Aug. 20, 1935. W. W. EITEL ET AL 2,012,038

ELECTRODE SUPPORT

Filed Nov. 7, 1933

Fig. 1.

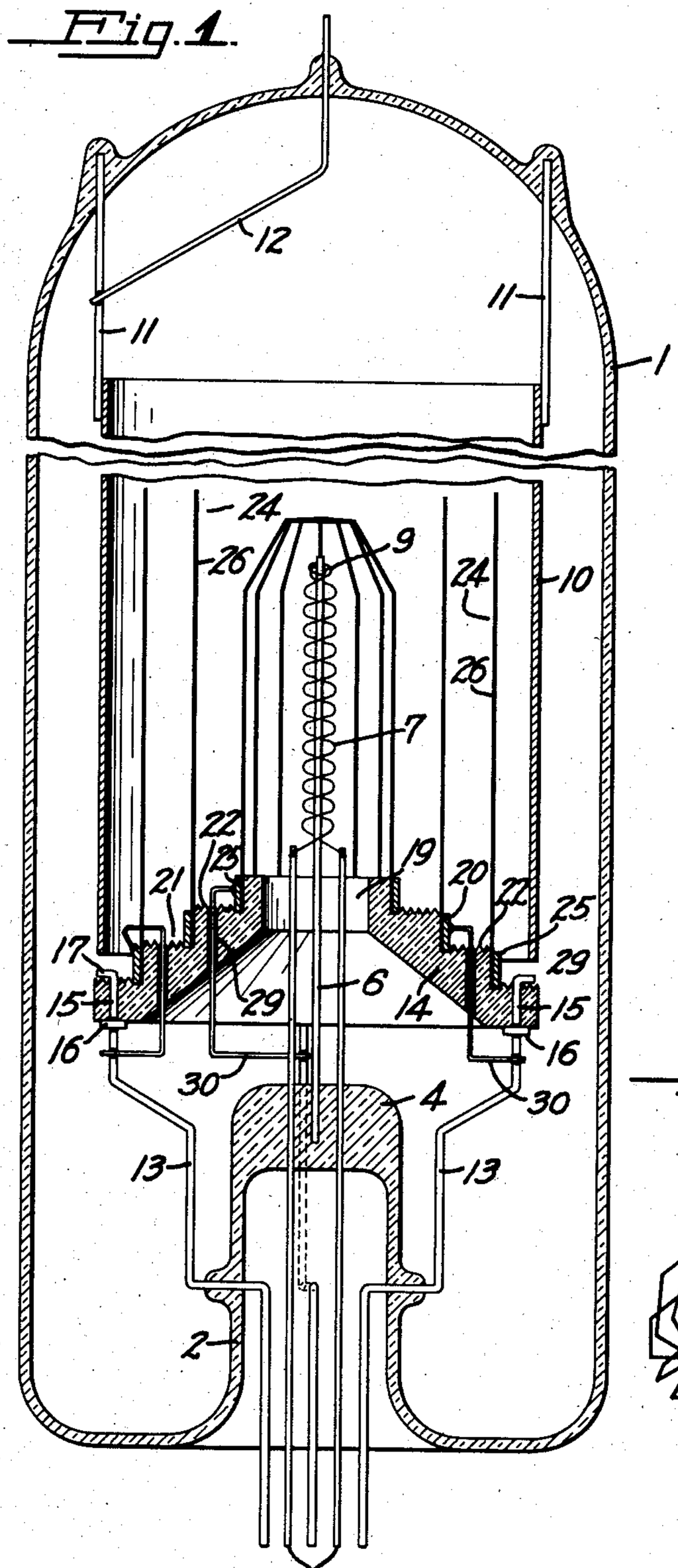


Fig. 2.

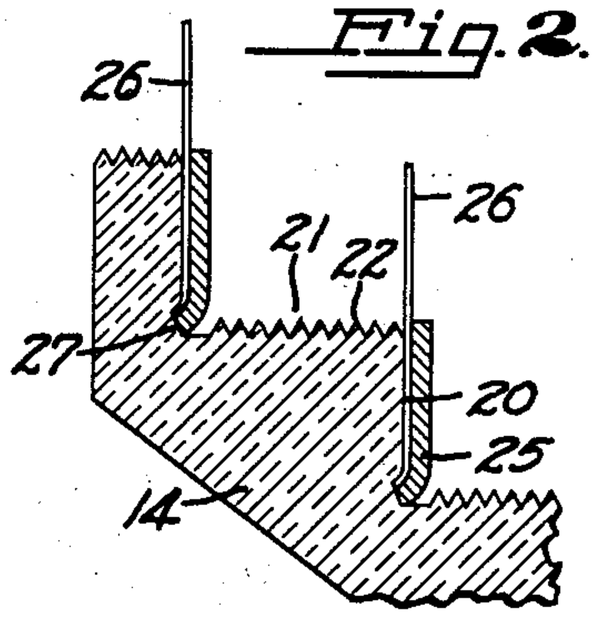


Fig. 3.

