

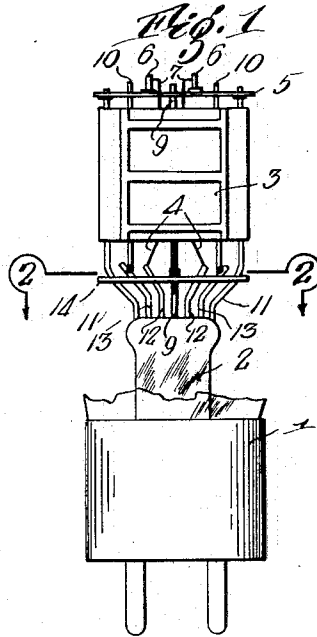
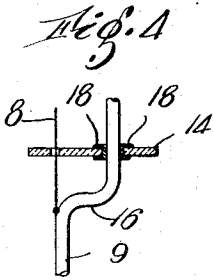
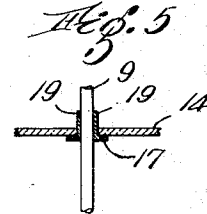
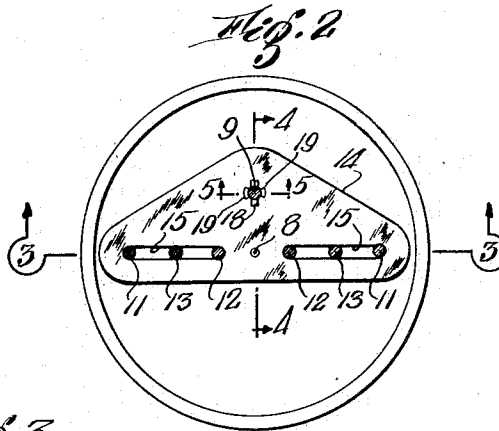
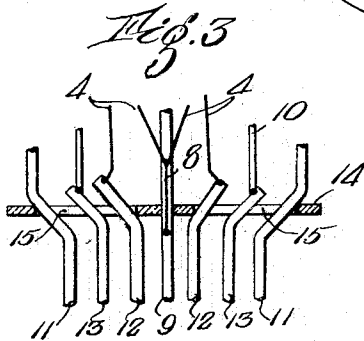
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ELECTRON DISCHARGE DEVICE

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ELECTRON DISCHARGE DEVICE

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13 Claims. (Cl. 250—27.5)

In radio tubes and other electron discharge devices, of both thermionic and gaseous conduction types, it is essential that the electrodes, such as filaments, grids and plates, be held in properly spaced relationship, since even slight relative displacement seriously affects the operating characteristics of such devices and substantial relative displacement may result in short circuits. While it is comparatively easy to establish the correct spacing in the manufacture of the tubes, owing to the inherent fragility of such devices difficulty has been experienced in maintaining the initial relationship during shipment and use.

Objects of the present invention are to provide such devices with means for maintaining the aforesaid relationship which are not only effective for the intended purpose but at the same time are light and inexpensive and can be applied with facility and without substantially increasing the time or cost of manufacture.

For the purpose of illustrating the genus of the invention a typical concrete embodiment is shown in the accompanying drawing in which:

Fig. 1 is a side elevation of a radio tube of the type 71A, with the glass broken away;
Fig. 2 is a section on line 2—2 of Fig. 1;
Fig. 3 is a section on line 3—3 of Fig. 2;
Fig. 4 is a section on line 4—4 of Fig. 2; and
Fig. 5 is a section on line 5—5 of Fig. 2.

The particular embodiment of the invention chosen for the purpose of illustration comprises a base 1, a support in the form of a reentrant glass stem 2, a plate electrode 3 of the flat tubular type, an M-shaped filament 4 having its top points supported on top insulating plate 5 by means of posts 6 and fine wires 7 and having its bottom mid-point supported by a fine wire 8 on post 9, a grid wound spirally about the grid-supporting posts 10 in the space between the filament and the plate and posts 11 for supporting the plate 3 at its opposite sides. Each of the posts 9, 10 and 11 projects through the upper insulating plate 5 and one or more of the posts may be anchored thereto. The filament is supplied with current through the supporting wires 12 and the grid posts 10 are welded to lead-in wires 13. As usual the wires 9, 11, 12 and 13 are relatively heavy and are sealed into the stem 2.

According to this invention the wires 9, 11, 12 and 13 are held in position intermediate the stem 2 and the electrodes by means of a plate or sheet 14 of mica or other suitable insulating material. This sheet is provided with two aligned slots 15 each of which accommodates one of the two sets of wires 11, 12 and 13. As shown in Figs. 1 and 3 the portions of these wires which extend through the plate 14 are bent or inclined outwardly so that the filament wires 12 overlap the insulating plate on the under side at the inner ends of the slots and the plate wires 11 overlap the insulating plate on the upper side at the outer ends of the slots, whereby upward displacement of the sheet 14 is obstructed by the wires 11 and downward displacement of the sheet is resisted by the wires 12.

It will be understood that the insulating sheet 14 is placed in position before the electrodes are mounted on the wires 11, 12 and 13, the sheet being moved downwardly over the upper ends of the wires to a position underneath the overhanging portions of the wires 11 by flexing these two wires inwardly enough to permit the sheet to reach the position shown in Fig. 3 after which the upper portions of the wires 11 may be flexed outwardly to normal position if indeed they do not snap to this position by their own resiliency.

