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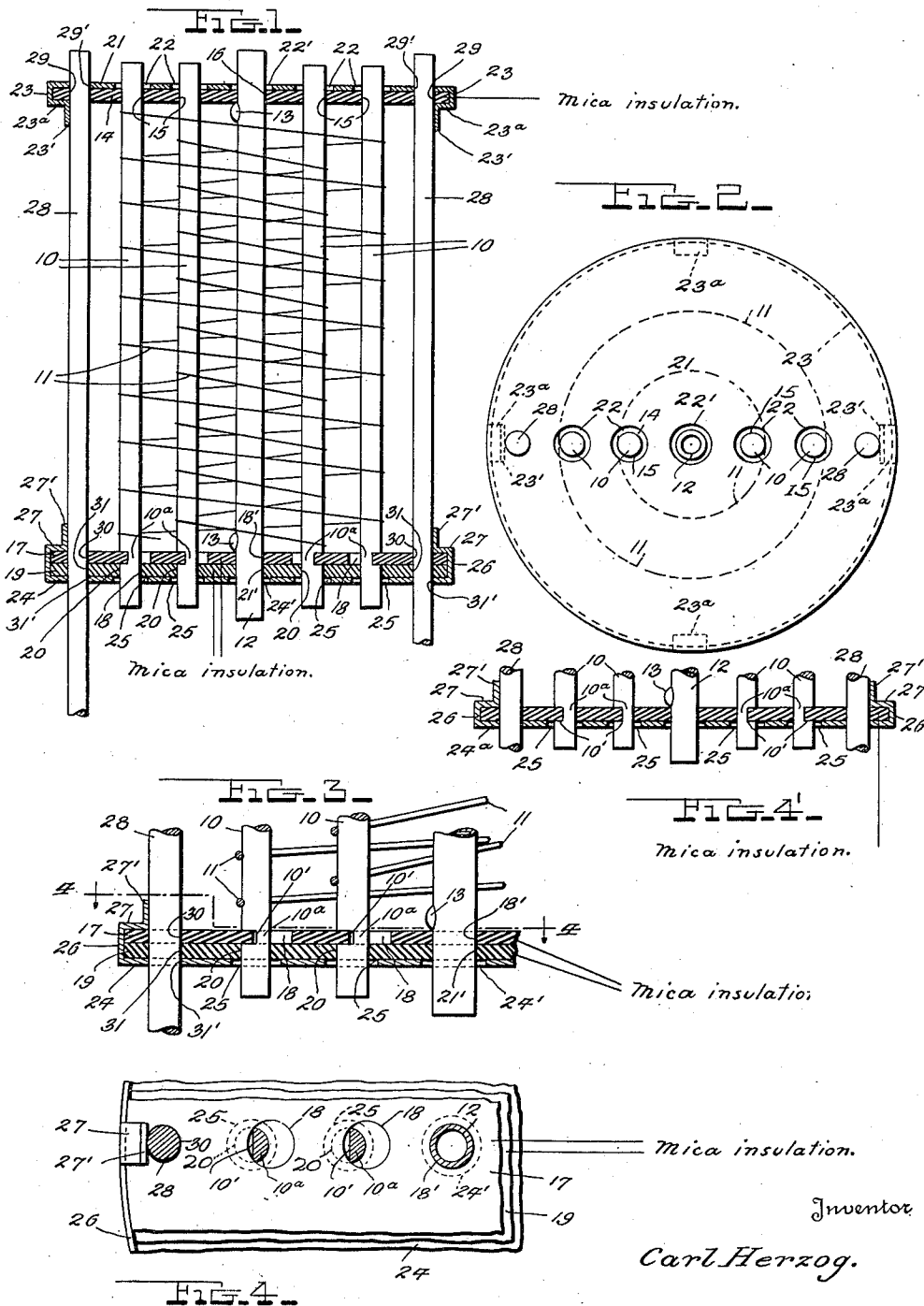
C. HERZOG

2,347,262

GRID DEVICE

Filed Oct. 5, 1943

2 Sheets-Sheet 1



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April 25, 1944.

