Jan. 3, 1933. R. F. GOWEN 1,893,466

AUDION CONSTRUCTION

Filed Jan. 17, 1919

Fig. 1.

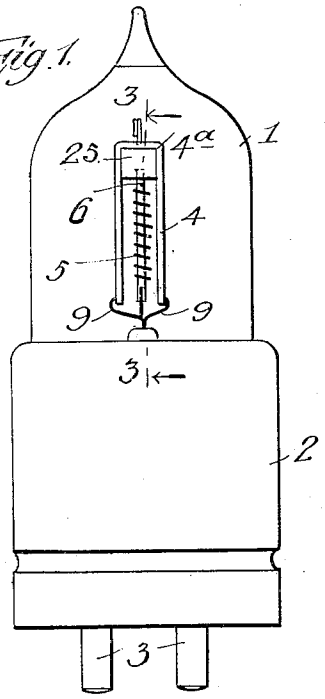


Fig. 2.

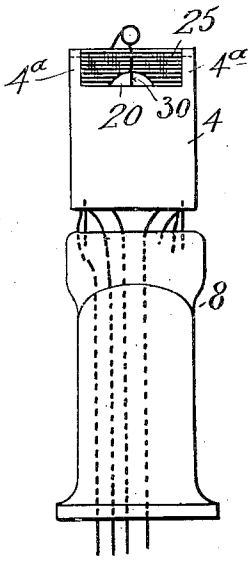


Fig. 3.

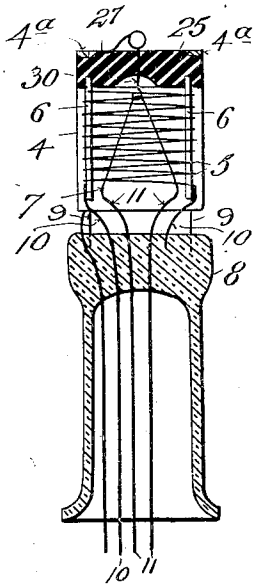


Fig. 4.

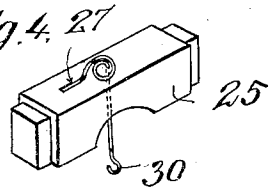


Fig. 5.

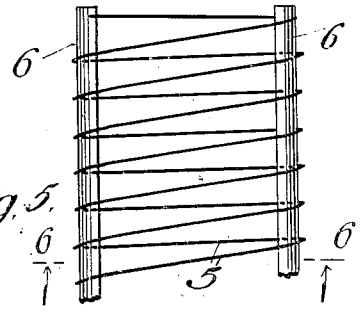


Fig. 6.

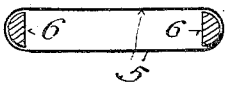


Fig. 7.

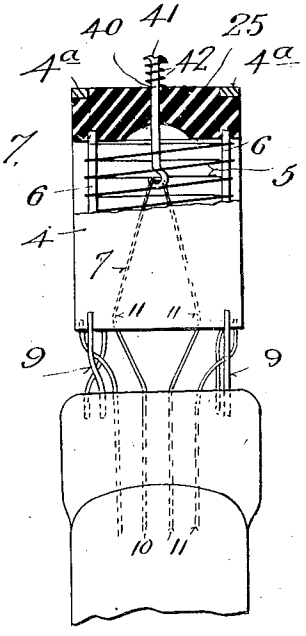
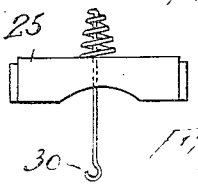


Fig. 8.



Inventor

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by his atty Samuel Ostby

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UNITED STATES PATENT OFFICE

ROBERT F. GOWEN, OF NEW YORK, N. Y., ASSIGNOR TO DE FOREST RADIO TELEPHONE & TELEGRAPH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

AUDION CONSTRUCTION

Application filed January 17, 1919. Serial No. 271,556.

This invention relates to audion constructions.

The object of this invention is to provide an evacuated vessel for use in wire or wireless communication, or for any purpose to which a device of this nature may be applied, which is simple in construction, economical to manufacture, and efficient in operation.

A further object of the invention is to provide a device of the character set forth which is compact, sturdy, and is not liable to derangement due to vibration, shock, or the like.

Further objects of the invention will appear more fully hereinafter.

The invention consists substantially in the construction, combination, location and relative arrangement of parts, all as will be more fully hereinafter set forth as shown by the accompanying drawing and finally pointed out in the appended claims.

Referring to the drawing:

Fig. 1 is a view in side elevation of an audion construction embodying my invention.

Fig. 2 is a similar view showing the electrode support.

Fig. 3 is a sectional view taken on the line 3, 3, Fig. 1, looking in the direction of the arrows.

Fig. 4 is a detail view of the insulating and supporting structure employed in accordance with my invention.

Fig. 5 is a fragmentary sectional view of the grid structure embodying my invention.

