May 10, 1938. A. HASLAUER 2,116,788

THERMIONIC VALVE ELECTRODE CONSTRUCTION

Original Filed Aug. 28, 1936

Fig. 1

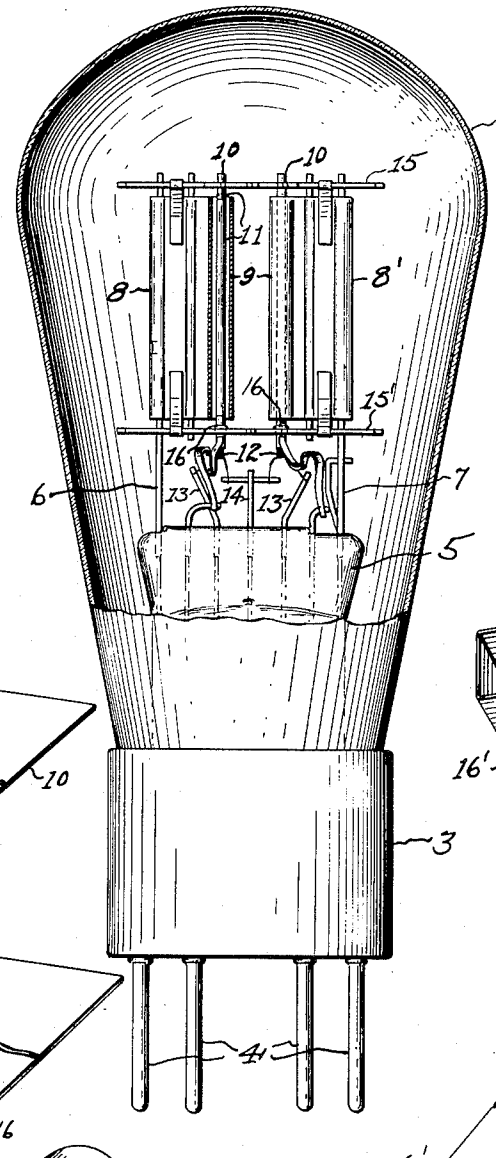


Fig. 2

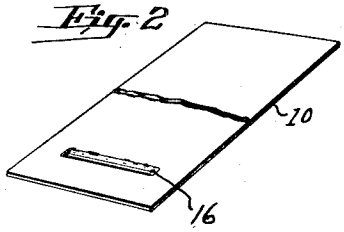


Fig. 5

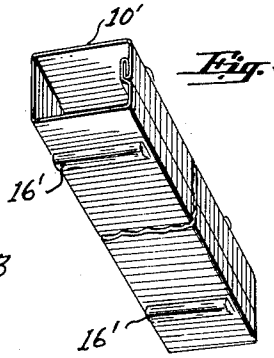


Fig. 3

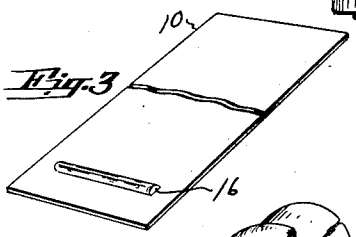


Fig. 4

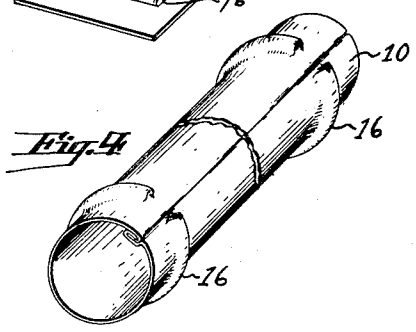
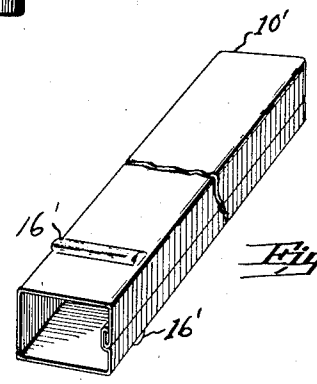


Fig. 6



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UNITED STATES PATENT OFFICE

2,116,788

THERMIONIC VALVE ELECTRODE CONSTRUCTION

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Application August 28, 1936, Serial No. 98,333
Renewed November 15, 1937

7 Claims. (Cl. 250—27.5)

This invention relates, generally, to thermionic valves or vacuum tubes, and the invention has reference, more particularly, to a novel construction of cathode for use in such valves or tubes.