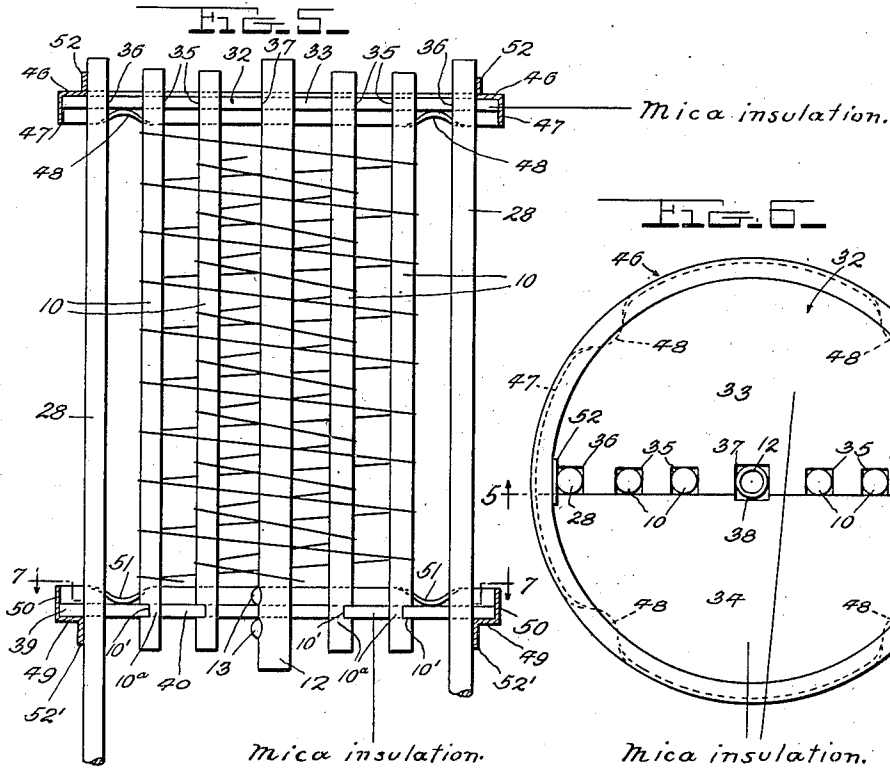
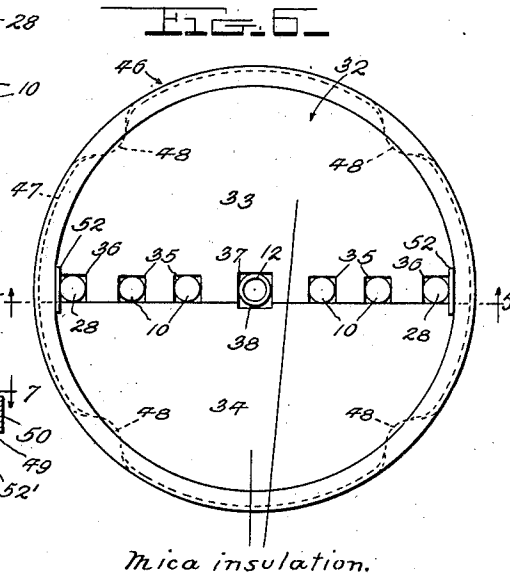
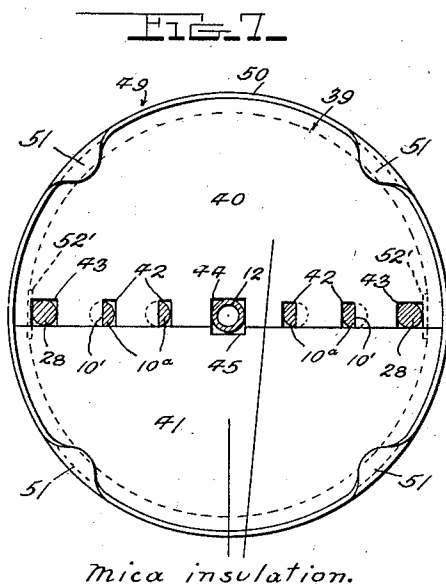
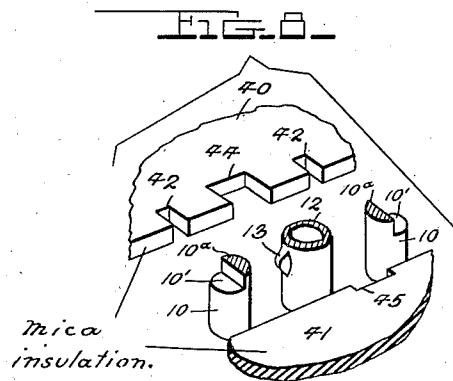
C. HERZOG

