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THERMIONIC TUBE

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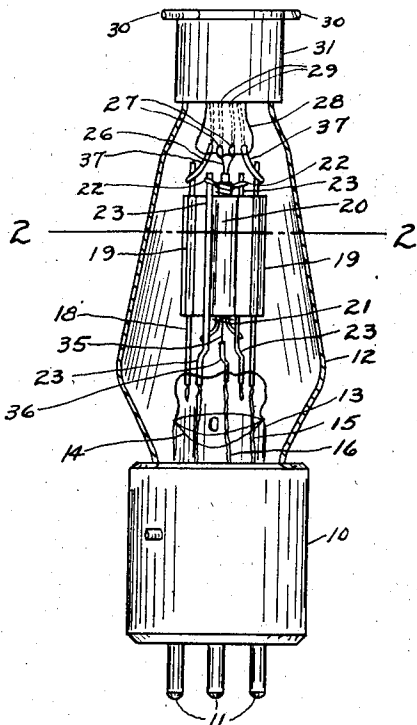


Fig. 1

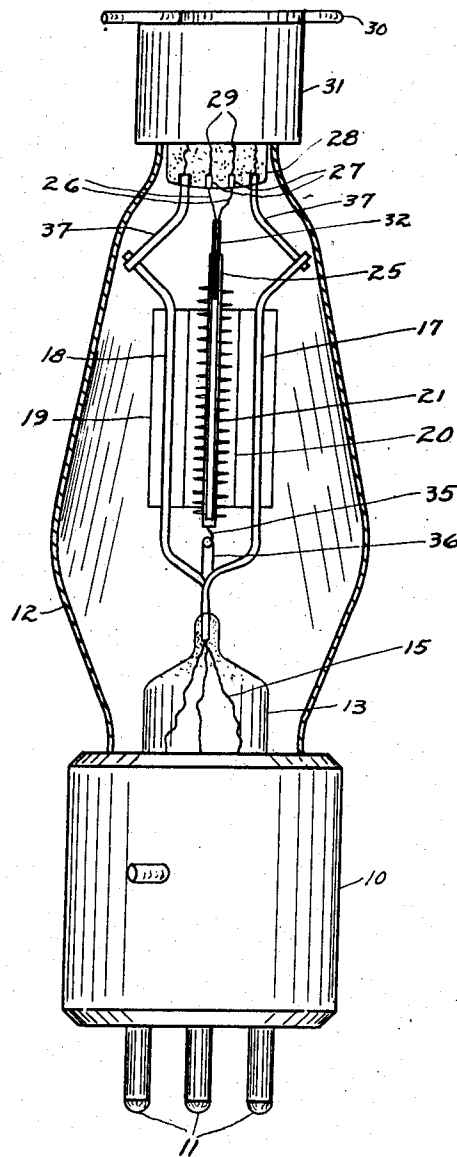


Fig. 3

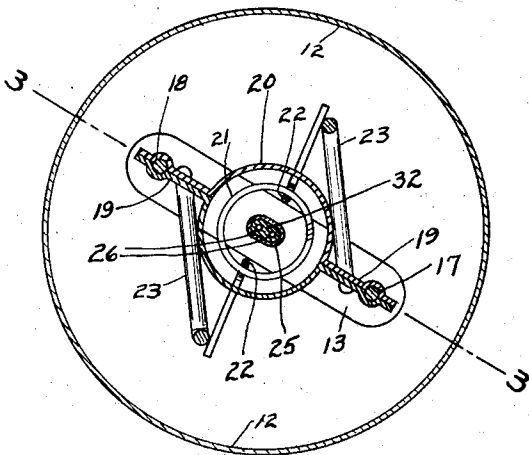


Fig. 2

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THERMIONIC TUBE

Application filed April 9, 1926. Serial No. 100,897.

This invention relates to vacuum tubes such as are frequently employed in radio systems and particularly to tubes of the character in which the cathode is associated with a heating element heated by a resistance member supplied with current by leads connected with terminal contacts carried by an auxiliary base or cap at the end of the glass envelope or bulb remote from the main base.

In tubes of this type heretofore manufactured the leads to the resistance member, above referred to, pass through a secondary or auxiliary stem associated with the cap member. In the manufacture of tubes, it is necessary to seal this auxiliary stem to the top of the tube, and in the tubes previously manufactured it has been necessary to adjust this auxiliary stem during the sealing process, just referred to, so as to position the cathode and heating element centrally of the cylindrical grid. As this process has to be carried out with considerable care and exactness, it renders the manufacture of the bulb slower and more expensive.

The object of the present invention, therefore, is the provision of means associated with the tube elements whereby the said elements and particularly the cathode and heating element thereof are maintained in their proper relative positions; thus obviating the adjustment of the auxiliary stem during the sealing process above referred to.

It is believed the further disclosure of the invention will be understood most readily from a detailed description thereof taken in connection with the accompanying drawings, in which:

Fig. 1 is a side view of a completed tube of the present invention, with one side of the glass inclosure or bulb cut away;

Fig. 2 is a transverse section through the tube elements of the device of Fig. 1 substantially on the line 2—2;

Fig. 3 is a longitudinal section substantially on the line 3—3 of Fig. 2.

