Dec. 24, 1968 W. SCHMIDT 3,418,523

MAGNETRON HAVING DIVERSE SIZE RESONATORS

Filed Dec. 21, 1965

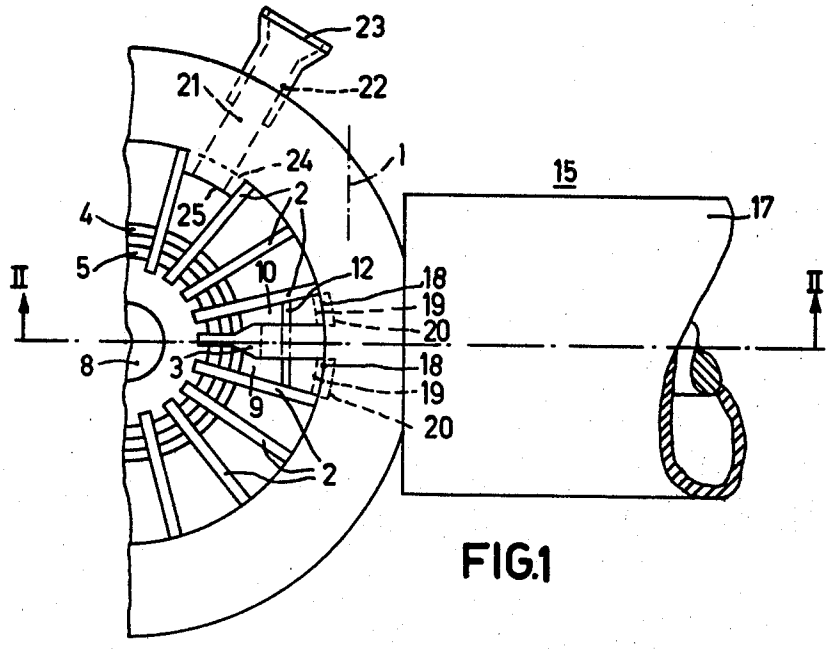


FIG.1

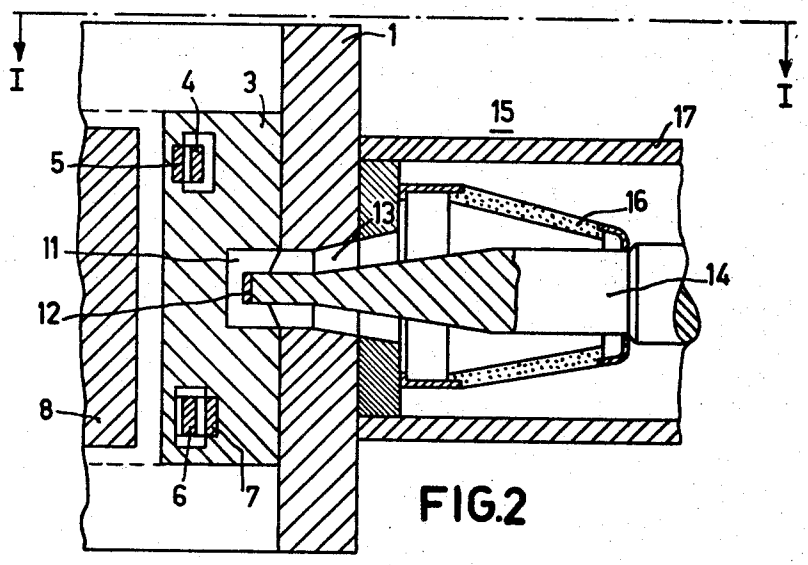


FIG.2

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United States Patent Office 3,418,523
Patented Dec. 24, 1968

3,418,523

MAGNETRON HAVING DIVERSE SIZE RESONATORS

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Filed Dec. 21, 1965, Ser. No. 515,433
Claims priority, application Germany, Dec. 23, 1964, P 35,741
4 Claims. (Cl. 315—39.65)

ABSTRACT OF THE DISCLOSURE

A magnetron having a plurality of resonant cavities surrounding a central cathode and separated by radial partitions, at least one of the partitions or the rear wall of one of the cavities having an aperture therein for receiving an electrical conductor, and the wall surrounding the aperture being deformed so that the electrical and thermal characteristics of the cavity are substantially the same as those of the other cavities.

The invenion relates to a magnetron having a number of circular-symmetrical resonant cavities surrounding a central cathode, the rear or side wall of at least one of the resonant cavities comprising an aperture.

An aperture in the side wall between two resonant cavities is found in those magnetrons in which the inner conductor of a coaxial output coupling extends to within the aperture. From the end of the inner conductor a guide extending at right angles thereto passes to the oppositely located walls of the associated resonant cavities or to a curved conductor which forms a loop in each of the said resonant cavities.