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GRID DEVICE

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2 Sheets-Sheet 2



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2,347,262

GRID DEVICE

Carl Herzog, Belleville, N. J.

Application October 5, 1943, Serial No. 505,061

13 Claims. (Cl. 250—27.5)

The present invention relates to a grid device for radio tubes or the like.

An important object of the invention is to provide simple and reliable means for locking the grid side rod or rods with the insulating disc, against axially movement in both directions.

A further object of the invention is to provide locking means for holding the grid side rod against axially displacement, near one end thereof, while leaving the opposite end of the side rod free for axial expansion or contraction.

A further object of the invention is to provide locking means of the above mentioned character, which are simple in construction and will render easy the assembling of the various associated parts.

A further object of the invention is to provide locking means of the above mentioned character which will eliminate the stacking of the side rod or rods or the welding of separate wire stops to the same.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a central vertical longitudinal section through a grid device embodying my invention, parts being shown in elevation,

Figure 2 is the plan view of same,

Figure 3 is a central vertical section, upon an enlarged scale, through the bottom disc and associated elements,

Figure 4 is a horizontal section taken on line 4—4 of Figure 3,

Figure 4' is a central vertical section through a lower disc and associated elements, showing a modification of the invention,

Figure 5 is a vertical section through a modified form of grid device embodying my invention, taken on line 5—5 of Figure 6,

Figure 6 is a plan view of the same,

Figure 7 is a horizontal section taken on line 7—7 of Figure 5, and,

Figure 8 is an exploded perspective view of the lower locking disc and associated elements, parts broken away.

The first form of the invention is shown in Figures 1 to 4 inclusive. In this form of the invention a plurality of grid units are shown. Each grid unit comprises a pair of upstanding

grid side rods 10, formed of metal, having secured thereto by welding or the like a grid element or grid wire 11. The grid elements or wires 11 are preferably circular or spiral and the grid units are arranged in spaced concentric relation. The grid side rods 10 are provided near their lower ends with notches 10', facing radially outwardly, forming reduced portions 10", as shown.

Disposed within the inner grid unit is a cathode sleeve 12 provided near its ends with stops 13.

Arranged near the upper ends of the pairs of grid side rods 10 is an insulating disc 14 formed of mica or the like. This insulating disc has pairs of openings 15 to receive the pairs of grid side rods 10, which preferably have a sliding fit within these openings. The pairs of openings 15 have the same center distances as the normal center distances of the grid side rods 10. The insulating disc 14 has a central opening 16 to slideably receive the upper end of the cathode sleeve 12.

Arranged near the lower ends of the pairs of grid side rods 10 is an inner insulating disc 17, formed of mica or the like. This insulating disc has pairs of openings 18 to receive the pairs of grid side rods, and the center distances of the pairs of openings 18 is less than the center distances of the pairs of side rods. The insulating disc 17 has a central opening 18' to receive the lower end of the cathode sleeve 12 and the stops 13 are disposed adjacent to the discs 14 and 17. Arranged beneath and contacting with the lower face of the disc 17 is an outer insulating disc 19, formed of mica or the like, and this insulating disc has pairs of openings 20 to receive the pairs of grid side rods and the pairs of openings 20 have the same center distances as the pairs of grid side rods which they receive. The disc 19 is provided centrally thereof with an opening 21' to receive the lower end of the cathode sleeve 12, as shown.

A shield is provided for the upper insulating disc 14, which is preferably formed of metal. This shield includes a disc 21, having pairs of openings 22, through which the pairs of grid side rods pass. The openings 22 are of larger diameter than the side rods so that the shield is insulated from the side rods. The disc 21 has a central opening 22' to receive the cathode sleeve 12, and this opening is larger in diameter than the cathode sleeve to insulate the same. The shield has a marginal annular flange 23, receiving the periphery of the disc 14 and extending below the same. The flange 23 has

tabs 23^a which are bent over the lower face of the disc 24. These tabs carry extensions 23'.

