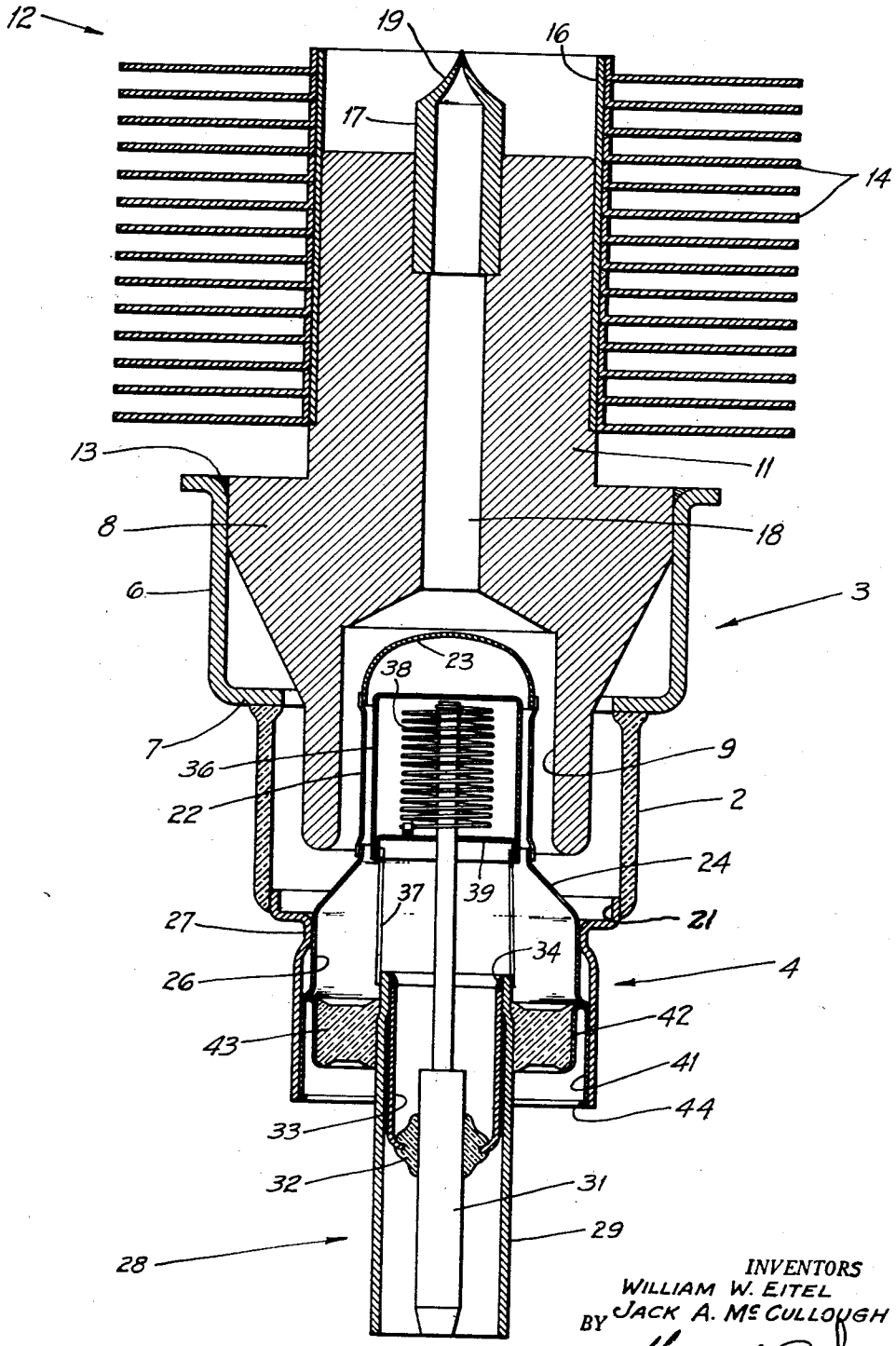
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ELECTRON TUBE

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ELECTRON TUBE

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Our invention relates to an electron tube particularly adapted for ultra high frequency operation.

It is among the objects of our invention to provide a tube of the character described having an improved construction of and arrangement for the electrodes in an envelope.

Another object is to provide improved supporting means for the electrodes, whereby the latter may be assembled with facility and to maintain close and accurate spacings between the electrode surfaces.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of our invention. It is to be understood that we do not limit ourselves to this disclosure of species of our invention as we may adopt variant embodiments thereof within the scope of the claims.

Referring to the drawing:

The figure of the drawing is an axial sectional view of a tube embodying the improvements of our invention.

In terms of broad inclusion, our tube comprises an anode, a concentric cathode stem, and an intermediate grid terminal member, all arranged coaxial on the envelope. The anode has an internally projecting portion having a recess therein, and an externally projecting portion carrying a cooler. A cathode and grid are arranged in the envelope to extend into the anode recess, the grid being connected to the terminal member and the cathode to the concentric stem.