Heretofore, in certain types of thermionic or vacuum tubes such as the UY—227 tube, the usual cathode filament has been replaced by an indirectly heated cathode consisting of an oxide-coated metal cylinder which is heated by an internal filament insulated from the cylinder. The filament is usually tungsten and may be operated with alternating current, the fluctuations in temperature of the filament with each alteration of the current being prevented from varying the substantially uniform temperature of the cylinder owing to the thermal inertia of the insulating material and of the cylinder.

These cylinders, as heretofore constructed, have generally been flattened or pinched at their tops to prevent the same from moving vertically with respect to the surrounding mica insulating support adjoining the upper end portions of these cylinders, the pinching of the upper ends of the cylinders serving to increase their diameters so that they do not slide downwardly through the apertures provided for the cylinders in the mica support. However, this pinching of the upper end portions of the cathode cylinders is objectionable inasmuch as it very often causes the breaking of the internal filament contained within the cylinder, thereby causing an open circuit so that the cathode does not heat up in use. Also, such pinching of the cylinder results in the distortion thereof and causes different parts of the upper portions of the cylinder to be spaced at different distances from the plate or anode of the tube, thereby causing uneven and irregular action of electron flow resulting in the premature ageing and destruction of the oxidized coating of the cathode cylinder.

The principal object of the present invention is to provide a novel construction of cathode cylinder wherein means in the form of a small external bead or beads is provided on the cylinder, which means serves to properly retain the cylinder against longitudinal movement with respect to the mica insulating guide supports of the same.

Another object of this invention lies in the provision of a novel cathode of the above character wherein the internal cross section of the cylinder is not decreased by the presence of the external positioning bead or beads, whereby the internal heating wire is prevented from being injured.

Still another object of the present invention is to provide a novel cathode cylinder wherein the bead is struck out from the material of the cathode cylinder itself, thereby providing an economical and rigid structure and one which does not appreciably detract from the electrical efficiency of the cylinder.

Other objects of this invention, not at this time more particularly enumerated, will be clearly understood from the following detailed description of the same.

The invention is clearly illustrated in the accompanying drawing, in which:

Fig. 1 is a view in front elevation with parts broken away of a thermionic valve provided with the novel cathode construction of this invention.

Fig. 2 is an enlarged perspective view with parts broken away of a blank used in forming the cathode cylinder of Fig. 1, the outstruck boss for forming the bead of the cylinder being shown.

Fig. 3 is a view similar to Fig. 2, but shows the reverse side of the blank.

Fig. 4 is a perspective view of a cathode cylinder provided with beads at both end portions thereof, and

Figs. 5 and 6 are modifications showing the use of cathode cylinders of rectangular cross section.

Similar characters of reference are employed in said views to indicate corresponding parts.

Referring now to Figs. 1 to 3 of the said drawing, the reference numeral 1 designates a thermionic valve or vacuum tube having a bulb 2 and base 3 provided with contact prongs 4. Within the bulb 2 there is the usual glass supporting neck 5 carrying upstanding spaced posts 6 and 7. Tube 1 is illustrated as of the double diode type having plates 8 and 8' carried by the posts 6 and 7, respectively, the said plates having hollow cylindrical inner or active portions 9 surrounding cathodes comprising the novel cathode construction of this invention. Since both cathodes within the plate active portions 9 are similar, only one of these cathodes need be described in detail.

The cathode is of hollow or tubular shape and is designated by the reference numeral 10 in the drawing. The same comprises essentially a tube made up of thin sheet metal having preferably a lock seam joint that is especially shown in Fig. 4 and being provided on its exterior surface with an oxide-coating 11. Within the cylinder 10 is provided a heating filament or wire coil 12 having terminals connected to posts 13 and 14 leading to certain of the prongs 4. In use, the heating of the filament 12 serves to effect the heating of the cylinder 10 surrounding the filament and hence the heating of the oxide-coating 11, re-

sulting in the flow of electrons to the plate portion 9.