Numeral 24 designates a lower shield, preferably formed of metal, arranged beneath and in contact with the disc 17, and having pairs of openings 25, to receive the pairs of grid side rods 10 and these openings are of larger diameter than the side rods so that the side rods are insulated from the disc 24. The disc 24 has a central opening 24' to receive the cathode sleeve 12 and this opening is larger in diameter than the sleeve 12, to insulate it. The shield 24 has an annular flange 26, receiving the peripheries of the discs 17 and 19, and has tabs 27 bent over the upper face of the disc 17, and carrying extensions 27'.

The numeral 28 designates a pair of mounting side rods, extending through openings 29 in the disc 14, openings 29' in the disc 21, openings 30 in the disc 17, openings 31 in the disc 19, and openings 31' in the disc 24.

In assembling the device, the outer pair of grid side rods 10 is brought into proximity to the outer pair of openings 18 and pressed inwardly so that their normal center distance is reduced to that of the outer pair of openings 18. The lower ends of the outer pair of grid side rods 10 are then inserted into the outer pair of openings 18, subsequently to which the pressure is relieved upon the outer pair of grid side rods and they expand to their normal center distance, as the grid wire is resilient, and the notches 10' will receive portions of the disc 17 adjacent to the openings 18. In a similar manner, the inner pair of grid side rods are introduced into the inner pair of openings 18 and subsequently locked to the disc 17. The cathode sleeve 12 has its lower end passed into the opening 18' and the mounting side rods 28 have their lower ends passed into the openings 30. The outer disc 19 is now placed upon the disc 17 and its pairs of openings 20 receive the pairs of grid side rods, since the pairs of openings 20 have the same center distances as the normal center distances of the grid side rods. The other openings in the disc 19 receive the ends of the sleeve 12 and the mounting side rods. The disc 24 is now applied to the disc 19 and the tabs 27 are bent over the disc 17. The upper insulating disc 14 is now applied to the upper ends of the pairs of grid side rods and these side rods extend through the openings 15 since the pairs of openings 15 have the same center distances as the normal center distances of the pairs of grid side rods. The sleeve 12 and mounting side rods 28 pass through the other openings in the disc 14. The disc 21 is applied to the disc 14 and the flaps 23^a are bent over the inner face of the disc 14. The extensions 23' and 27' are now welded to the rods 28.

From the foregoing description it will be seen that the notches 10' lock the pairs of grid side rods to the lower disc 17 against axial movement, adjacent to their lower ends, while the disc 19 holds these pairs of grid side rods against lateral movement with relation to the disc 17. The pairs of grid side rods are therefore securely locked against axial and lateral movements adjacent to their lower ends, while the disc 14 holds them against lateral displacement near their upper ends, but permits of the sliding movement of the upper ends of the grid side rods within the openings 15, due to the expansion and contraction of the same.

I contemplate omitting the insulating disc 19, and relying upon the stiffness of the grid wires to hold the grid side rods in the normal center

positions. A disc 24^a corresponding to the disc 24 is applied to the disc 17, Figure 4'. All other parts of the device remain identical with those shown and described in connection with the first form of the invention.

In Figures 5 to 8 inclusive, I have shown a modified form of the invention. The same grid units are shown including the pairs of grid side rods 10, the same cathode sleeve 12 is used except that the two stops 13 are disposed near the lower end of the sleeve 12, and the same mounting side rods 28 are used.

In this form of the invention, an upper insulating disc 32 is provided, formed of mica or the like. This disc is cut generally diametrically into two segments 33 and 34, the segment 33 being slightly larger. The segment 33 has pairs of openings or notches 35 formed therein, slideably receiving the pairs of grid side rods 10. The center distances of the notches 35 is the same as the normal center distances of the grid side rods. The segment 33 also has openings or notches 36 to receive the mounting side rods 28. The openings or notches 35 and 36 are formed entirely in the segment 33. The segment 33 has a central opening or notch 37, co-acting with a smaller central opening or notch 38, formed in the segment 34, to receive the upper end of the cathode sleeve 12.