Fig. 6 is a sectional view taken on the line 6, 6, Fig. 5, looking in the direction of the arrows.

Fig. 7 is a view partially in section, partially in side elevation of a modified electrode supporting structure embodying by invention.

Fig. 8 is a view in elevation of a modified construction.

The same part is designated by the same reference character wherever the same occurs throughout the several views.

It is among the special purposes of my present invention to provide a rugged structure of evacuated vessel having electrodes therein, and particularly of the audion type, such as is used in radio or wire communications, and which are known by various names, the most common of which being "audion", "amplifier", "ultraaudion" and "oscillion".

Great difficulty has been heretofore encountered in devices of this nature due to the fact that to secure and procure sensitiveness and efficiency of the device it has been necessary to have an exceedingly fragile and delicate instrument. Also, due to the fact that generally three or more electrodes are employed, which electrodes are of themselves of a fragile nature and which have necessarily been located within a relatively small distance from each other, due to vibration or shock the electrodes have been subject to vibrating relative to each other, coming in contact with each other or becoming broken due to the vibration of their supporting means which has generally been a single support, that is, each of the more fragile electrodes has had but a single support at one of its ends allowing the entire body thereof to vibrate freely and be subject to breakage, derangement, or other trouble.

In accordance with my invention I provide means for permanently holding the electrodes relative to each other after the most efficient position thereof has been secured, and forming a rigid support for both ends of all electrodes whereby any vibration, shock or the like instead of causing each electrode to move relatively to the other causes them all to move in unison thereby securing a neat, compact, rugged device, well suited for the work to which it is to be put. In the copending application of myself and James L. Bradford, Serial No. 226,537, filed April 3, 1918, we show and describe in detail an audion construction to which form thereof I have applied my present invention, but I wish it to be understood my invention is not to be limited or restricted to any particular type of construction.

Referring to the drawing: I show a construction similar to that shown in the application above identified wherein the glass container is indicated at 1, the base 2, the plugs 3, connected to the respective electrodes, which in the form shown, consist of the plate

electrode 4, the grid electrode 5 carried by suitable supports 6 and the filament electrode 7 positioned between the supports 6 with the grid 5 in the nature of a wire spirally wound around the support 6 thereby enclosing the filament 7, the plate 4 being in the nature of one piece bent over to extend in a plane parallel to the plane of the wire suspended between the support 6 and on opposite sides thereof, the structure thus far described thereby constituting one having a filament with a grid on opposite sides thereof and a plate on each side of the grid. The glass base 8 of the vessel 1 carries therein the supports 9 for supporting the plate 4, supports 10 for carrying the grid supporting members 6 and supports 11 carrying the filament 7 in the usual well known manner. The top of the plate 4 is cut away for ventilating purposes, and, in accordance with my invention, to form a space for the supports which I will now described.

It has heretofore been the custom to have no further supporting means for the filament electrodes 7, and the grid and grid supports, and it will be seen that any jar, vibration or shock which the device receives will cause the grid supporting members 6 to vibrate, and in consequence will cause the grid wire to vibrate, and the filament which is a thin wire to vibrate, and that it is not only possible but in practice actually is a fact that the wires frequently contact with each other, burn out, or break. I overcome this by mounting in the cut away portion 20 of the plate 4 an insulating block 25 provided with holes into which the upper ends of the grid supporting member 6 project. The block is cut away to allow the straps 4^a of the plates 4 to lie flush with the upper surface thereof as will be readily understood by reference to Fig. 4. It is also cut away on the sides to allow the straps 4^a to lie flush with the surface thereof. It will be seen that the block thus far described forms a support for the upper end of the grid supporting members 6. In accordance with my invention I provide a hole through the center of the block 25 and through this hole insert means for engaging and holding under spring tension the free end of the filament. This may be accomplished in any suitable or desired manner, for example, and referring particularly to Figs. 2, 3 and 4, a small hook may be inserted through the hole in the block 25 to engage the free end of the filament 7, the engaging means being in the nature of one end of a spring formed into a hook, the one end of which is coiled on the outer or top surface of the block 25 as indicated at Figs. 1, 2 and 3, and shown more clearly in Fig. 4, with the free end thereof suitably anchored in a niche provided for that purpose indicated at 27 in the top surface of the block 25, thereby maintaining a constant tension on the filament 7. A modified construction is shown in Fig. 7 wherein a plunger of relatively strong material indicated at 40 passes through the block 25 and is hooked at one end to engage the free end of the filament 7, the top of the plunger being flared at 41 and a coil spring 42 being interposed between the flared end of the plunger 40 and the top surface of the block 25 to maintain a constant tension on the filament. In Fig. 8 I show a still further modification wherein the spring is in the nature of a spiral cone, one end of which rests on the block 25 and the other end extends down through the center thereof and through the block and provided with a hook 30 on its end as shown. To maintain the grid on opposite sides of the filament in a constantly parallel line, and referring particularly to Figs. 5 and 6, I form the standard 6 of semi-circular material thereby securing parallel wires between the supports 6 as will be readily understood.