In such magnetrons certain mechanical and electronic disturbances occur. If, for example, the even and odd anode segments are connected by rings it frequently occurs that after changing the load, for example, by switching on and off, said rings bend or even break. In addition, deviations occur in the oscillations, such as incorrect mode of oscillation, too great dependence upon the load, and so on.

The latter electronic deviations also occur in those magnetrons in which the rear wall of one of the resonant cavities comprises an aperture succeeded by a window for observing the cathode in connection with the determination of the temperature thereof.

It is the object of the invention to mitigate said drawbacks as much as possible.

According to the invention, in a magnetron having a number of circular-symmetrical resonant cavities surrounding the central cathode, an aperture being provided in the rear or side wall of at least one of the resonant cavities, the wall is deformed relative to the other resonant cavities so that the electric and thermal properties of the resonant cavity in question are equal to those of the other resonant cavities.

The invention is based on the discovery that the aperture in the rear wall or side wall of the resonant cavity results in thermal and electrical deviations, which cause the above described disturbances.

If an aperture for receiving the end of the inner conductor of the coaxial output coupling is provided in the side wall between two resonant cavities, said aperture will produce a reduction of the radial heat conductivity. Consequently, when the magnetron is loaded, the temperature of said partition wall rises as a result of which said wall will show a stronger expansion than the other partition walls. As a result of this the connection rings are strongly loaded mechanically. However, also if no connection rings are provided the mutual position of the anode segments which constitute the ends of the partition wall varies. As a result of this detuning occurs which causes electronic disturbances. The aperture in the partition wall also produces a variation of the inductance in the adjacent resonant cavities.

An aperture in the rear wall of the resonant cavity also produces detuning an electronic disturbance by the influence on the inductance in the resonant cavity.

According to the invention, to compensate for the influence of the aperture in the partition wall between two resonant cavities, said wall is made to be so much thicker in the end remote from the cathode that the thermal conductivity corresponds to that of the other partition walls. If the influence of said thickening on the inductance of the adjacent resonant cavities is such that detuning still occurs, said detuning can be compensated for by displacing the rear wall of the resonant cavities relative to that of the other resonant cavities in a radial direction. The same measure is used to compensate for the influence of an aperture in the rear wall of a resonant cavity. This may be done by soldering a plate or milling the wall.

The invention may be applied to magnetrons with, and without, connection rings between the alternate anode segments. Alternately, the resonant cavities may be segments of a circle in cross-section, may be circular with a gap to the anode-cathode space, or have a rectangular cross-section.

The invention will now be described, with reference to the accompanying drawing, in which

FIG. 1 is a plan view of the electrode system of a magnetron according to the invention, and

FIG. 2 is a cross-sectional view through the axis of said system.

In the anode block **1**, a number of anode segments **2** and **3** are alternately arranged around the cathode **8**. The even segments **2** are interconnected by rings **4** and **6** and the odd segments **3** are interconnected by rings **5** and **7**. On either side of the segment **3**, located symmetrically with respect to the output coupling, the resonant cavities **9** and **10** are arranged bounded by the segments **2**.

The straight end **12** of the output coupling is secured in said segments **2**. The rod **12** is further supported by the inner conductor **14** of the coaxial output coupling **15**. The conductor **14** is introduced through the aperture **13**. The outer conductor **17** is secured to the anode block **1**. The anode segment **3** is thickened over the part adjoining the anode block **1** to compensate for the thermal conductivity which is reduced by the presence of the aperture **11**. To compensate for the influences of the aperture **11** and the thickening of the segment **3** on the inductance of the resonant cavities **9** and **10**, the rear wall **18** thereof may be displaced to **20** (increasing the inductance), or to **19** (decreasing the inductance).

The rear wall of another resonant cavity comprises an aperture **21** having a pipe **22** to which a glass window **23** is sealed. The rear wall **25** of the resonant cavity is moved inwards radially with respect to the other resonant cavities to compensate for the increase of the inductance as a result of the presence of the aperture **21**.

What is claimed is:

1. A magnetron comprising an anode block having a plurality of radial partitions extending inwardly and defining a plurality of resonant cavities therebetween surrounding a central cathode, at least one of a partition between adjacent cavities and a rear wall of at least one of the cavities having an aperture therein for receiving a conductor, said wall and partition in the proximity of said aperture being deformed with respect to the wall and partition of the other resonant cavities to an extent that the electric and thermal properties of each of the cavities are substantially equal.

2. A magnetron as claimed in claim 1, characterized in that the partition wall between two resonant cavities which is provided with an aperture is thickened on the part remote from the cathode.

3. A magnetron as claimed in claim 1, characterized in that the rear wall of the resonant cavity, which rear wall has a cavity therein, is displaced radially with respect to the other resonant cavities.

4. A magnetron having a number of circular-symmetrical resonant cavities surrounding the central cathode, substantially as herein described with reference to the accompanying drawing.

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U.S. Cl. X.R.

315—39.53, 37.75