The numeral 39 designates a lower insulating disc, formed of mica or the like, and this disc is cut generally diametrically to provide a segment 40 and a segment 41, the segment 40 being slightly larger than the segment 41. The segment 40 is provided with pairs of reduced openings or notches 42, having the same center distances as the normal center distances of the pairs of grid side rods 10 and of sufficient size to snugly receive the reduced portions 10^a of the grid side rods. The segment 40 is provided with openings or notches 43 to receive the mounting side rods 28 and is also provided with a central opening or notch 44 co-acting with an opening or notch 45 to receive the lower end of the cathode sleeve 12. The openings or notches 42 and 43 are formed entirely in the segment 40.

The numeral 46 designates a spacer shield, preferably formed of metal and arranged upon the top of the disc 32 and having a depending annular flange 47. Portions of this annular flange are crimped inwardly and upwardly to form stops 48, engaging the inner face of the disc 33, as shown. A metal spacer shield 49 is arranged upon the lower face of the disc 40 and has an annular flange 50, portions of which are crimped inwardly and downwardly, to form stops 51, engaging the inner face of the disc 40. The upper spacer shield 46 is provided with extensions 52, welded to the mounting side rods 28, while the lower spacer shield 49 is provided with extensions 52', welded to the mounting side rods. The spacer shields are insulated from the grid side rods.

In assembling the grid device, the segments 33 and 40 may be held vertically on edge with their notches uppermost. The assembled grid units and cathode sleeve are brought in proximity to the segments 33 and 40, and corresponding ends of the grid side rods 10 are placed in the notches 35 and the corresponding end of the cathode sleeve in the notch 37, while the reduced portions 10^a of the side rods are inserted into the notches 42 and the adjacent end of the sleeve 12 into the notch 44. In a similar manner the mounting side rods 28 are arranged with-

in the notches 36 and 43. The shield 49 may now be applied to the segment 40 and the flange 50 crimped to provide the stops 51. The segment 41 may now be inserted in place within the flange 50 and will cover the several notches, and will be held in place by crimping the flange 50 to produce stops 51. In a similar manner the shield 46 is applied and secured to the segment 33, after which the segment 34 is arranged within the annular flange 47 and covers the notches of the segment 33 and is locked to the shield by the formation of the stops 48. The extensions 52 are now welded to the mounting side rods 28. The invention is not restricted to this precise manner of assembling.

It is thus seen that the notches 10' receive portions of the segment 40 adjacent to the openings 42 and the walls of the notches 10' hold the side rods against axial movement and the walls of the openings 42 hold the grid side rods against radial displacement while the segment 41 holds them against displacement at a right angle to this radial movement.

While the grid side rods are securely held or locked to the lower disc 39 against axial and lateral displacement, their upper ends are securely held in the openings or notches 35 against lateral displacement, but may slide therein, due to expansion and contraction. The segment 33 is in the plane of the segment 34 and the segment 40 is in the plane of the segment 41.

In each form of the invention, the grid wires 11 are in the form of spiral turns. This form of grid element has been shown for the purpose of illustration and other forms of grid elements may be used. While I have shown two grid units for the purpose of illustration, any number may be used.

The present application is a continuation in part of my application Grid device, filed July 3, 1943, Serial No. 493,459, allowed August 21, 1943.

It is to be understood that the forms of my invention herewith shown and described are to be taken as preferred examples of same, and that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A grid device for radio tubes or the like, said device comprising spaced grid side rods having a normal center distance and provided with notches, a grid element carried by the side rods, and insulating discs having openings to receive the side rods, the openings of one disc having a different center distance than the normal center distance of the side rods so that the notches in the side rods may receive portions of such disc.

2. A grid device for a radio tube or the like, said device comprising spaced grid side rods having a normal center distance and provided with notches, a grid element carried by the side rods, and insulating discs having openings to receive the side rods, the openings of one disc having a smaller center distance than the normal center distance of the side rods, the arrangement being such that the side rods are shifted inwardly so that they may enter the last named openings and then return to the normal center distance so that their notches receive portions of the disc adjacent to the last named openings, and means to hold the side rods so that their center distance can not be changed with relation to the last named openings.

