(12) UK Patent Application (19) GB (11) 2 228 363 (13) A

(43) Date of A publication 22.08.1990

(21) Application No 8822824.2

(22) Date of filing 29.09.1988

(51) INT CL[5]
H01J 23/18, H01P 7/10

(52) UK CL (Edition K)
H1D DK D16CY D16C1BX D16C1BY D16C1Y D16M1 D16S7 D16S8 D18AY D18A1BY D18A1B2B D18A1B2Y D18A1X D18A1Y D18A3B D18A3Y D46C D46Y
H1W WGX W1 W3B1 W5

(71) Applicant
English Electric Valve Company Ltd

(Incorporated in the United Kingdom)

106 Waterhouse Lane, Chelmsford, Essex, CM1 2QU, United Kingdom

(72) Inventors
Paul Andrew Jerram
Stephen Bainbridge

(74) Agent and/or Address for Service
G Cockayne
GEC Patent Department (Chelmsford Office), GEC-Marconi Research Centre, West Hanningfield Road, Great Baddow, Chelmsford, Essex, CM2 8HN, United Kingdom

(56) Documents cited

GB 2153598 A	GB 2145575 A	GB 1552974 A
GB 1512186 A	GB 1376938 A	GB 1232159 A
GB 1081714 A	US 4500859 A	US 4267537 A

(58) Field of search
UK CL (Edition J) H1D DK DV, H1W WGA WGP WGX
INT CL[4] H01J, H01P

(54) Magnetrons

(57) The performance of a magnetron may be degraded by its output frequency changing. This degradation may be reduced by fixing a resonator element 4 in the magnetron's output waveguide 2 enabling temperature stabilisation to be achieved and also permitting the output spectrum of the radiation to be narrowed.

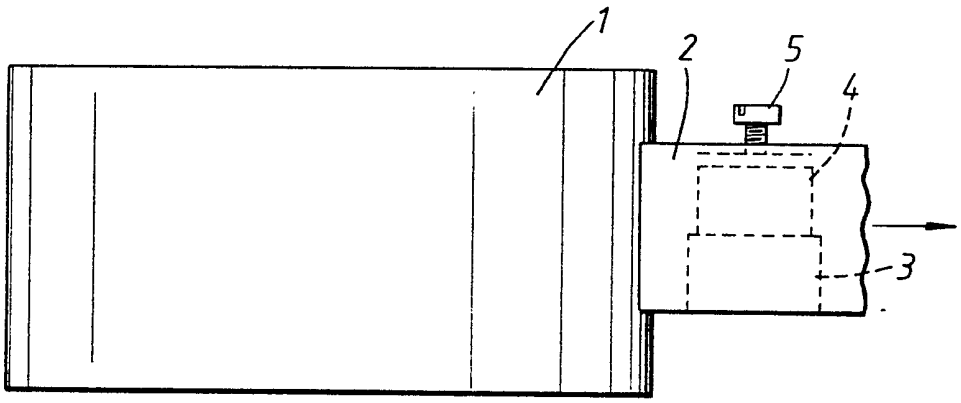

FIG. 3.

