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W. ENGBERT
MAGNETRON OSCILLATOR
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Fig. 1

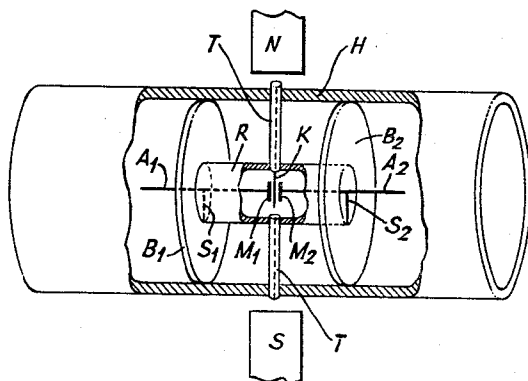
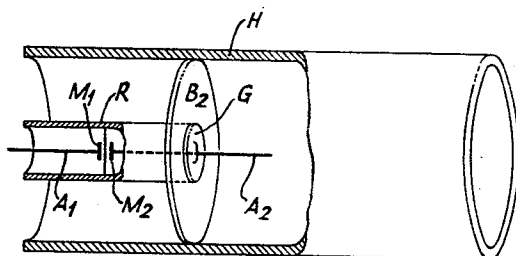


Fig. 2



INVENTOR
WILLI ENGBERT
BY *H. S. Grover*
ATTORNEY

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MAGNETRON OSCILLATOR

Willi Engbert, Berlin, Germany, assignor to Telefunken Gesellschaft für Drahtlose Telegraphie m. b. H., Zehlendorf, Ostweg, Berlin, Germany, a corporation of Germany

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7 Claims. (Cl. 250—36)

This invention is concerned with a magnetron device adapted to excite ultra-high frequency electrical oscillations in which a magnetron tube is disposed inside a hollow tubular cable without inner conductor serving for the conduction of energy. The outstanding feature of the invention is that the anode system is contained in line with a concentric line the inner conductor of which extends into the adjoining hollow cable and causes oscillations to be excited therein.

The invention will now be described in more detail, reference being made to the appended drawing wherein Figure 1 illustrates a preferred arrangement of a magnetron discharge device enclosed in a section of a tubular conductor, and Fig. 2 shows a modified magnetron discharge tube arrangement.

Referring to Fig. 1, H denotes the outer tubular conductor which is sealed at a suitable point so that it can be exhausted in the neighborhood of the magnetron system. If desired, this tube H can form a wave guide of known construction. Disposed inside the tube H and perpendicular to its axis are two ring-shaped disks or flat rings B₁ and B₂ the inner openings of which are interconnected by a tube R. Inside the latter the conductors A₁ and A₂ are coaxially supported by stays or props S₁ and S₂. At the juxtaposed ends of the said two conductors A₁ and A₂ are the anode segments M₁ and M₂ mounted coaxially with respect to the cathode K. In this manner a coaxial transmission cable is formed by tube R and the conductors A₁ and A₂. In line with the inner conductor are mounted the anode segments M₁ and M₂ of the magnetron system. Conductors A₁ and A₂ extend beyond the tube R into the outer conductor H where they act as an antenna to excite said conductor H. The tube H may be sealed at one end by providing a closure plate at a distance such that resonance prevails for the oscillation to be generated or to be received. The length of inner tube R amounts preferably to $\lambda/2$, while the extensions of the axial conductors A₁ and A₂ beyond the closure plates B₁ and B₂ are equal to $\lambda/4$. An important consideration in this connection is the fact that the transmission line may be effectively shortened, if desired, by capacitive loading of the anode segments. The filament may be mounted to pass through aligned holes in the outer tube H and the inner tube R. The filament may also be surrounded by iron tubes T which function as magnetic pole pieces.

Vacuum-tight sealing of the magnetron system is preferably effected at the ends of tube R by disks of insulation material in which the conductors A₁ and A₂ are sealed. One end may, however, be closed entirely by metal, in which case, for instance, disk B₁ is preferably in contact with conductor A₁, disk B₂ being understood to be of insulating material. Conductor A₁ then terminates directly on this disk and conjointly with

the left hand end of tube R constitutes an oscillatory circuit tuned to $\lambda/4$.

An arrangement of this kind is again shown in Fig. 2 where the tube is sealed by means of a glass disk G in the opening of disk B₂, disk G serving simultaneously for supporting conductor A₂.

I claim:

1. A magnetron device adapted to generate ultra-high frequency oscillations, said device comprising an anode system coaxially surrounding a linear cathode and enclosed in the inner conductor of a coaxial transmission cable, the axis of the cathode being perpendicular to the axis of the cable, said inner conductor being short relative to said transmission cable and having an extension which constitutes an antenna means for exciting said transmission cable.

2. Arrangement as claimed in claim 1, and having a resonant circuit to which said antenna means is connected at a current loop thereof, said resonant circuit being constituted by said inner conductor and a surrounding portion of said transmission cable in combination with a metallic disk.

3. In combination with a tubular wave guide, a magnetron discharge device mounted within the tubular wall of said guide, said device having a linear cathode extending diametrically with respect to said tubular wall, a segmented anode system coaxial with the cathode and a dipole antenna the arms of which are each attached to a respective one of the anode segments and extend longitudinally of the wave guide.

4. The combination according to claim 3 and having magnetic field concentrating means constituted by ferrous tubes surrounding the cathode.

5. The combination according to claim 3 and having at least one wave-reflecting flange disposed perpendicular to the antenna axis.

6. The combination according to claim 3 and having a metallic tubular envelope for said magnetron device, said envelope constituting part of a resonant tank circuit.

7. An oscillation generator of the magnetron type mounted within the tubular walls of a metallic wave guide, said generator having a linear cathode disposed perpendicular to the axis of said wave guide, and having anode segments disposed coaxially with respect to the cathode, a dipole antenna the arms of which are mounted on said anode segments and extend in each direction along the axis of said wave guide, and a resonant circuit for said generator constituted by a metallic spool and a portion of the tubular wall of said wave guide, said spool having a core portion of smaller diameter than that of the tubular guide, and flanges extending to, and contacting with, the inner wall of said tubular guide.

WILLI ENGBERT.