Referring now to the drawings in which like reference characters indicate the same parts in the different views, 10 indicates a tube base which may be of the usual character from which project the terminal contact pins

11. Within the base 10 is one end of the glass inclosure or bulb 12. Extending upwardly from the lower end of the bulb 12 and sealed thereto is the stem 13 through which extend the conductors 14, 15 and 16 terminating at their lower ends in the terminal pins 11. The wires 17 and 18 are fixed at their lower ends in the stem 13 and extend upwardly and are secured to the flanges or wings 19 extending outwardly from the substantially cylindrical plate 20.

Within the plate 20 and substantially concentrically therewith is a grid 21 which may be formed of a helical coil of wire or in any other desired manner. Located within the opposite sides of the grid 21 are the wires 22, the opposite ends of which are bent outwardly at right angles and secured to the wires 23. The lower ends of wires 23 are offset and fixed in the stem 13.

As above noted, the cathode employed in the tube of the present invention is of the type wherein the heating or resistance element is electrically independent of the cathode and acts through the porcelain or like material in which the resistance element is positioned to heat the cathode sleeve or shell. In the present embodiment of the invention the cathode shell surrounds the porcelain portion of the heating device. A cathode of the general character of that herein employed is described in detail in the application of Frederick S. McCullough, Serial No. 12,477, filed March 2, 1925.

In Fig. 2 the cathode sleeve or shell is indicated at 25. Within the sleeve 25 is the resistance element or wire 26 arranged in the form of a loop, the upper ends of which extend from the top of the cathode structure, as shown in Fig. 1, and are electrically joined to the wires or leads 27 anchored in the secondary or auxiliary stem 28. The wires 27 are connected by the leads 29 to the contact pins 30 carried by the auxiliary base 31. Surrounding the resistance wire 26 and acting to electrically insulate it from the cathode shell 25 is the heat conducting insulating material 32, such as porcelain or the like.

It is to be understood that the stem 28 is sealed to the top of the glass inclosure or bulb

12. As previously pointed out, in tubes of the general character of that herein shown, it has heretofore been necessary when sealing the auxiliary stem 28 to the top of the bulb 12 to adjust it so that the cathode and heating element are centrally positioned within the grid. In the present arrangement the lower end of the cathode structure is maintained substantially in position by the conductor 35 which joins the lower end of the cathode shell to the wire 36 fixed in the stem 13. Extending downwardly from the auxiliary stem 28 is a pair of wires 37, the lower ends of which curve outwardly and are fixed to the upper ends of the wires 17 and 18, which, it will be remembered, are secured to the flanges 19 extending from the plate 20. The wires 37 being fairly rigid and being securely fixed to the wires 17 and 18, act firmly to maintain the auxiliary stem 28 in such a position that the heating element rests centrally of the grid member 21.

As the grid member 21 is carried between the wires or rods 23, which are anchored to the base 13, it is maintained in its proper position. The wires 17 and 18 being secured to the wings 19, extending outwardly from the plate member 20, are maintained firmly in spaced relation and thus form a relatively rigid structure to which the auxiliary base 28 is fixed through the medium of the wires 37. Thus all tube elements are maintained in their proper relative positions so that in assembling the elements in the inclosure or bulb 12, it is not necessary to adjust or manipulate the auxiliary stem 28 when sealing it to the top of the bulb. This structure not only greatly facilitates the assembling of the bulb, but also acts to more certainly insure that the tube elements will occupy their proper relative positions.

While in the drawings and in the present description but a single form of tube has been disclosed, it is to be understood that the details of construction may be greatly modified without departing from the spirit of the invention. The invention, therefore, should be limited only by the scope of the appended claims.

Having thus described my invention, what I claim is new and desire to secure by Letters Patent of the United States is:

1. In a vacuum tube, a stem, a pair of spaced wires extending from said stem, a plate fixed between said wires, a grid, means lying in a plane at right angles to the plane of said spaced wire for supporting said grid from said first stem to maintain said grid in substantially fixed relation to said plate, a cathode associated with said grid, a support in said stem for said cathode a looped heating element for said cathode, a secondary stem, leads for said heating element extending through said secondary stem for positioning said cathode and means joining said secondary stem to said wires whereby said second-

ary stem is supported by said wires to position cathode and plate.

2. In a vacuum tube, a stem, spaced wires extending from said stem, a plate fixed to said wires, a grid, wires extending from said stem for supporting said grid from said stem in fixed relation to said plate said wires being offset so as to lie in a plane at substantially right angles to the plane of said spaced wires, a cathode associated with said grid and attached to said stem and having a conductor extending through said stem, a heating element for said cathode, a secondary stem, leads for said heating element extending through said secondary stem, and means joining said secondary stem to said wires whereby said cathode is maintained in fixed relation to said plate.

3. A vacuum tube structure including a glass envelope having a glass supporting stem, an anode having double supports connected to said stem, a grid, double supports for said grid fixed to said stem, said last mentioned double supports being positioned in a plane divergent to the plane of said anode supports, a cathode structure attached to said stem, a second supporting stem attached to the anode supporting means, and means attaching said cathode structure to said second stem, said glass envelope being attached to said first stem and adapted to be sealed to said second stem.

In testimony whereof I have signed this specification.

EARL L. KOCH.