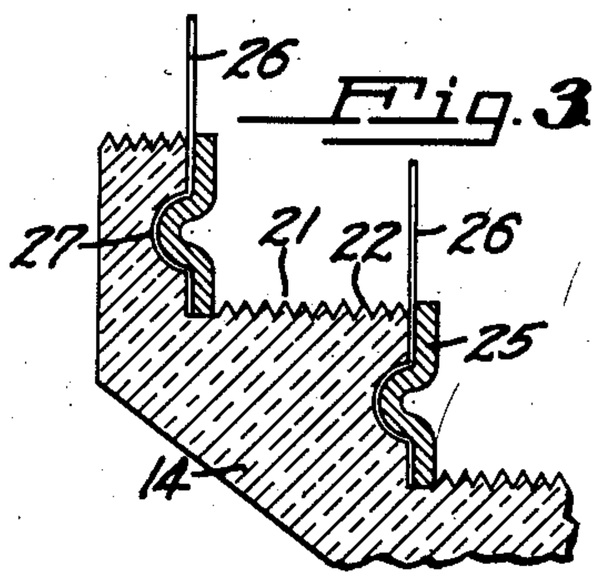
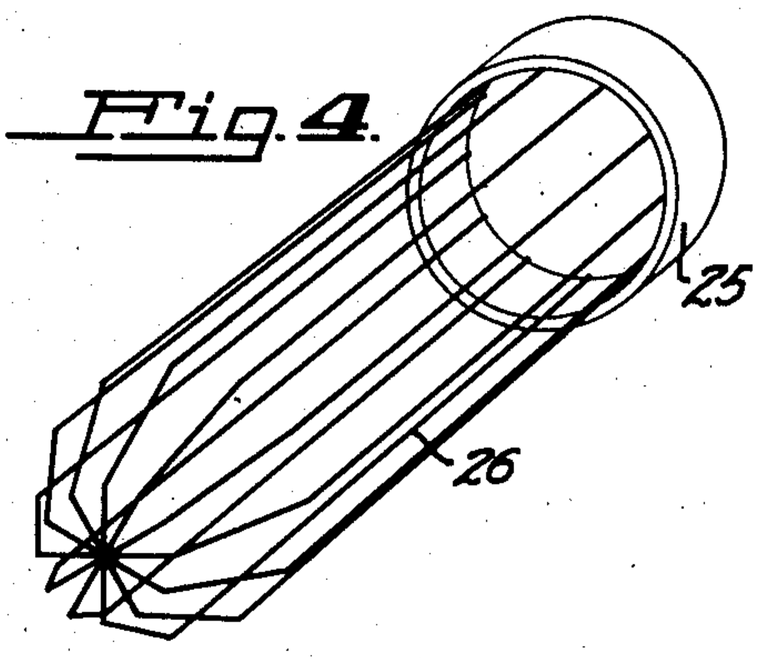


Fig. 4.



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2,012,038

UNITED STATES PATENT OFFICE

2,012,038

ELECTRODE SUPPORT

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Application November 7, 1933, Serial No. 696,977

3 Claims. (Cl. 250—27.5)

Our invention relates to an electrode support particularly adaptable for the positioning and spacing of concentric electrodes in electrical discharge tubes.

Among the objects of our invention are:

To provide a positive spacing and supporting member for concentric electrodes; to provide a unitary support member upon which a plurality of grids or other electrodes may be mounted in electrical discharge tube; to provide a means for supporting discharge tube electrodes; and to provide a stepped electrode supporting insulator.

Other objects of our invention will be apparent or will be specifically pointed out in the description forming a part of this specification, but I do not limit myself to the embodiment of my invention herein described, as various forms may be adopted within the scope of the claims.

In the drawing which delineates a preferred form of support as used in a thermionic tube,

Figure 1 is a longitudinal sectional view of a thermionic tube embodying our invention.

Figures 2 and 3 are sectional views showing various means for locking mounted electrodes to the insulator.

Figure 4 is a perspective view of a preferred form of grid structure such as used in the tube of Figure 1.

The grid structure shown in Figure 4 is of the type disclosed in our co-pending application Serial No. 696,974, filed November 7, 1933, for a Space discharge device, and claimed therein.