GB 2 228 363 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

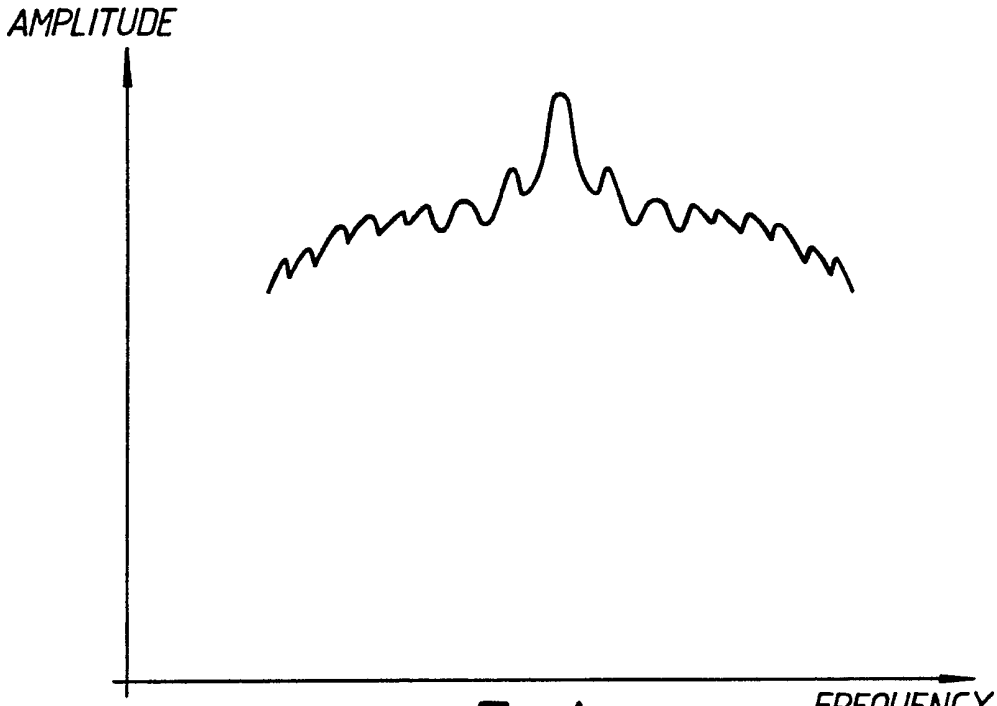

FIG. 1a.

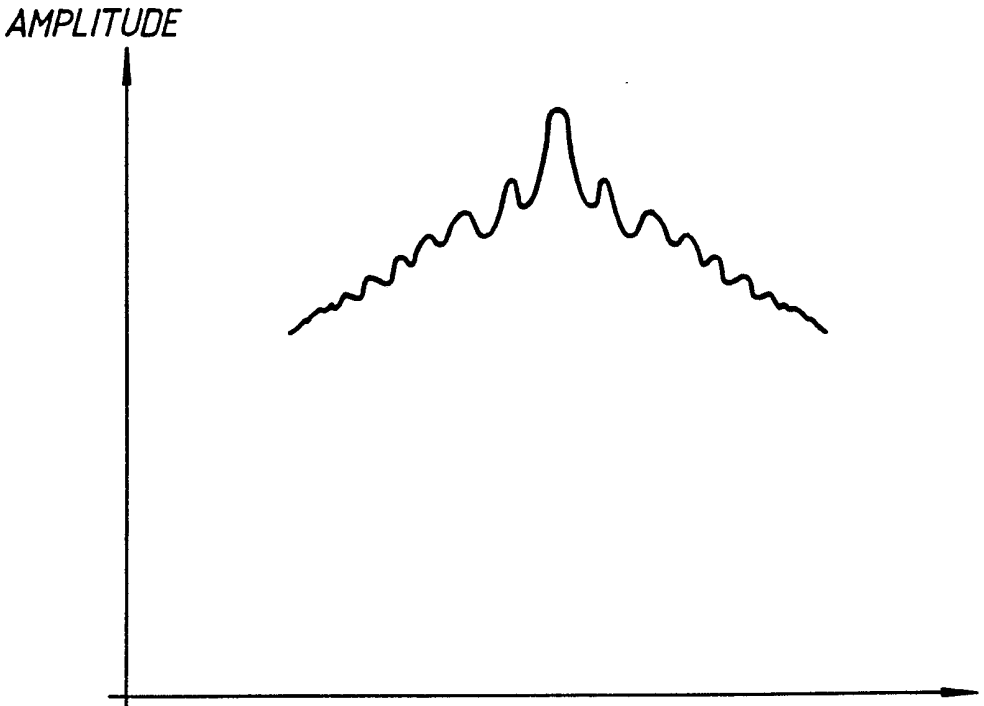

FIG. 1b.