Many other changes and modifications will readily occur to those skilled in the art without departing from the spirit and scope of my invention as defined in the claims, and I therefore desire to have my foregoing description and drawing to be regarded in an illustrative sense and not in a limiting sense. Having now set forth the objects and nature of my invention and having shown and described a structure embodying the principles thereof, what I claim as new and useful and of my own invention and desire to secure by Letters Patent is:—

1. The combination of a base, a plurality of electrode elements including an electron emitting cathode, a control grid completely encircling said cathode, an anode having portions disposed on opposite sides of said cathode, a plurality of metallic members supporting said electrodes and separately sealed into said base, and an insulator spacer member secured to all said elements to form a rigid and unitary structure, said electrodes and insulator element being supported entirely from said base.

2. The combination of a base, an electron emitting cathode, an anode having portions disposed on opposite sides of said cathode, a grid completely encircling said cathode, a plurality of metallic lead-in wires sealed directly into said base and serving as the sole supporting means for said cathode, anode and grid, an insulator means attached to all the electrodes spacing them apart, said insulator means being supported solely from said base.

3. The combination with a base, of a plurality of electrode elements supported at one end thereby, and means including a block of insulating material for securing said elements together into a rigid unitary structure, a hook carried by said block, means for maintaining a spring tension on said hook tend-

ing to draw the hook towards said block, said hook being adapted to engage one of said electrode elements.

4. A vacuum tube having a base, a filament supported by said base, a plate electrode supported by said base, a pair of posts positioned between said filament and plate and having a grid electrode wound helically therearound, the lower ends of said posts being sealed into said base, a block of insulating material carried by said plate and having a pair of holes to receive the upper ends of said grid posts, and means for supporting the filament from said block.

5. An electron discharge device comprising a cathode, an anode, a grid, a press, said anode and grid having portions disposed on opposite sides of said cathode, a support for said electrodes comprising a metallic frame arising from said press and terminating in a block of insulating material, and lead in wires through said press for said anode and cathode.

6. An evacuated vessel containing an anode, a grid and a filament, said grid being intermediate the anode and the filament and comprising a pair of posts having a wire helically wound therearound, and a block of insulating material supported by the anode and serving as a support for the grid and filament said block having openings to receive the upper ends of said grid posts.

7. A vacuum tube comprising a press, anode, cathode and control electrodes said control electrode comprising a pair of spaced rods with a wire helically wound therearound, metallic means on said press supporting the said anode, and means on said anode supporting said other electrodes the last mentioned means comprising an insulator member having openings to receive the upper ends of said spaced rods.

8. A vacuum tube having a base, a filament supported by said base, a plate electrode supported by said base, a pair of posts positioned between said filament and plate and having a grid electrode wound helically therearound the lower ends of said posts being sealed into said base, a block of insulating material carried by said plate and having a pair of holes to receive the upper ends of said grid posts, a hook carried by said block to engage said filament, and means for maintaining said hook under tension to maintain said filament in a taut condition.

9. An electron discharge device comprising a gas tight vessel containing a plurality of spaced electrodes, one of said electrodes being in the form of a helically wound wire completely encircling another of said electrodes, a support for said electrodes comprising an additional electrode partially enclosing said other electrodes and attached to the base of said device and a lead-in and electrode-supporting wire for said additional electrode sealed in the base of said device.

10. The combination with a base, of a plurality of electrode elements comprising a plate, a cathode and a grid, each element having a supporting wire sealed into said base and supported at one end thereby, one of said electrodes being in the form of a helically wound wire completely encircling another of the electrodes and means including a block of insulating material securing said elements together into a rigid unitary structure, a hook carried by said block, means for maintaining a spring tension on said hook, said hook being adapted to engage one of said electrode elements.

11. A vacuum tube comprising a plate electrode, a grid electrode including a pair of posts having a grid wire wound helically therearound, means supporting said posts at their lower ends from the base of said tube, an insulating member mounted adjacent the upper ends of said plate and grid electrodes, the upper ends of said grid posts being seated in corresponding holes in said insulating member, and an electron emitting cathode mounted to emit electrons to the interior surface of said plate.

12. A vacuum tube comprising a base portion, a plate electrode, a filament, a grid electrode including a pair of posts having a wire helically wound therearound, means supporting said posts at their lower ends in the base of said tube, an insulating member mounted at the upper ends of said plate and grid electrodes for preserving the spacing of said electrodes, said grid posts having their upper ends seated in corresponding holes in said insulating member, and resilient means carried by said insulator member for maintaining said filament under tension.

In testimony whereof I have hereunto set my hand on this 10th day of January A. D., 1919.

ROBERT F. GOWEN.