May 8, 1956 R. DUNSMUIR 2,745,040

CAVITY TYPE MAGNETRONS

Filed Oct. 11, 1954

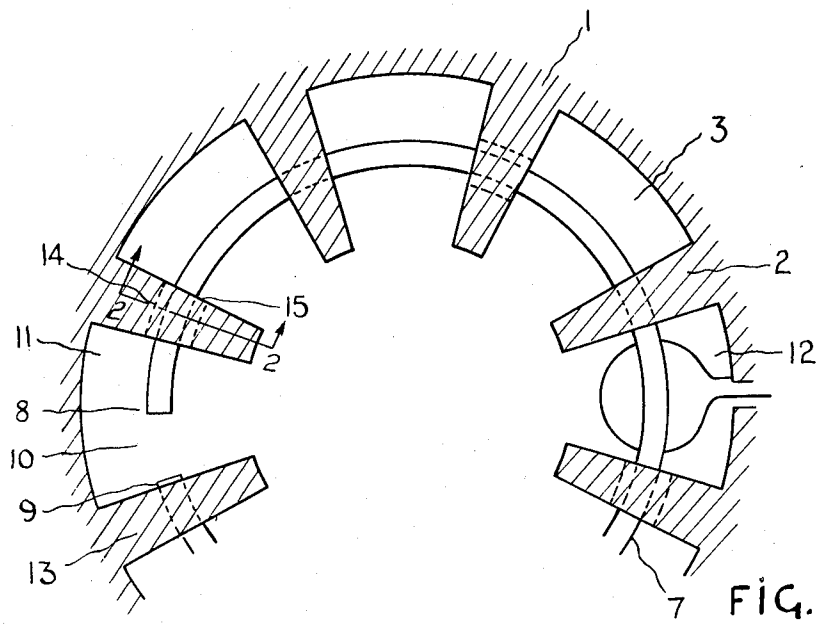


FIG. 1

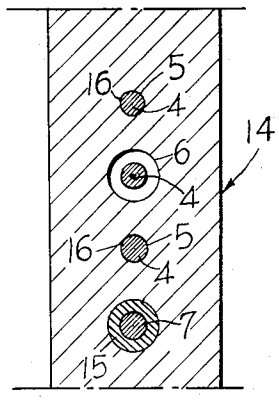


FIG. 2

INVENTOR

ROBERT DUNSMUIR

BY Miles M. Gillam

ATTORNEY

United States Patent Office 2,745,040 Patented May 8, 1956

2,745,040

CAVITY TYPE MAGNETRONS

Robert Dunsmuir, Rugby, England, assignor to The British Thomson-Houston Company Limited, a British company

Application October 11, 1954, Serial No. 461,572

4 Claims. (Cl. 315—39.69)

This invention relates to multi-cavity magnetrons of the type having an anode comprising a series of cavity resonators. More particularly, the invention relates to such magnetrons in which the anode cavity resonators are formed by a series of circumferentially spaced vanes.

In such cavity type magnetrons there is a tendency to resonate in several modes having slightly different wavelengths.

In many cases the frequency discriminating properties of the magnetron may be insufficient to suppress the unwanted modes with the result that unwanted frequencies may occur in the output.

In order to eliminate such unwanted frequencies, strapping has been employed, although other physical solutions of this problem have been employed in the art. The system of strapping generally used provides circumferentially extending ring straps, generally of toroidal shape. A plurality of such straps is positioned axially along the length of the anode, the planes in which such straps lie being substantially parallel. Each strap is normally connected to each alternate vane or segment and adjacent straps are normally connected to the opposite sets of vanes or segments.

Each ring passes through all the vanes but only makes contact with alternate vanes and passes through apertures in the intervening vanes without making contact. Such intervening vanes are connected by the adjacent straps.

The main object of the invention is to provide an improved arrangement for eliminating modes other than the π mode in magnetron oscillators of the type under consideration. More particularly, it is an object of the present invention to provide an improved end strap or ring construction to improve the elimination of such other modes.

