

MAGAZINE OF CONCRETE RESEARCH

Volume 17, Number 53 : December 1965 : Price Five Shillings

EDITORIAL ADVISORY BOARD

A. L. L. Baker, D.Sc.(Eng.), M.I.C.E., M.I.Struct.E.

Professor of Concrete Structures and Technology, University of London, Imperial College of Science and Technology

W. F. Cassie, Ph.D., M.S., F.R.S.E., M.I.C.E., M.I.Struct.E.

Professor of Civil Engineering, University of Newcastle upon Tyne

R. H. Evans, C.B.E., D.Sc., D.ès Sc., Ph.D., M.I.C.E., M.I.Mech.E., M.I.Struct.E.

Professor of Civil Engineering, University of Leeds

T. W. Parker, M.Sc., Ph.D., F.R.I.C.

Deputy Director of Building Research, Department of Scientific and Industrial Research

A. D. Ross, B.Sc., Ph.D., F.R.S.E., M.I.C.E.

Professor of Civil Engineering, University of London, King's College

SECRETARY TO THE BOARD AND EDITOR

Ralph P. Andrew, M.A., Ph.D.

Printed and published four times a year by the Cement and Concrete Association

Editorial Office : Wexham Springs, Slough, Bucks : Fulmer 212

Editorial comment

DUFF A. ABRAMS died in New York on 3 June 1965 at the age of 85. He was known to the present generation of concrete engineers and research workers in Great Britain particularly for his “water/cement ratio law”, as it came to be called about 1940, although his own reports refer only to the effects of the “water-ratio to volume of cement” (or, simply, “water-ratio”) on the properties of concrete.

He had become a legendary figure, and probably many of us did not know that he was still living until so recently. If so, we may be excused: although he was very active reporting the results of an intensive programme of tests on concrete during the period 1918 to 1925 when he was Professor in Charge, Structural Materials Research Laboratory, Lewis Institute, Chicago, he does not appear to have published much original work since. He was President of the American Concrete Institute in 1931 and for a while had been Director, Research Laboratory, of the Portland Cement Association and Director of Research, International Cement Corporation, but his contributions to the *Proceedings* of the A.C.I. seem to have been limited to a series of forthright written contributions to other papers during the period 1939 to 1949 when he was a consultant in New York. One gains the impression that he had been living on his capital of earlier work and was not willing to concede that others could build on the foundations he had laid.

He was a pioneer in many respects. In 1913, when he was Associate in Theoretical and Applied Mechanics at the University of Illinois Engineering Experiment Station, he published a 240-page report on tests of bond between concrete and steel; this refers to the development of testing techniques between 1909 and 1911, particularly batching materials by weight instead of by volume, which had been necessary to reduce variations in the concrete. His work at the Lewis Institute, undertaken in co-operation with the Portland Cement Association, followed, in a similar vein, with the establishment of controlled laboratory conditions and testing procedures, and has set the pattern of much subsequent research on the properties of concrete.

He continually laid emphasis on the need to control the workability of the concrete. From his experience in 1913, when all he could report about the workability was that “the concrete was mixed rather wet so that very little ramming was necessary after placing it in the forms”, he became more and more aware of the relationship between the strength of concrete of a given richness and its workability. By 1918, however, he reported the consistence of concrete in terms of the shortening of a 6 by 12 in. cylinder of a plastic mix when the steel form was slipped off immediately after moulding; by 1922, this test was being modified by the A.S.T.M. to become the slump test.

His reports also cover the effects of fineness of

cement, admixtures, mixing time, compaction by vibration, jiggling and pressure and of curing on various properties of concrete, including the compressive and flexural strengths and resistance to wear. His concept of the fineness modulus of an aggregate is still applied in some places to typical aggregates. His colour test for the detection of organic impurities in sands has led to considerable arguments when used as a standard test for acceptance or rejection of a sand, although his report in 1919 stated “if a dark-coloured solution is produced, the sand should not be used in high-grade concrete, or used only after mortar or concrete strength tests have shown it to be satisfactory for the purpose”. In 1918 he was reporting the coefficient of variation of sets of his compressive strength results and getting a within-batch variation of 2 to 4%.

He had produced over a dozen papers in the five years from 1918 to 1922. His bibliographies are of interest and suggest that he was well aware of what had been done many years previously and what was being done at that time in countries other than his own. In a summarizing report on “Proportioning concrete mixtures”, published in 1922, he referred to the studies having so far reached a total of 100,000 tests. It is not surprising, therefore, that most of his conclusions were convincing and have stood the test of time. It is depressing to read again the first paragraph of this report:

“We have the present custom (almost universal, I regret to say) of proportioning concrete by arbitrary quantities; that is, we use, say a 1:2:4 mix regardless of the particular type of materials available and regardless of the quantity of mixing water used and take little or no account of the strength of concrete produced. Needless to say, this method is extremely crude, and does not recommend itself to thoughtful engineers.”

Even though a very full summary of his work appeared in the British journal *Concrete and Constructional Engineering* in the issues of April and May 1923 under the same title, strength testing of site-made concrete was not seriously undertaken for many years, but it gained impetus after our Code of Practice for *The structural use of reinforced concrete in buildings* was issued as a recommendation in 1933 and then published in 1948. Nominal mixes are still referred to, but in a comparatively low category, in the 1965 amendment to the Code. In 1921, he produced Tables of quantities of materials for concrete of different strengths for purposes generally similar to those for which the new “standard mixes” given in the Code are to be used.

A man who lived before his time? How can we get the results of research applied to practice in less than 30 or 40 years? Perhaps every research worker needs his disciples.