MECHANIZATION AND AUTOMATION

NEW APPARATUS AND METHOD FOR TESTING REFRACTORIES UNDER TENSION AT HIGH TEMPERATURES

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During service many types of refractory are subjected to the action of tensile forces (roof refractories, steel-casting and coking refractories, crucibles for metal smelting, etc.).

Fig. 1. Apparatus for testing refractories under tension at high temperatures.

In addition to the strength of refractories at high temperatures, to characterize their exploitation and technological properties considerable importance is attached to the magnitude of their deformation under tension, and also to the rupture temperature, determined at constant load. This matter has been covered in the Russian and foreign literature [1-9].
The present article describes an improved apparatus developed in the thermal-mechanical laboratory of VIO* and a method for testing refractories under strain in the 20-1700°C range.

Design of the apparatus. The improved apparatus, in contrast to the universal equipment [1], is designed only for determining the deformation during tension. The raising and lowering of the silicon-carbide furnace is mechanized; more operationally reliable units for gripping the ceramic holders were created, and the recording of the deformation in the specimens was automated. The apparatus is compact and reliable in operation.

In the plate 1 of the apparatus (Fig. 1) are fitted two columns 2, along which move the guides 3 and the table 4 on which is placed the silicon-carbide furnace 5. The table is lifted and lowered by a screw 6 driven by a worm reducer 7 and an electric motor 8 capacity 0.4 kw. The speed of the table is 0.43 m/min. In the extreme top and bottom positions the table is fixed by terminal switches 9 cutting out the electric motor. The specimen 10 is placed in the ceramic holders 11 and 14 which in turn are fixed in metal clamps 12 and 15.

By turning the handle 13 it is possible to regulate the position of the lower holder over a height of 70 mm. In the upper part of the apparatus on the rest 16 is placed the lever-balance 17 with an arm ratio of 1:10. The long arm of the balance is finished with sector guides 18 with which a constant distance is obtained between the axis of rotation of the arms and the points of application of the load.

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* The plans of the apparatus were drawn up by the collective of the mechanical-technological sector of VIO under I. G. Ur'f'skii and A. A. Nikitina.