CORRESPONDENCE
ON PAPERS PUBLISHED IN JANUARY 1947 JOURNAL.

Paper No. 5523.

"Mechanized Quarrying Equipment at Beecroft Limestone Quarry." †

By BERTRAM JEFFRIES GEE, B.Sc., and GEORGE ERNEST WILLIAM KNOWLES, B.Sc., A.M.I.C.E.

Correspondence.

Mr. T. H. Carr inquired whether, in addition to the overhead protection provided for the 2,000-ampere O.B.3 circuit-breaker, earth-leakage protection had been included. Had any difficulties been experienced in obtaining a suitable earth-point? Had any troubles been experienced with the belt conveyor and its associated equipment? Finally, what was the average cost of repairs and maintenance per ton of stone passing through the storage hoppers?

Mr. Gee, and **Mr. J. S. Hayes** (on behalf of the late Mr. Knowles), observed, in reply, that for the protection of the O.B. 3 circuit-breaker, in addition to the overload protection, core balance earth-leakage protection was incorporated. Earth-leakage protection was also provided on circuits where transportable equipment was used in the quarry.

To comply with the Quarries General Regulations, the metal-work of the whole installation was bonded and earthed at the transformer neutral earth-point. The resistance value of the conduit or cable sheathing should not exceed twice the resistance of the cable conductor. The earthing system, which had proved quite effective, consisted of a 2-inch by $\frac{1}{8}$-inch copper tape laid in the cable trench along the route of the low-tension cable, with connexions to rod electrodes. No troubles of any character had been experienced with the belt conveyor and its associated equipment.

The throughput of the plant had been :—

	Tons	Cwt.
1 June–31 July, 1945	15,937	0
Year ended 31 July, 1946	144,839	13
Year ended 31 July, 1947	142,569	2
Total since start-up date	303,345	15

† J. Instn Civ. Engrs, vol. 27 (1946–47), p. 219 (Jan. 1947).

The repair charges for the year ended 31 July, 1946, were :—

		Pence per ton.
Crushing and screening plant :	Labour and materials . .	2·19
Shovel	,, ,, . .	0·25
Dumpers	,, ,, . . .	1·00
Well hole drill	,, ,, . . .	0·28
Total repair charge		3·72

The repair charges were based on tons sold or used, no allowance being made for the tonnage to refuse tip.

Paper 5531.

" The Stress-Distribution in Gravity Dams." †

By O. C. Zienkiewicz, Ph.D., B.Sc.

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Mr. G. M. J. Williams observed that, although there could be no doubt that the relaxation method constituted a valuable item in the tool-chest of the civil engineer for the investigation of stresses in many types of structure, it was not so certain that the approach through the quasi-harmonic function, described briefly by the Author in Appendix I, was the best way of determining the stresses in a two-dimensional system.

In a Paper presented to The Institution in 1943, Mr. Douglas McHenry [1] had derived the equations :

$$12u_0-4(u_1+u_3)-u_5-u_8-u_7-u_6-v_5+v_8-v_7+v_6=0\,;$$

$$12v_0-4(v_2+v_4)-v_5-v_8-v_7-v_6+u_8-u_5+u_6-u_7=0\,;$$

where u and v denoted respectively the point displacements in the directions O_x, O_y respectively and the subscripts referred to the points in *Fig. 25* (p. 267) of the paper under discussion.

McHenry's equations, or their boundary equivalents, had to be satisfied at every point in the network ; consequently if there were n nodal points, $2n$ simultaneous equations might be derived, which could be solved by the relaxation method.

Supposing, at any time in the process, that

$$12u_0-4(u_1+u_3)-u_5-u_8-u_7-u_6-v_5+v_8-v_7+v_6=U_0\,;$$

$$12v_0-4(v_2+v_4)-v_5-v_8-v_7-v_6+u_8-u_5+u_6-u_7=V_0\,;$$

† J. Instn Civ. Engrs, vol. 27 (1946–47), p. 244 (Jan. 1947).

[1] " A Lattice Analogy for the Solution of Stress Problems," J. Instn Civ. Engrs, vol. 21 (1943–44), p. 59 (Dec. 1943).