Jan. 16, 1945. C. M. RIVELY 2,367,615

GRID

Filed Nov. 10, 1943

Fig. 1.

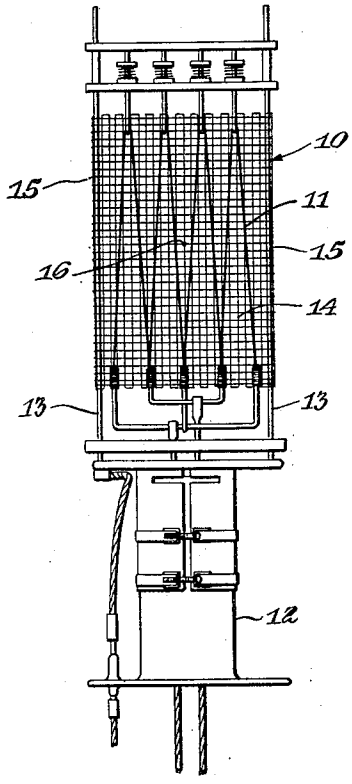


Fig. 2.

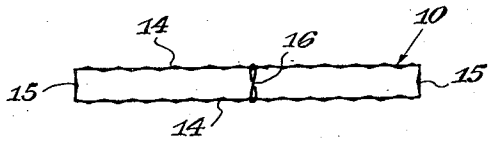
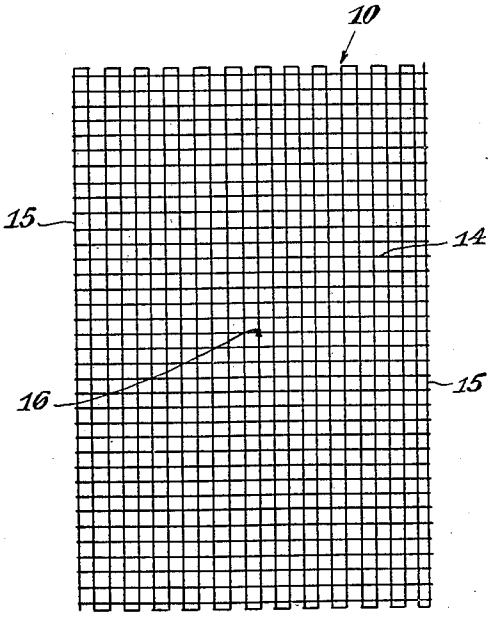


Fig. 3.



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GRID

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8 Claims. (Cl. 250—27.5)

This invention relates to grids, and is included within the general classification of electron discharge devices.

It is recognized that in many respects a grid fabricated from woven-wire mesh constitutes a most desirable control element in electron discharge devices. For least interference with electron flow therethrough, the wire from which the mesh is woven is preferably of a very small gauge, but which has the detrimental effect of rendering the grid less rigid and consequently easily deflected from its normal plane and rendered convex under influence of otherwise negligible forces. In an electron discharge device, high voltages exist in use between the grid and anode which set up an electrostatic attraction. Since a rectangular box-form of grid is attached only at its side edges, and in a transmitting tube is approximately three or four inches wide and woven of wire having a diameter of .015 inch, the attraction mentioned bulges or bows the large and otherwise flat faces of the grid to a considerable extent. The grid in use is hot, and as a result retains a percentage of the distortion, as a consequence of which the grid-to-anode and grid-to-cathode spacings are changed and the static characteristics of the device no longer meet requirements therefor.

In its most general aspect, an object of the present invention is to overcome bulging of the flat grid faces.

More specifically, an object of the invention is to maintain substantial parallelism of the large flat faces of the box-form rectangular grid.

Another object of the invention is to utilize means for maintaining the grid surfaces substantially parallel and at the same time avoid change of tube characteristics by inclusion of such means.

In detail, the invention contemplates tying the opposed larger flat faces of a rectangular grid to each other for preventing bowing or bulging thereof.

Still further objects of the invention will be apparent to those skilled in the art to which it appertains as the description progresses, both by direct recitation thereof and by implication from the context.

Illustrative of the invention, reference is made to the accompanying drawing in which like numerals of reference indicate similar parts throughout the several views, and in which

Figure 1 is a front elevation of a part of the electrode assembly of an electron discharge device embodying the present invention;

Figure 2 is a cross-section of the grid with my invention applied thereto; and

Figure 3 is a front elevation thereof.