According to the preferred construction, in order to prevent the cylinder 10 from sliding or moving longitudinally with respect to the upper and lower mica insulators or plates 15 and 15' the cylinder 10 is provided on its exterior surface with a projecting hollow boss or bead 16 that is struck out from the material of the cylinder, the said bead being positioned adjacent one of the insulating plates 15 or 15'. In Fig. 1 of the drawing, the bead 16 is shown engaging the upper surface of the lower mica insulating plate 15', although this bead could be positioned at the upper portion of cylinder 10, if desired, so as to engage the insulating plate 15. With the bead 16 engaging plate 15', the cathode is effectively held against longitudinal movement, and inasmuch as the bead 16 is symmetrical with respect to the main body of the cylinder 10, the same does not materially effect the electrical properties of the same, and furthermore does not interfere with the inner contained filament 12.

In Figs. 2 and 3 the sheet metal blank used in producing the cathode cylinder 10 is illustrated, the same being formed with the outstruck bead 16 extending transversely thereof prior to rolling the blank into cylinder shape. Although the cathode cylinder 10 is illustrated in Figs. 1 to 3 as provided with but a single bead it is understood that the same may be provided with two beads, one at each end portion thereof, for engaging both of the mica insulating plates 15 and 15'. Thus, in Fig. 4 the cathode cylinder 10 is shown made up with two of the beads 16.

It is not essential that the cathode cylinder shall be of circular shape in cross section, and if desired this cylinder could be made of any suitable shape. Thus in Fig. 5, the tubular cathode is shown as of rectangular cross section and the same is true of the structure in Fig. 6. In Fig. 5 the cathode tube 10' is shown provided with two pairs of the bosses or beads 16', the bosses or beads of each pair extending along opposite sides of the cathode 2, one pair being located adjacent the lower end of the tube and the other pair being located adjacent the upper end of the tube. In Fig. 6 but one pair of beads or bosses is shown. It will be noted that in all forms of the invention the beads or projections are so located as not to interfere with the lock seam joint of the cylinder or tube, the bead terminating short of the joint and extending substantially completely around the tube in the forms of the invention shown in Figs. 1 to 4, and but part way around the same in forms shown in Figs. 5 and 6.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, as defined by the following claims, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:—

1. A one-piece cathode for thermionic tubes comprising, a tubular member formed from a sheet metal blank having a transverse outstruck boss thereon terminating short of the side margins of said blank, said blank being bent into tubular shape and formed with a lock seam joint, said boss providing an external bead on said cathode terminating short of said joint.

2. An electrode for a thermionic tube comprising a sheet-metal blank retained in tubular shape by a lock-seam joint comprised of marginal areas of the blank, and having one or more positioning elements struck from the blank, prior to its formation into a lock-seam tube, at one or more regions intermediate said marginal areas and intermediate the ends of the electrode.

3. An electrode for a thermionic tube comprising a sheet-metal blank retained in tubular shape by a lock-seam joint comprised of marginal areas of the blank, and having one or more positioning elements struck out from the blank, prior to its formation into a lock-seam tubular electrode to project externally from the lock-seam electrode at one or more regions intermediate said marginal areas and intermediate the ends of the electrode.

4. A one-piece cathode for a thermionic tube comprising a sheet-metal blank retained in tubular shape by a lock-seam joint comprised of marginal areas of the blank, and having one or more positioning beads extending circumferentially of the member, terminating short of said lock-seam joint, and struck from the blank, prior to its formation into a lock-seam tube.

5. A one piece cathode for a thermionic tube comprising a sheet-metal blank retained in tubular shape by a lock-seam joint comprised of marginal areas of the blank, and having one or more series of circumferentially spaced positioning elements struck from the blank, prior to its formation into a lock-seam tube, at regions intermediate said marginal areas.

6. An electrode for a thermionic tube comprising a tubular member retained in shape by a lock-seam joint extending undistorted longitudinally thereof, and having one or more positioning elements struck from the members intermediate its ends and at regions other than said lock-seam joint.

7. A blank for a beaded electrode having intermediate its ends one or more positioning elements struck out from the blank at regions leaving opposite margins of the blank undistorted by the positioning elements for formation of a lock-seam.

ADOLF HASLAUER.

CERTIFICATE OF CORRECTION.

Patent No. 2,116,788. May 10, 1938.

ADOLF HASLAUER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 27, claim 3, after the word "electrode" insert a comma; and line 51, claim 6, for the word "members" read member; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of June, A. D. 1938.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)