Feb. 6, 1945. W. W. EITEL ET AL 2,368,812

ELECTRONIC TUBE

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Fig. 1

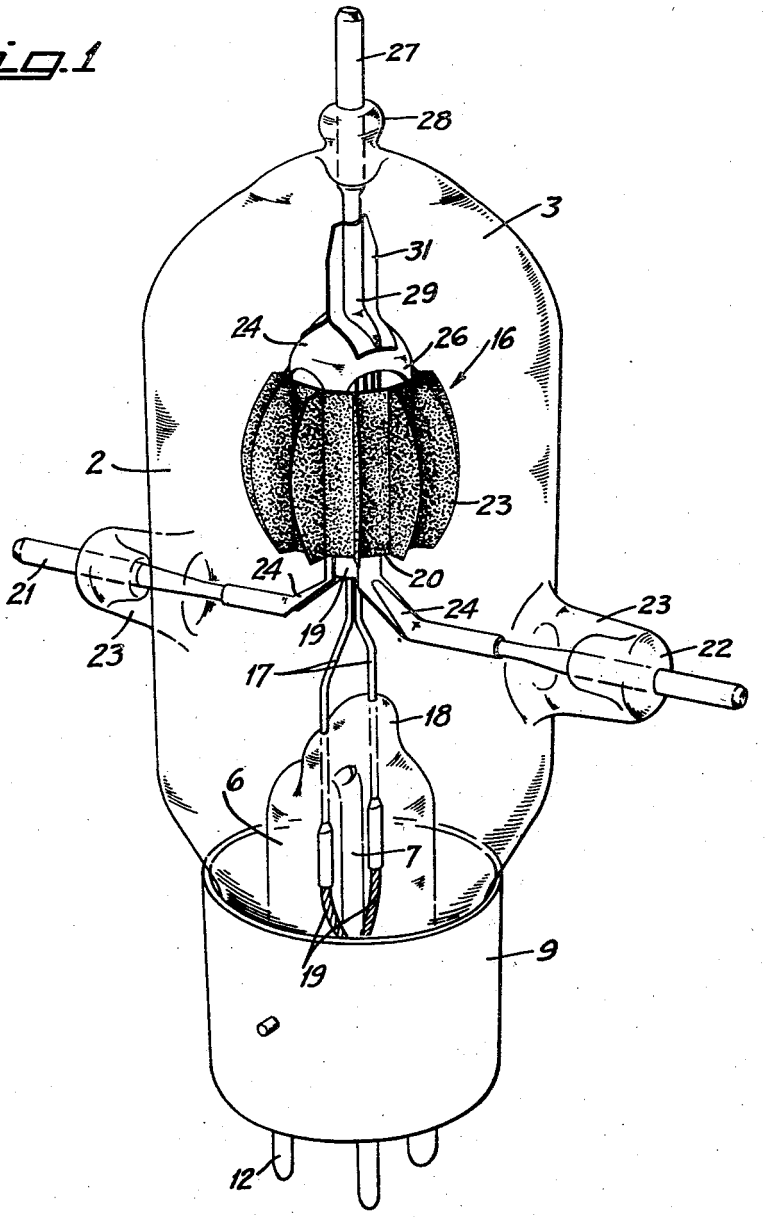

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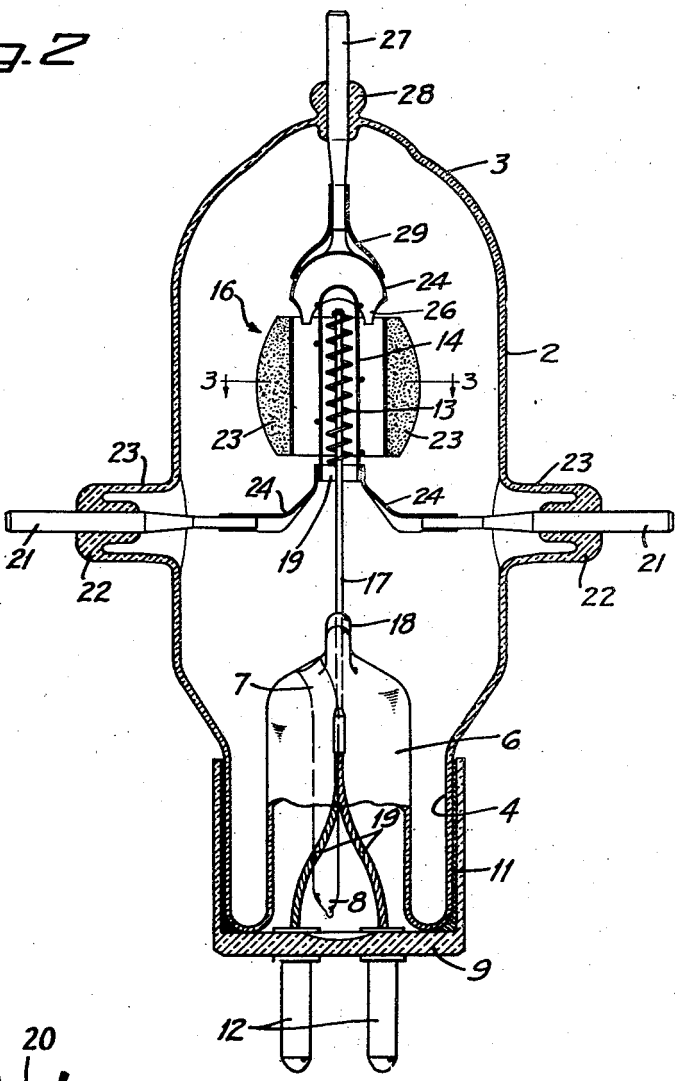
Fig. 2



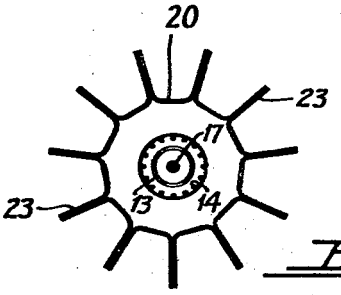


Fig. 3

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Patented Feb. 6, 1945 2,368,812

UNITED STATES PATENT OFFICE

2,368,812

ELECTRONIC TUBE

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Application June 30, 1942, Serial No. 449,147

4 Claims. (Cl. 250—27.5)

Our invention relates to an electronic tube particularly adapted for transmission purposes.

It is among the objects of our invention to provide an improved structure of, arrangement for and mounting of the electrodes and leads in the envelope of a tube.

Another object is to provide an improved finned plate structure.

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 drawings:

Figure 1 is a perspective view of a tube embodying the improvements of our invention.

Figure 2 is a vertical sectional view of the tube.

Figure 3 is a horizontal sectional view of the electrodes taken in a plane indicated by line 3—3 of Figure 2.

In terms of broad inclusion, our tube comprises an envelope enclosing a plurality of coaxial electrodes including a cathode, grid and plate. The plate is preferably supported on a lead coaxial with the electrodes; the grid on a lead transverse to the electrodes; and the cathode on leads sealed to a stem at the envelope end opposite the plate lead. The improved plate structure comprises a plurality of channel-shaped sections disposed side-by-side to form a tubular body with the channel flanges extending radially to provide heat radiating fins.

In greater detail, and referring to the drawings, our tube comprises an envelope of glass or the like having a cylindrical body 2 with a top dome 3 and a reduced neck 4 to which a reentrant stem 6 is sealed. The stem carries a tubulation 7 for evacuating the envelope and, after exhaust, is sealed off the pump at point 8. Base 9 of say porcelain is secured to neck 4 by a suitable cement 11. The base carries the usual set of prongs 12.

Within the envelope are mounted a plurality of coaxial electrodes, including a cathode 13, grid 14 and plate or anode 16. The cathode is preferably of the filamentary type comprising a coil of thoriated tungsten secured at top and bottom to a pair of tungsten leads 17 sealed to a press 18 on stem 6. Flexible lead extensions 19 connect the lower ends of cathode leads 17 with a pair of the base prongs 12.

