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REPORT

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COUNTRY Czechoslovakia

SUBJECT Detection and Removal of Hot Spots on Vacuum Tubes

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THIS IS UNEVALUATED INFORMATION

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1. Insignificant and invisible particles of metal which settled on the inside of glass envelopes formed "hot spots". This would occur during evacuation of the glass envelope. The shaded area (a) of the attached sketch indicates where "hot spots" would occur most frequently. When vacuum tubes which had "hot spots" were put into operation the high-frequency field would heat the area in which the metal particles had been deposited, and being an area of conduction, would become hot. This area would become so hot that the glass envelope would soften and implode. Vacuum tubes with "hot spots" were very common in Czechoslovakia, because of the fact that the materials used were not of good quality, and because the manufacturing methods did not conform to good practice.
2. Until 1949 there were no methods in the Tesla industry to determine whether "hot spots" existed until actually placed in operation, at which time the defective tubes failed. Starting in 1949 the Tesla-Vrsovice plant used a very thin white tissue paper to ascertain if "hot spots" existed. This paper was placed around the glass envelope and the tube was placed in operation, and where "hot spots" occurred, the paper turned brown, showing the location, the size, and the intensity of the hot spot. The vacuum tubes showing "hot spots" were not used for oscillation (power amplifier) purposes.
3. The method used to remove hot spots was developed in the Tesla-Vrsovice plant in 1951. When the process of evacuating the glass envelope was half accomplished, air was admitted in the tube again and then exhausted to a pressure of the order of 1.0 to 10⁻¹ mm. of mercury.

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The vacuum tube was then warmed in an electric furnace to a temperature just above the transformation temperature (where the internal tension of the glass dissolves) below the melting point. The vacuum tube stayed at such a temperature for 15 to 30 minutes. After this heating had been completed, the glass envelope was then evacuated completely. This treatment was applied preventively in Tesla-Vrsovice on all types of medium-powered vacuum tubes, which experience had shown were likely to have "hot spots". This treatment was applied retroactively on the remaining medium-powered tubes and on all high-powered tubes which showed "hot spots" when tested. This technique was not applied to small vacuum tubes where the processing was too expensive. [redacted] the method used to ascertain the presence of "hot spots" and to remove them was known only in Czechoslovakia. MARES, chief vacuum technician with the Tesla-Vrsovice plant visited Marconi's Wireless Telephone Company, Ltd., in London two or three times before 1949 and did not learn any method to alleviate "hot spots" on vacuum tubes.

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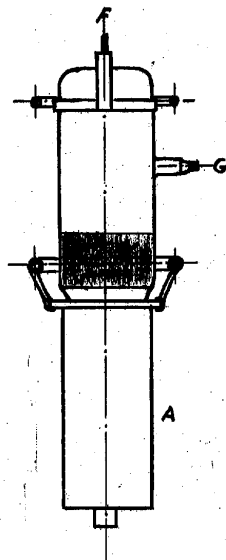
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LEGEND

F. Filament

G. Grid

A. Anode

a. Part of the envelope where the "hot spots" occurred most frequently.

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