

REPORT TO THE COUNCIL FROM THE REFRACTORIES RESEARCH AND SPECIFICATIONS COMMITTEE.

THE Committee has pleasure in presenting the following report on its labours during the past eight months:—

GENERAL POLICY.

Since its appointment by the Council, as the result of representations made by a Conference held at the Ministry of Munitions in July, 1918, the Committee has held five meetings, whilst the various Sub-Committees have also held several meetings and have engaged in voluminous correspondence.

At the first of the meetings of the Committee, held on August 12th, 1918, at King's College, London, the general policy of the Committee was discussed and settled. It was decided that it was essential to produce at as early a date as possible a set of Provisional Specifications dealing with:—

- (a) Tank blocks,
- (b) Clay for glass pots and grog.
- (c) Silica bricks and blocks,
- (d) Miscellaneous refractories,

based on a combination of such scientific data as existed and the best practical experience. Such Provisional Specifications were needed urgently for the guidance of glass manufacturers, furnace builders, and the suppliers of refractory materials. At the same time, it was decided that researches into the nature and properties of refractory materials suitable for glass making were called for on an elaborate scale, and that steps should be taken to have these set on foot and the results embodied in a fuller series of Specifications at a later date.

THE WORK OF THE COMMITTEE.

The work of the Committee fell, therefore, into three sections:—

- (1) The collection of data towards a Provisional Specification.

- (2) The planning of a research programme which should yield speedy results, yet be capable of indefinite expansion.
- (3) The provision of funds both to meet the expenses incurred during the setting up of the Provisional Specification and to finance the researches required.

In order to obtain data on the best experience extant, circulars were issued to glass manufacturers inviting them to give information along certain lines based on experience with the refractory materials in use. A number of replies was received giving very useful information in several cases, although the response, on the whole, was not quite so good as hoped for. These data were passed on for consideration to four Sub-Committees, each dealing with a distinct body of problems, as it was thought that only by subdivision of the work could Specifications be drafted expeditiously. The four Sub-Committees and their constitution are as follows:—

Committee on Fireclay Bricks and Blocks.—Prof. J. W. Cobb, Messrs. J. Connolly and W. J. Rees (Chairman), and Dr. J. Mellor (co-opted).

Committee on Glass Pots and Raw Clay and Grog for Glass Pots.—Messrs. J. H. Davidson, S. N. Jenkinson (Chairman), C. J. Peddle, Duncan Webb, and Dr. M. W. Travers.

Committee on Silica Refractories.—Prof. J. W. Cobb, Mr. W. J. Rees (Chairman), and Dr. J. W. Mellor.

Committee on Miscellaneous Refractories.—Prof. J. W. Cobb (Chairman), Messrs. S. N. Jenkinson and W. J. Rees.

The President and Secretary were *ex-officio* members of these Committees.

These Sub-Committees did not include any manufacturers of refractory materials. It was considered advisable in the early stages of the discussion that glass manufacturers and their scientific advisers should draw up a statement of the requirements of the industry, and that at a later date refractories manufacturers should be invited to join the Committee, when the proposed specification could be discussed in the light of practical manufacturing considerations.

Information for the guidance of the Committee was also sought from two additional sources. The first, namely, the Committee on Standards of the American Ceramic Society, is likely to help by its criticisms and advice in the future. Although as yet no comments have been received on Provisional Specifications forwarded for criticism, the Chairman of the Standards Committee has expressed his pleasure at the opportunity for co-operation. The second source was the discussion on refractory materials, held at

the October meeting of the Society, arranged purposely with the object of eliciting opinions. Five papers were contributed and discussed, namely, "Refractory Materials and the Glass Industry," by Prof. J. W. Cobb; "Note on the Firing of Glass Pots," by Dr. M. W. Travers; "The Requirements of Clay for the Glass Industry," by S. N. Jenkinson; "Note on the Solubility of Pot Material in Glass," by J. H. Davidson and Dr. W. E. S. Turner; "Notes on Pot Attack," by C. Coad-Pryor.

The task of drawing up a research programme was committed to a Research Committee, consisting of the President and Secretary with Messrs. Jenkinson, Rees, and Morrison, and Dr. Travers, and it was determined that the problems recommended for immediate investigation should be those likely to yield results leading to a marked improvement in glass refractories at an early date. It was decided that the Delegacy for Glass Research, Sheffield, should be approached to carry out the proposed tests on clays, and Prof. Cobb and Mr. Rees those on fireclay bricks and blocks, in the research programme.