In greater detail, and referring to the drawing, our tube comprises an envelope having a cylindrical body section 2 of vitreous material, such as glass, sealed at one end to an anode supporting member 3 and at the other end to a grid terminal member 4. The anode support 3 is preferably a cup-shaped piece having a cylindrical wall 6 and a flange 7 to which the glass is sealed.

The anode is preferably of metal having good heat conductivity, such as copper, and comprises an inwardly projecting portion 8 having a recess 9 and an outwardly projecting portion 11 carrying the cooler 12. This anode unit is generally cylindrical in shape, concentric with the longitudinal axis of the tube, and is secured to support 3, as by a copper braze 13 at the rim of wall 6. The internal portion of the anode is preferably tapered toward the recessed end, which reduces the amount of metal yet provides an ample heat

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path. Recess 9 is preferably cylindrical and is coaxial with the anode.

Heat is conducted away from the active portion of the anode by the outwardly projecting portion 11, which portion forms the core of cooler 12. Anode portion 11 is preferably cylindrical and of sufficient cross-sectional area to provide for the necessary heat flow. Cooler 12 may be of any suitable construction, such as one having radial fins 14 secured to a sleeve 16 attached to anode portion 11.

The tube is exhausted through a metal tubulation 17 secured to the end of anode projection 11. This tubulation communicates with a passage 18 into the anode opening into anode recess 9. After exhaust, the tube is sealed by mechanically pinching off the tubulation at tip 19. By surrounding tubulation 17, the cooler performs the additional function of providing a protective closure for the tubulation.

Grid terminal member 4 is preferably tubular and is coaxial with the anode. It has a flange 21 to which glass body section 2 is sealed. Grid 22 is preferably cylindrical with vertical bars secured at the top to a cap 23 and at the bottom to a conical bracket 24 having a cylindrical sleeve 26 fitted into terminal member 4. This grid assembly is inserted through the open end of member 4, and is secured by spot welding to reduced neck portion 27 of member 4. These parts are carefully shaped as to diameter so as to align the grid within the anode recess. Member 4, being connected to the grid, thus functions as the grid terminal.

Cathode stem 28 is also coaxial with the anode, and projects into tubular member 4 from which it derives its support. The stem comprises a pair of concentric stem members including an outer tubular part 29 and an inner rod-like part 31. These stem parts are joined by a glass bead 32 sealed between rod 31 and the lower end of a sleeve 33, which sleeve is fitted into tubular stem part 29 and secured thereto by braze 34.

The cathode comprises a can-shaped element 36 having a cylindrical side wall carrying the active cathode coating. This coating may be of the usual oxide type commonly employed with indirectly heated cathodes. Cathode element 36 extends concentrically within the grid and the anode recess. It is supported by and electrically connected to outer stem member 29 by bracket arms 37. The cathode heater comprises a spiral 38 connected at one end to the inner stem member and at the other end to base plate 39 of the cathode element. Heating current may thus be

supplied to the heater through the stem members.

The cathode and its stem structure is supported by a U-shaped sleeve fitted into tubular member 4 and having an outer flange 41 and an inner flange 42. A vitreous ring or washer 43 is sealed between outer stem member 29 and inner flange 42 of the supporting sleeve. Sleeve 41—42 abuts sleeve 26 so that the latter serves as a spacer and positioning stop for the cathode unit. Final braze 44 is made at the outer edge of flange 41 and the adjacent rim of tubular member 4.

We claim:

1. An electron tube comprising an envelope having a recessed anode at the upper end and a cathode stem at the lower end, said stem comprising an outer tubular member and an inner prong member, a grid terminal ring interposed in the envelope wall between the outer stem member and said anode and providing a cylindrical contact surface, the lower portions of the stem members projecting externally of the envelope and providing cylindrical contact surfaces coaxial with that of said grid terminal ring, the cylinders defined by said contact surfaces having different diameters of which the inner stem member is the smallest the outer stem member is next largest and the grid terminal ring is the largest, a cathode element extending into the anode recess and connected to one of the stem members, a heater for the cathode element connected to the stem members, and a grid disposed about the cathode element and connected to said grid terminal ring.

2. An electron tube comprising an envelope having a recessed anode at the upper end and a cathode stem at the lower end, said stem comprising an outer tubular member and an inner

prong member, a grid terminal ring interposed in the envelope wall between the outer stem member and said anode and providing a cylindrical contact surface, the lower portions of the stem members projecting externally of the envelope and providing cylindrical contact surfaces coaxial with that of said grid terminal ring, the cylinders defined by said contact surfaces having different diameters of which the inner stem member is the smallest the outer stem member is next largest and the grid terminal ring is the largest, the envelope wall being joined to the tubular stem member above its cylindrical contact surface, vacuum-tight sealing means disposed between the stem members and joined to the inner prong member above its cylindrical contact surface, a cathode element extending into the anode recess and connected to one of the stem members, a heater for the cathode element connected to the stem members, and a grid disposed about the cathode element and connected to said grid terminal ring.

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