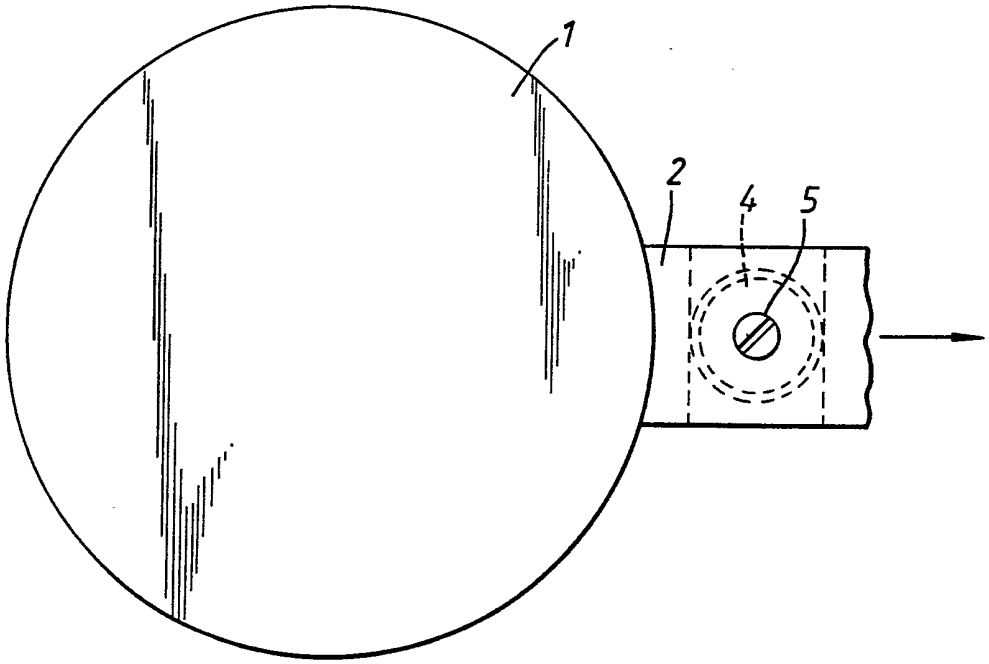

FIG. 2.

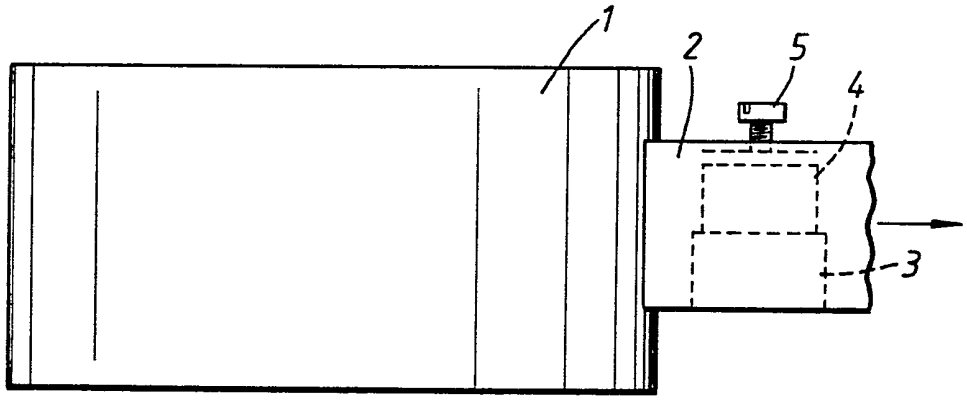

FIG. 3.

I/7641/EEV

MAGNETRONS

This invention relates to magnetrons and more particularly to frequency stabilisation of output radiation from magnetrons.

