25 per cent of platinum by weight, is used in various sizes ranging from some 2 mm diameter for the "back bone" or grid support, down to 0.25 mm diameter or less for the wire used for actual grid winding.

To enable this composite wire to be manufactured, and indeed after manufacture to be satisfactorily used, it is obviously necessary that the bond between platinum and molybdenum should be sound throughout the interface. In the early days of manufacture the molybdenum rod was coated with a thin layer of nickel prior to drawing the platinum in an attempt to improve the bond between the two metals. Unfortunately, while it was successful in assisting the manufacturing process, the nickel was found to diffuse through the platinum during the high temperature pumping schedule of the valve and to condense as a thin film on the exposed surfaces of both valve envelope and electrodes. Non-adherence of this film permitted flash arcing when the valve was operating under high voltage conditions and in extreme cases inter-electrode shorts could take place.

More recently the manufacture of the composite platinum-clad molybdenum wire has been accomplished without the use of the nickel interface, the quality of the bond and of the finished product being maintained by precise control of manufacturing conditions.

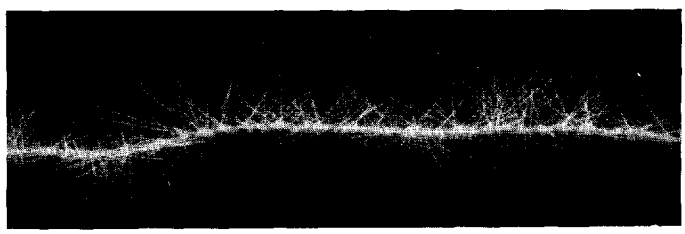
It has been found in practice that the composite wire exhibits the hot strength of the molybdenum core and has the very real advantage of being more readily spot welded than molybdenum largely due to freedom from oxidation.

The disadvantages of employing grid wires of this type are that the wire cannot be run with as high a power dissipation as the bare molybdenum grid will permit, partly due to the lower melting point of platinum (1769°C as against 2620°C for molybdenum) and partly due to the tendency for the two metals to fuse together slightly during life which leads to some grid distortion. For these reasons grids are usually designed to run at a dissipation per unit surface area of 10 watts per sq. cm., at which level the grid wire is generally assumed to operate at a temperature approximating to 1400°C.

Platinum has thus shown itself to be one of the best tools so far in the hands of the transmitting valve engineer for combating one of his main causes of valve loss during manufacture—grid emission.

Exothermic Fuse Wire

Based upon the exothermic reaction that takes place between aluminium or magnesium and platinum or palladium after a critical temperature has been reached, an interesting new product has been developed by the Sigmund Cohn Corporation of Mount Vernon, New York. This comprises a composite wire having a core of aluminium with a sheath of palladium. The wire is strong and ductile, but when heated to about 650°C by the passage of a current it ignites with explosive violence and reaches a temperature of about 2000°C. A similar product is also available in the form of laminated sheet. Applications are expected to develop in the field of detonating devices.



A photograph of 0.003 inch diameter palladium-clad aluminium wire less than 5 milliseconds after ignition