FINANCIAL ASSISTANCE FROM THE MINISTRY OF MUNITIONS.

In regard to the provision of funds for the prosecution of research, the Ministry of Munitions, Glassware Munitions, recognised the need for immediate assistance, and was successful in obtaining from the Treasury for the purpose a grant of £1,000, with a further grant of the same amount if a satisfactory report was presented by the Committee within six months after receipt of the grant.

The Committee was also of the opinion that an application to the Advisory Council for a large grant ought to be made, and the Secretary was instructed to prepare a case and to make arrangements for a deputation to lay the case before the Advisory Council.

APPLICATION TO THE ADVISORY RESEARCH COUNCIL.

The consideration of the case occupied most of the second meeting of the Committee, held at the Institute of Chemistry, Russell Square, on September 25th, and a deputation, consisting of Sir Herbert Jackson, Dr. Travers, Sir Harry Seymour Foster (representing the Glaziers' Company), Messrs. S. N. Jenkinson, J. H. Davidson, J. Connolly, W. J. Rees, and Dr. Turner met the Chairman and Secretary of the Advisory Research Council, and Mr. Davies, representing the Board of Education, and discussed the matter very thoroughly. As a result, it was resolved to draw up

a fresh case, setting forth the position of the industry and its claim for special treatment, and this was done. Although renewed applications have been made on behalf of the Society, the Advisory Council ultimately decided to let the application remain in abeyance, and to press the glass industry to form a Research Association, the objects of which should include the investigation of furnace constructional materials.

THE FINANCE COMMITTEE.

For the present, therefore, the researches on refractories have necessarily to be conducted on a modest scale. The oversight of the finances was entrusted to a Finance Committee, consisting of the President, Messrs. S. N. Jenkinson, S. W. Morrison (Chairman), W. M. Gibbons (Treasurer), and Dr. Turner.

CO-OPERATION WITH THE REFRACTORIES MANUFACTURERS.

At the third meeting of the Committee, held on October 15th, 1918, draft specifications were presented by three of the Sub-Committees, namely, those on Tank Blocks, Raw Clay and Grog for Pots and Silica Refractories, and after discussion were sent forward to the Council. After consideration of the reports, the Council, on October 23rd, thought the time ripe to invite the opinions and co-operation of the manufacturers of refractory materials, and an invitation, therefore, was addressed to the Employers' National Council for the Clay Industries inviting that body to nominate representatives. Eventually notice was received, on December 16th, that the following gentlemen had been nominated:—Major H. C. King, Mr. H. J. C. Johnston, Major Thomas, Mr. F. H. Brooke, Mr. W. Gardiner, Mr. Alfred Stephens, and a further meeting of the Committee was accordingly held on January 15th in Manchester, at which the representatives of the refractories manufacturers were present. Considerable advance was made, but it was decided ultimately that the manufacturers of refractory materials should first of all meet to consider the proposed specifications in detail and formulate their views, after which the full Sub-Committees, including refractories manufacturers, could hold a joint session. The refractories manufacturers were co-opted on the Sub-Committees as follows:—On the Fireclay Brick and Block Committee, Messrs. H. C. Johnston, M. Barrett, Majors H. King and C. W. Thomas; Raw Clay and Grog for Pots, Majors H. King and C. W. Thomas, and M. Barrett; Silica Refractories Committee, Messrs. W. Gardiner, F. H. Brooke, and A. Stephens.

THE COMMITTEE'S RECOMMENDATIONS.

The meetings of the refractories manufacturers and of the Sub-Committees having been held, the Committee held its fifth meeting on March 26th at the Queen's Hotel, Birmingham, and after a four hours' sitting drew up its recommendations, which are now presented. The subject of Miscellaneous Refractories had been found more difficult to deal with than the others, and it was recommended that publication of the three other Provisional Specifications appended should not be delayed for the sake of that on Miscellaneous Refractories.

The Committee feels that there is yet much work, even of a preparatory character, to be carried out. Thus, the Sub-Committee on Fireclay Bricks and Blocks has dealt as yet only with Tank Blocks, the subject of Siege Blocks still having to be discussed, whilst the Sub-Committee on Raw Clay and Grog for Pots desires presently to make recommendations on a variety of subjects, including the method of heating up glass pots and their subsequent treatment, whilst the question of standardisation of sizes and shapes is one which needs to be considered at once. Indeed, the work of the Committee appears to be but beginning, since each problem considered, like the fabulous decapitated hydra, gives rise to at least seven others.

S. W. MORRISON, *Director of Research.*

W. E. S. TURNER, *Secretary.*