The frequency of output radiation produced by a magnetron is determined primarily by the volume and configuration of its resonant cavities. Other factors may affect the output frequency and, in particular, changes in temperature will cause this frequency to drift undesirably. In the past drift has been compensated for by including additional cavities of low temperature coefficient coupled to the main resonant cavities so as to tune the magnetron to the desired frequency. Such arrangements are difficult to fabricate, bulky and expensive.

The present invention seeks to provide relatively simple apparatus which permits effective stabilisation of the output frequency of a magnetron.

According to the invention there is provided a magnetron comprising: an output waveguide along which output radiation from the magnetron is arranged to be transmitted and, positioned in the waveguide, a resonator element arranged such that the output radiation is transmitted through it. By employing the invention, the frequency of output radiation may be stabilised by arranging that the element has a resonant frequency which

matches the desired operating frequency of the magnetron.

A further advantage of using the invention is that the output spectrum of the magnetron may be narrowed to give a more desirable frequency distribution. This is illustrated in Figs. 1a and 1b which respectively show the frequency spectrum of radiation from a magnetron without a resonator element and when a resonator element is included in its output waveguide.

More than one resonator element may be positioned in the output waveguide such that the output radiation is transmitted through them. This enables the frequency spectrum to be further constricted if desired.

The output waveguide may be immediately adjacent a magnetron resonant cavity and integral with the magnetron, such that it directly receives the output radiation, or it may form another part of the transmission path and be more remote from the magnetron.

Preferably, the resonator element consists of dielectric material and it is preferred that it is a solid cylinder in configuration, although other shapes may be used.

Since the resonator element is placed in the output waveguide, the physical size of the magnetron compared to that of the conventional magnetron need not necessarily be increased.

One way in which the invention may be performed is now described by way of example only with reference to the

accompanying drawings, in which;

Figure 2 is a schematic plan view of a magnetron in accordance with the invention; and

Figure 3 is a schematic side view of the magnetron shown in Figure 2.

With reference to Figures 2 and 3, a magnetron includes a plurality of resonant cavities, an anode, a cathode, and means for producing a magnetic field, and is indicated generally at 1. During operation, radiation generated by the magnetron is transmitted along an output waveguide 2 in the direction shown by the arrow.

The waveguide 2 is rectangular and includes a stepped portion 3 which defines a transverse section of reduced area.

A dielectric resonator element 4, in the form of a solid cylinder, is stuck on the stepped portion 3. The stepped portion 3 ensures that radiation from the magnetron 1 is channelled through the resonator element 4. The resonator element 4 has a resonant frequency which is matched to the desired frequency of the output radiation from the magnetron and propagates frequencies closest to its resonant frequency with greatest efficiency and those furthest away from the resonant frequency with least efficiency.

Fine tuning of the resonator element 4 is achieved by use of a turning screw 5.

CLAIMS

1. A magnetron comprising: an output waveguide along which output radiation from the magnetron is arranged to be transmitted and, positioned in the waveguide, a resonator element, arranged such that the output radiation is transmitted through it.

2. A magnetron as claimed in claim 1 in which the resonator element has a resonant frequency matched to a desired output frequency of the magnetron.

3. A magnetron as claimed in claim 1 or 2 in which the element is of dielectric material.

4. A magnetron as claimed in any preceding claim in which the element is a solid cylinder.

5. A magnetron as claimed in any preceding claim in which the waveguide has a portion of reduced transverse sectional area in which the resonator element is located.

6. A magnetron as claimed in any preceding claim and including means for adjusting the resonant frequency of the resonator element.

7. A magnetron substantially as illustrated in and described with reference to Figures 1 and 2 of the accompanying drawing.

Published 1990 at The Patent Office, State House, 66/71 High Holborn, London WC1R 4TP. Further copies may be obtained from The Patent Office. Sales Branch, St Mary Cray, Orpington, Kent BR5 3RD. Printed by Multiplex techniques ltd, St Mary Cray, Kent, Con. 1/87