ately below each converter, making available a total of 15,000 to 20,000 lb/hr steam at 300°C, 270 psig. This steam provides two-thirds of the power requirements of the Escher Wyss rotary turbo compressor which compresses the nitric oxide containing gases prior to absorption.

Oxidation of the nitric oxide and its subsequent absorption takes place in a series of six stainless steel towers, each 60 feet high. These are ring-packed, and owing to the elevated absorption pressure, this operation is carried out at high efficiency, with a final stack loss of less than two grains of acidity per cubic foot.

An outstanding feature of this new plant is its very low requirement for operating labour. All flow rates, pressures and temperatures are automatically measured, recorded and controlled. Elaborate safety devices ensure rapid and automatic shut down of the plant in the event of impending disaster. The gas cleaning systems, together with a very low loss rate of catalyst alloy, enable long continuous operating runs exceeding three months to be achieved for maximum economy.

Rare Earth-Palladium Cermets

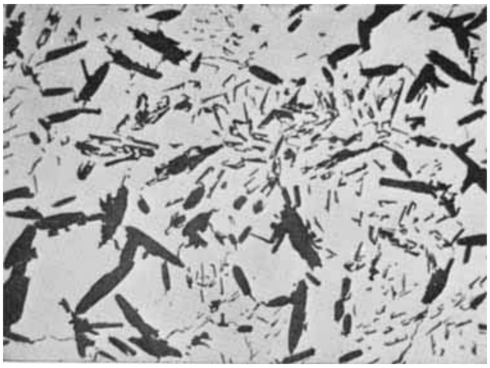
FABRICATION OF CONTROL AND SHIELDING MATERIAL

The exceptionally high thermal neutron absorption cross sections of samarium, europium and gadolinium make these rare earth elements particularly suitable for use in control rods and for shielding purposes in nuclear engineering. Unfortunately no technique has yet been evolved for their economic fabrication into the necessary shapes, although much effort has been put into research on this problem, more particularly into the use of rare earth compounds dispersed in metal matrices.

An interesting attack on this problem has now been reported by E. S. Funston and J. A. McGurty of the Aircraft Nuclear Propulsion Department of the General Electric Company, Cincinnati.

In the course of research aimed at the development of nuclear control or shielding alloys which could be used in air at high temperatures, studies were made on palladium base alloys containing neutron poisons such as samarium and gadolinium metal. In subjecting 5, 10, 15 and 20 weight per cent samarium in palladium to elevated temperature tests, it was found that these alloys possessed exceptional high temperature stability. It was also found, however, that the stability of these alloys did not arise as a result of the oxidation resistance of the binary alloy system, but rather due to the fact that, when heated in air, oxygen very rapidly penetrated the alloy causing oxidation *in situ* of the samarium and forming a cermet.

One of the features of cermets produced by such a procedure is the uniformity of oxide dispersions within the metallic matrices. Also, cermets containing large amounts of oxide dispersion are severely limited as to their workability. Cermets made by internally oxidising the rare earth metal allow for metal working or machining before the ceramic phase is formed. After the component is in final shape the oxidation process can be brought about in such a way as to produce a uniform dispersion of the ceramic phase throughout the metal matrix.



Microstructure of 20 per cent samarium-palladium alloy after treatment in air at 1200°C for 100 hours

In the photomicrograph the dark phase is the samarium oxide, the light phase is the palladium metal.

Obviously other rare earth metals may be substituted for the samarium constituent.