The electrode support of our invention is particularly adapted for use in tubes known as "pentodes" wherein there is an anode, a cathode and a plurality of grids therebetween, all of the electrodes preferably being mounted in concentric relation.

Such a tube is shown in Figure 1. An envelope 1 is provided with a re-entrant stem 2, terminating in a pinch 4 through which cathode leads 5 are sealed. A center cathode support 6 is fused in the pinch between the two cathode leads. A double spiral cathode 7 is held in place around the cathode support 6 by means of an upper sliding loop 9.

A cylindrical anode 10, surrounding the cathode, is suspended from the upper end of the envelope by anode supports 11—11 preferably four, equally spaced, and sealed to the envelope wall at the end of the tube opposite the stem. An anode lead 12 passes through the upper end of the envelope.

Conductive risers 13, each electrically separate, are sealed through the vertical stem wall and are extended upwardly to position a stepped insulating block 14. We prefer to use three, or four, of these risers as shown, to provide the block with a firm solid support, the risers passing through riser holes 15 near the periphery of the block, the block resting on spacer bars 16 below and kept from coming off by riser bends 17 above the block.

The block is roughly of conical shape, and provided with a central aperture 18 through which the cathode projects. The upper surface is provided with a series of steps, each having a vertical surface 20 and a horizontal surface 21. The latter surface is roughened or provided with ridges 22 in order that the leakage path between the vertical surfaces may be increased.

Grids 24 are mounted on each step. These grids preferably are of the cage type above referred to and have a marginal head 25 to which cage wires 26 are attached.

We have shown the grids in the instant example as being of circular section. In that case the vertical surfaces 20 will also be circular, and each grid made of a different diameter in order that the beads may slide over, and be mounted on the vertical surfaces. The relative diameters and number of grid wires may be varied to suit the required characteristics of the tube under construction.

As the marginal beads slide over and fit the vertical surfaces, means should be provided so that they will stay in place. Figures 2 and 3 show such means.

In Figure 2 the bottom of the vertical surface is slightly under cut to form a circular groove 27. The bottom of the bead may then be spun into the groove and thus firmly attach the grid to the block.

In Figure 3 the groove 27 is cut in the center of the surface, and then the bead is spun into the depression. Other methods will be apparent, such as the use of separated depressions into which the bead may be pressed at intervals around the surface.

We then prefer to make electrical connection to each grid by drilling lead holes 29 through the block adjacent each grid, and passing lead link 30 through these holes. One end of the link is welded to a grid, the other to a riser. By providing at least as many risers as there are grids, each grid may be connected to a separate riser, which, being electrically separate, will then act not only as supports, but as leads for the various electrodes mounted on the block.

Anode, cathode, and grid potentials are, in the construction shown, widely separated. The cathode leads come through the stem pinch, the grid leads through the stem side wall, and the anode lead through the opposite end of the tube. All elements are rigidly supported to resist deformation, and the grids are positively spaced. The entire construction is adapted to glass lathe production methods and is such that tubes having substantially constant characteristics may be turned out in quantities.

It is, of course, unnecessary that the grids be of circular section. Whatever the shape, all that is necessary is that the bead slip over and fit the vertical surface, which may be readily shaped to receive it.

We claim:

1. In combination with an envelope containing a group of concentric electrodes including an anode and cathode, a plurality of said electrodes surrounding said cathode and having marginal beads, a circumferentially stepped insulator having offset vertical surfaces to which said beads are applied to position said electrodes in spaced relation, said vertical faces having depressions therein, and retaining means on said beads for engaging said depressions.

2. In combination with an envelope containing a group of concentric electrodes including a cathode and anode, a plurality of said electrodes surrounding said cathode and having marginal beads, a circumferentially stepped insulator forming the sole support for said certain electrodes and having offset vertical surfaces to which said beads are applied in spaced relation, a reentrant stem fused to said envelope, a plurality of electrically separate risers fused through the side wall of said stem and terminating in said insulator and supporting it, and separate electrical link members attached to each of said beads and passing through said insulator to contact individual risers.

3. In combination with an envelope containing a group of concentric electrodes including an anode and cathode, a plurality of said electrodes surrounding said cathode and having marginal beads, a circumferentially stepped insulator having offset vertical surfaces to which said beads are frictionally applied to position said electrodes in spaced relation.

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DISCLAIMER

2,012,038.—*William W. Eitel* and *Jack McCullough*, San Bruno, Calif. ELECTRODE SUPPORT. Patent dated August 20, 1935. Disclaimer filed October 16, 1936, by the assignee, *Heintz & Kaufman, Ltd.*

Hereby enters this disclaimer to claim 3 of said Letters Patent.

[*Official Gazette November 10, 1936.*]