Grid 14 is of the cage type free at the top and terminating at the bottom in a tantalum ring 19. The grid may be of any suitable material such as tantalum, but platinum is preferred. This grid is preferably supported on the inner ends of a pair of aligned tungsten leads 21 disposed transversely of the electrodes and extending through the sides of the envelope at seals 22 on horns 23. Supporting brackets 24 for the grid comprise strips of tantalum welded to ring 19. These brackets are shaped to form sleeves embracing and welded to the reduced inner ends of leads 21. Short direct leads, desirable for high frequency work, are thus provided. If desired, one of the leads and supporting brackets may be omitted to provide a tube having a single grid lead.

Plate 16 is also of improved construction. It comprises a plurality of channel-shaped sections 20, preferably of tantalum, disposed side-by-side to form a tubular body with the channel flanges extending radially to provide heat radiating fins 23. Adjacent flanges of the sections are spot welded together, producing fins of double thickness and uniting the sections into a structurally integral unit. This plate structure is strong mechanically; is highly resistant to warpage; is easily fabricated; and radiates heat efficiently.

Fins 23 are preferably arcuately shaped to furnish greater fin width at the central regions of the plate. This gives more radiating surface at the mid portions of the unit where heating is the greatest.

A hemispherical cap 24, also preferably of tantalum, is arranged over the top of the plate with depending tabs 26 welded to the plate sections. Arched recesses in the cap between tabs 26 form vent openings at the rim. This cap protects the glass at the dome against electron bombardment and affords additional heat radiating surface for the plate structure.

Plate lead 27 of tungsten is disposed coaxially of the electrodes and extends through the top of the envelope at seal 28. Support for the plate is provided by a bracket 29 welded at one end to cap 24 and at the other end to the reduced inner portion of lead 27. This bracket preferably comprises a pair of tantalum straps shaped to form a sleeve for embracing the lead, with outwardly projecting flanges 31 extending along the lead to function as heat radiating fins. The lower foot portions of the bracket straps are curved to lap the plate cap for convenient welding.

The above mounting produces a rigid support for the plate, and furnishes a short direct lead. Furthermore, the mounting prevents seal 28 from

cracking because end cap 24 and finned bracket 29 dissipate the heat by radiation before any great amount has a chance to flow out to the seal by conduction.

We claim:

1. An electronic tube comprising an envelope, and an electrode in the envelope comprising a plurality of channel-shaped sections disposed side-by-side to form a cylindrical body with the channel flanges extending radially to provide heat radiating fins, said fins being wider adjacent the central portions of the electrode than at an end thereof to provide maximum heat radiating area about the mid circumference of the electrode.

2. An electronic tube comprising an envelope, an electrode in the envelope comprising a plurality of channel-shaped sections disposed side-by-side to form a tubular body with the channel flanges extending radially to provide heat radiating fins, a lead sealed to the envelope, a cup-shaped cap having rim portions secured to the channel sections at one end of the electrode, and means on the cap for supporting the electrode on the lead.

3. An electronic tube comprising an envelope, a plate in the envelope comprising a plurality of channel-shaped sections disposed side-by-side to form a tubular body with the channel flanges extending radially to provide heat radiating fins, a lead extending longitudinally of the plate and sealed to the envelope, means adjacent one end of the plate for supporting it on said lead, a grid extending within the plate, a lead disposed transversely of the plate and sealed to the envelope, and means adjacent the other end of the plate for supporting the grid on the transverse lead.

4. An electronic tube comprising an envelope, an electrode in the envelope comprising a plurality of channel-shaped sections disposed side-by-side to form a tubular body with the channel flanges extending radially to provide heat radiating fins, a lead projecting into the envelope, a cup-shaped cap having rim portions secured to the channel sections at one end of the electrode, and means adjacent the capped end of the electrode supporting it on said lead.

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