these points, similar conditions were found. After about six feet of gravel, some clay was encountered. This was at first thought to be the thick underlying stratum of gault known to exist in this area. However, further boring revealed that this layer of clay was only about one foot thick, and that below this was a layer of what might best be described as liquid mud, into which the soil borer could be pushed by the weight of the body, without any twisting action being necessary. This liquid mud was about four feet thick. In some of the borings a layer of peaty substance was found at the bottom of the gravel.

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Work-Hardening Under Complex Stresses

PLANE stress yielding was induced in a duralumin plate by expanding a 12-segmented cylindrical collet. The tangential strains in the plate were measured at ten values of radius by means of single-filament Minalpha resistance wire strain gauges[1]. At all loads the measured strains in the unyielded portion of the plate fitted the theoretical solution exactly. The measured values in the yielded zone from the inner radius out to the yield boundary are shown for a typical loading in the figure.

The experiment was designed to check the particular solution in my 1945 theory on post-yield stress-strain compatibility[2], but with the 1947 extension to any severity of deformation[3], since the experimental strains were large at the higher loads. The stress-strain relations for this plane-stress problem in polar co-ordinates (r, θ) are,

$$e_r = \frac{1}{E}(S_r - qS_\theta) + \int_{S_r^0}^{S_r}\left(\frac{1}{P} - \frac{1}{E}\right)dS_r - p\int_{S_\theta^0}^{S_\theta}\left(\frac{1}{P} - \frac{1}{E}\right)dS_\theta, \qquad (1)$$

with the expression for e_θ written by interchange of r and θ and in which e can be nominal strain for small strains or 'true' for any finite magnitudes[3,4], E the elastic modulus, P the inelastic modulus, S stress, q and p elastic and plastic transverse contraction ratios respectively, while superscript 0 denotes the stress operating when the element first yields. The stresses must satisfy the extended Huber – Mises – Hencky yield criterion[2]

$$S_r^2 - S_r S_\theta + S_\theta^2 = Y^2, \qquad (2)$$

the equations of equilibrium and the boundary con-