In the specific embodiment of the invention illustrated in said drawing, there are shown parts of a transmitting tube, which, as is well known and understood, is a triode comprising cathode, anode and grid supported in proper relation within an evacuated envelope. For simplicity of illustration the envelope and anode have been omitted from the drawing, Figure 1 being limited to showing of the grid 10 and filamentary cathode 11 therein with appropriate supporting means therefor carried by stem 12. The general electron discharge device structure includes two upright parallel posts or wires 13 spaced apart the width of the grid and welded or otherwise secured longitudinally of and to the grid at opposite sides thereof as usual.

The grid 10 is a foraminous structure preferably constituted from molybdenum woven wire mesh formed into a rectangular tube, or box-form in shape, providing large flat faces 14 parallel to each other and narrow side faces 15 perpendicular to the flat faces and parallel to each other. The supporting rods or wires 13 are secured to these side faces. Support for the large flat faces is entirely by virtue of integral formation thereof as continuing parts of the supported side faces.

Cathode 11 is situated within the hollow formed by the several faces of the grid, and is of the filamentary type, being shown as having a plurality of hairpin legs all in a plane midway between the large flat faces of the grid. Successive legs of the filament slope away from each other in said plane so midway of their lengths said legs have average separation and such a separation occurs between two legs at the geometric center of the grid.

Extending from one large flat face of the grid to the other or parallel large flat face thereof, is a tie means 16 shown in the form of an S-hook end loops whereof engage with strands of the mesh of the grid. The tie means is of just the right length to pass around strands of the grid faces 15 when said faces are parallel to each other. Said tie means is applied to the grid preferably at the geometric center of each said large face thereof and accordingly passes between the middle pair of filament legs where the legs have average separation. Likewise, by preference, the tie means is molybdenum wire and is at least as far from the filament legs at any point as said legs are from the grid face. These

circumstances avoid introduction of any capacitance or inductance changing the characteristics of the grid with sides all flat without such tie means. The tie means accordingly does not change the normal tube characteristics. Said tie means will restrain the grid faces from bulging or bowing and thus, notwithstanding electrostatic attraction in use of the anode upon the next contiguous face of the grid, said face is unable to respond to the attraction and remains parallel to the anode face and to the plane of the filament, and the grid-to-anode and grid-to-cathode spacings accordingly remain constant. Consequently an electron discharge device of the present invention will maintain its static characteristics after long usage.

I claim:

1. A grid having opposed faces supported at side edges thereof, and tie means substantially at the geometric centers of said faces retaining said faces thereat from displacement.

2. A grid having opposed faces supported at side edges thereof, and means engaging through said faces and holding said faces thereat with substantially constant spacing from each other.

3. A grid having opposed faces supported at side edges thereof, and tie means substantially at the geometric centers of said faces engaging through the same and retaining said faces thereat from bulging away from each other.

4. A grid comprising woven wire mesh formed as a rectangular tube having opposed large parallel faces, and tie means hooked through the wire mesh and extending between said faces retaining the same from bulging away from each other.

5. A grid comprising woven wire mesh formed as a rectangular tube having opposed large parallel surfaces, and an S-hook extending crosswise from one face to the other and having end loops engaging wires of the mesh of both said faces retaining said faces from bulging thereat.

6. A grid comprising woven wire mesh formed as a rectangular tube having opposed large parallel surfaces, and an S-hook extending crosswise from one face to the other and having end loops engaging wires of the mesh of both said faces from relative displacement with respect to each other.

7. An electron discharge device having a rectangular tubular grid and a hairpin filament in a plane substantially midway between two faces of said grid, and means between legs of said filament and between said two faces of the grid and attached to said faces retaining said faces substantially parallel to said plane.

8. An electron discharge device having a rectangular tubular grid and a hairpin filament midway between said faces of the grid and in a plane substantially midway between two other and larger faces of the grid, and means between legs of said filament and extending from one of said large faces of the grid to the other and attached to said large faces retaining the same substantially parallel to said plane, said means being spaced from any point of the filament at least as far as said plane of the filament is spaced from said large faces of the grid.

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