As shown in Fig. 4 the wire 9, which merely serves as a support and not as a lead-in conductor, has an offset portion 16 intermediate the stem 2 and the plate 14 so that it passes through the plate at a point offset from the line of the slots 15. The plate 14 is anchored to the supporting wire 9 by means of an eyelet having an annular flange 17 at one end and having the other end slit longitudinally at four places to provide two tabs 18 which are clinched down over the upper side of the sheet 14 and two lips 19 which are spot welded to the support 9. It will of course be understood that the eyelet is applied to the sheet 14 by clinching over the tabs 18 before the sheet is applied to the wires 9, 11, 12 and 13.

By providing slots 15, instead of individual perforations for the respective wires, assembly of the parts is greatly facilitated and, in use, there is much less leakage between the conductors 11, 12 and 13 inasmuch as the insulating sheet does not bridge the spaces between the conductors, thereby reducing leakage through the sheet and along the surfaces of the sheet. By arranging the conductors 11, 12 and 13 in the same vertical plane, with the slots in alignment in this plane, and anchoring the sheet to post 9 at a point offset from this plane, the structure is not only more effective in maintaining the electrodes in proper relative position but at the same time the construction is simplified.

It should be understood that the present dis-

closure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

5 I claim:

1. An electron discharge device comprising spaced electrodes, a sheet of insulating material having openings therein, and a plurality of pairs of conductors from the electrodes all said con-
10 ductors being bent, with the bent portions extending through said openings in juxtaposition to the peripheries of the openings, different conductors having bends in different directions relatively to the sheet to prevent upward and down-
15 ward displacement of the sheet.

2. An electron discharge device comprising spaced electrodes, a sheet of insulating material having openings therein and conductors extend-
20 ing from the electrodes through said openings in juxtaposition to the peripheries of the openings and obliquely to the sheet, certain of said conductors being inclined in one direction in relation to the sheet and the remainder of said conductors being inclined in an opposite direction.

3. An electron discharge device comprising spaced electrodes, a sheet of insulating material having a slot therein, and conductors extending from the electrodes through said slot near the
25 ends of the slot respectively, the conductor at one end of the slot overlapping one side of the sheet and the conductor at the other end of the slot overlapping the other side of the sheet.

4. An electron discharge device comprising spaced electrodes, a sheet of insulating material
30 having a slot therein, and conductors extending from the electrodes through said slot near the ends of the slot respectively, both conductors being inclined to the sheet in the same direction longitudinally of the slot so that they overlap
40 opposite sides of the sheet respectively.

5. An electron discharge device comprising spaced electrodes, a sheet of insulating material having slots therein, and conductors extending from the electrodes through said slots near one
45 end of each slot respectively, the conductor in one slot overlapping one side of the sheet and the conductor in the other slot overlapping the other side of the sheet.

6. An electron discharge device comprising spaced electrodes, a sheet of insulating material having slots therein, and conductors extending
50 from the electrodes through said slots near the ends of the slots respectively, the conductor at one end of each slot overlapping one side of the sheet and the conductor at the other end of each
55 slot overlapping the other side of the sheet.

7. An electron discharge device comprising spaced electrodes, a sheet of insulating material having slots therein, and conductors extending
60 from the electrodes through said slots near the ends of the slots respectively, the conductors be-

ing inclined to the sheet in different directions in two slots respectively.

8. An electron discharge device comprising spaced electrodes, a sheet of insulating material having two aligned slots therein, and conductors
80 extending from the electrodes through said slots near one end of each slot respectively, said conductors being bent in opposite directions longitudinally of the slots so as to overlap the sheet on the same side.

9. An electron discharge device comprising spaced electrodes, a sheet of insulating material having two aligned slots therein, and conductors
85 extending from the electrodes through said slots near the ends of the slots respectively, the conductors being bent in opposite directions in the two slots respectively so that transverse displacement of the sheet is obstructed in both direc-
90 tions at the ends of each slot.

10. An electron discharge device comprising spaced electrodes, a sheet of insulating material having two aligned slots therein, conductors ex-
95 tending from the electrodes through said slots near one end of each slot respectively, said conductors being bent in opposite directions longitudinally of the slots so as to overlap the sheet on the same side, and a support for said sheet
100 offset from the line of said slots.

11. An electron discharge device comprising spaced electrodes, a sheet of insulating material
105 having two aligned slots therein, conductors extending from the electrodes through said slots near the ends of the slots respectively, the conductors being bent in opposite directions in the two slots respectively so that transverse displacement of the sheet is obstructed in both direc-
110 tions at the ends of each slot, and a support for said sheet offset from the line of said slots.

12. An electron discharge device comprising a plurality of electrodes, a support spaced from
115 the electrodes, a sheet of insulating material disposed in the space between the electrodes and support, the sheet having openings disposed so that each opening is intersected by a single plane perpendicular to the sheet, conductors secured
120 to the support and having inclined portions extending obliquely to the sheet and through said openings, said conductors being connected to said electrodes respectively, and a post extending from the support to a point of connection with said
125 sheet in offset relation to said plane.

13. In a device of the character described the combination of a press, a plurality of wires sealed into said press in substantially the same plane,
130 an insulated member having a pair of aligned elongated slots, each slot positioned to receive one of said sets of wires with two wires in each set engaging opposite ends of the associated slot, and having means to prevent upward and down-
135 ward displacement of said member.

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