3. A grid device for a radio tube or the like, said device comprising spaced grid side rods having a normal center distance and provided with notches, a grid element carried by the side rods, insulating discs having openings to receive the side rods, the openings of one disc having a smaller center distance than the normal center distance of the side rods, the arrangement being such that the side rods are shifted inwardly so that they may enter the last named openings and then return to the normal center distance so that their notches receive portions of the disc adjacent to the last named openings, the stiffness of the grid element then holding the side rods in the normal center distance.

4. A grid device for a radio tube or the like, said grid device comprising spaced grid side rods having a normal center distance, and provided with notches, an insulating disc having openings to receive the grid side rods, the openings having a different center distance than the side rods, the notches receiving portions of the disc adjacent to the openings, and a second insulating disc disposed upon one side of the first named disc and having openings to receive the side rods.

5. A grid device for a radio tube or the like, said grid device comprising spaced grid side rods having a normal center distance, and provided with notches, an insulating disc having openings to receive the grid side rods, the openings having a different center distance than the side rods, the notches receiving portions of the disc adjacent to the openings, a second insulating disc disposed upon one side of the first named disc and having openings to receive the side rods, the center distance of the last named opening being the same as the normal center distance of the side rods, and means to hold the first and second named discs together.

6. A grid device for a radio tube or the like, said device comprising a plurality of spaced grid side rods having a normal center distance and provided with notches, grid means carried by the side rods, an insulating disc having openings to receive the side rods, the openings having a different center distance than the side rods, the notches receiving portions of the disc adjacent to the openings, means to hold the side rods so that their center distance can not be changed with relation to the openings, a second insulating disc having openings to receive the side rods, and means to support the first and second named discs.

7. A grid device for a radio tube or the like, said grid device comprising spaced side rods having a normal center distance and provided with notches, grid means carried by the side rods, an insulating disc having openings, the openings having a different center distance than the side rods, the notches receiving portions of the disc adjacent to the openings, a second insulating disc disposed upon one side of the first named disc and having openings which have a center distance substantially the same as the normal center distance of the side rods, a shield for securing the discs together, a third insulating disc having openings to receive the side rods and having the same center distance as the side rods, a shield secured to the last named disc, and means to support the shields.

8. A grid device for a radio tube or the like, said device comprising a side rod having a notch, a grid element carried by the side rod, an insulating member having an opening to receive the side rod, the notch receiving a portion of the insulat-

ing member adjacent to the opening, the side rod being locked to the insulating member against relative axial movement, and means to hold the side rod against lateral movement with relation to the insulating member.

9. A grid device for a radio tube or the like, said grid device comprising a side rod having a notch, a grid element carried by the side rod, an insulating disc having an opening to receive the side rod, the notch receiving a portion of the disc adjacent to the opening.

10. In a grid device for a radio tube or the like, a side rod having a notch, a grid element carried by the side rod, and an insulating disc arranged adjacent to the side rod, the notch receiving a portion of the disc.

11. A grid device for a radio tube or the like, said device comprising spaced side rods having notches, grid means secured to the side rods, an insulating disc having openings to receive the side rods, the notches receiving portions of the disc adjacent to the openings, the side rods being locked to the disc against relative axial movement, a second insulating disc spaced from the first named disc and having openings to slideably

receive the side rods, and means to support the discs.

12. In a grid device for a radio tube or the like, spaced grid side rods having notches providing reduced portions, grid means carried by the side rods, an insulating member having reduced notches to receive the reduced portions and hold the side rods against displacement, the notches of the side rods receiving portions of the insulating member to hold the side rods against axial displacement with relation to the insulating member, and means to hold the reduced portions within the notches of the insulating member.

13. A grid device for a radio tube or the like, spaced grid side rods having notches providing reduced portions, an insulating disc including segments, one segment having reduced notches to substantially snugly receive the reduced portions, the notches of the side rods receiving portions of the segment adjacent to the reduced notches, the other segment being arranged adjacent to the open ends of the notches in the companion segment, and means to hold the segments in place.

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