The present invention provides a multi-cavity type magnetron of the kind having an anode of cylindrical form and comprising a series of circumferentially displaced segments or vanes and a series of axially displaced ring straps whereof each strap contacts only alternate segments or vanes, and in which the end strap has provided means defining a break or gap between a pair of segments and is electrically connected to the adjacent segment on each side of the break or gaps.

Preferably the break extends substantially from one of the segments to a point midway between the pair of segments, i. e., from one of the segments to the center of the cavity resonator formed by this segment and an adjacent segment or vane.

The break is preferably in the cavity resonator opposite the output cavity resonator.

It will be appreciated that in the case of a vane type anode in which the ring passes through a clearance hole in alternate vanes there will be such a clearance hole on one side of each cavity resonator and in applying the invention it will be necessary to conductively seal the clearance hole in the side of the break in order that the end strap may be electrically connected to each of the adjacent segments or vanes.

In order that the invention may be more fully understood, reference will now be made to the accompanying drawings, in which:

Fig. 1 shows a diagram in plan of the end strap of a multi-cavity magnetron and its connections to the anode structure according to the invention.

Fig. 2 is a part section on the line 2—2 of Fig. 1 of a segment or vane of the magnetron.

In the drawings a multi-cavity type magnetron has an anode **1** containing segments or vanes **2** enclosing cavities or cavity resonators **3**. Ring straps **4** pass through the vanes, making electrically conductive connections **5** with alternate vanes and passing through apertures **6** in the intervening vanes without connection, these apertures **6** being radially enlarged relative to the apertures **16** in the vanes in which connections **5** are made. Adjacent straps are connected to alternate vanes as shown.

At least one of the upper or lower ends of the axially extending anode is provided with an end strap **7** having ends **8** and **9** defining a break or gap **10** which is made in cavity resonator **11** opposite to the output cavity resonator **12**. The break **10** extends from one segment half-way across cavity resonator **11**. The end strap **7** is electrically connected to both of the adjacent segments **13** and **14**. The connection to **13** is normal and an additional connection **15** is made to segment **14** by sealing the aperture with electrically conductive material.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A multi-cavity-type magnetron having an anode of cylindrical form, said anode comprising a series of circumferentially displaced segments defining a series of cavity resonators, a first ring strap concentric with said anode, said strap passing through said segments, connections between said strap and alternate segments, a second ring strap parallel to said first ring strap, connections between said second ring strap and intervening segments, an end strap, means defining a gap in the said end strap in a particular cavity resonator, and connections from said end strap on opposite sides of said gap to respective segments defining said cavity resonator.

2. A cavity-type magnetron having an anode of cylindrical form, said anode comprising a series of circumferentially displaced segments defining a series of cavity resonators, a plurality of ring straps concentric with said anode, said straps passing through said segments, connections between alternate straps and alternate segments, and connections between the intervening straps and intervening segments, an end strap, means defining a gap in said end strap in a particular cavity resonator, and connections from said end strap on opposite sides of said gap to respective segments defining said cavity resonator.

3. A cavity-type magnetron having an anode of cylindrical form, said anode comprising a series of circumferentially displaced segments defining a series of cavity resonators, a plurality of ring straps concentric with said anode, said straps passing through said segments, connections between alternate straps and alternate segments and connections between the intervening straps and intervening segments, an end strap, said end strap having ends in a cavity resonator defining a break in said end strap, one end being adjacent a segment and the other end being substantially midway between the segments defining said cavity resonator, and connections from said strap ends to each of said segments.

4. A cavity-type magnetron having an anode of cylindrical form, said anode comprising a series of circumferentially displaced segments defining a series of cavity resonators, output means, said output means being situated in an output cavity resonator, a plurality of ring straps concentric with said anode, said straps passing

through said segments, connections between alternate straps and alternate segments and connections between the intervening straps and intervening segments, an end strap, said end strap having ends in a second cavity resonator defining a break in said end strap, said cavity resonator being opposite the said output cavity, one end being adjacent a segment and the other end being substantially midway between the segments defining said second cavity resonator, and connections from said strap ends to each of said segments.

References Cited in the file of this patent

UNITED STATES PATENTS

2,475,960	Hegbar	July 12, 1949
2,497,831	De Vore	Feb. 14, 1950