Feb. 21, 1928. 1,660,122

J. GREGER

MULTIFILAMENT VACUUM TUBE

Filed Feb. 6, 1923

Fig. 1.

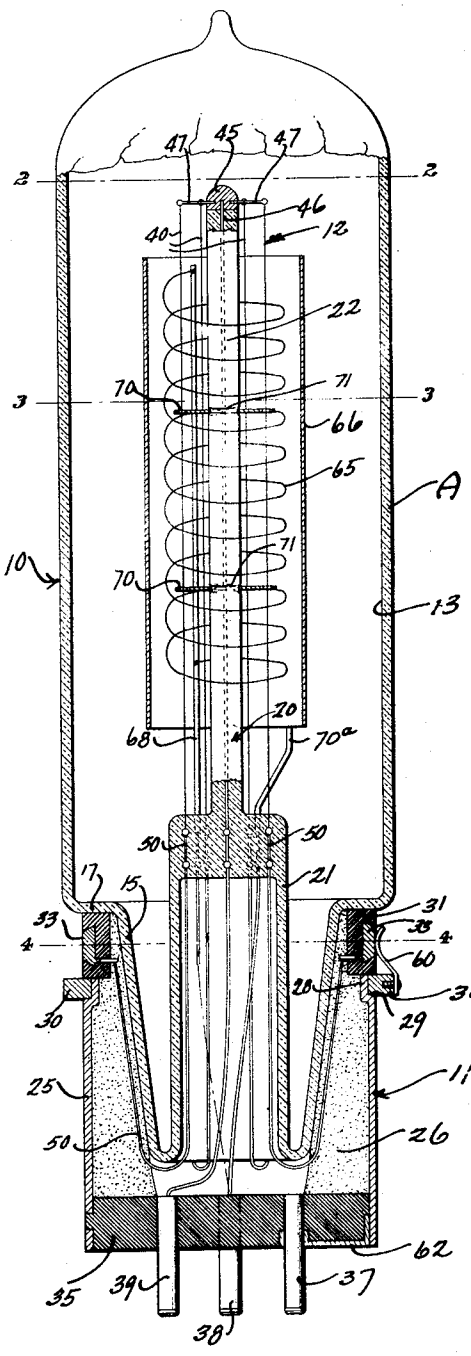


Fig. 2.

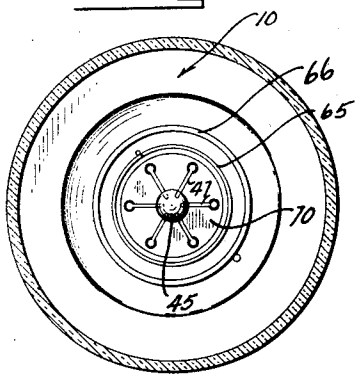


Fig. 3.

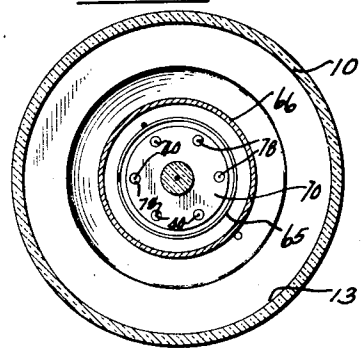
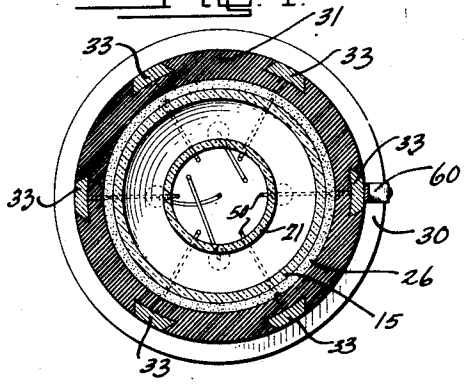


Fig. 4.



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UNITED STATES PATENT OFFICE.

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MULTIFILAMENT VACUUM TUBE.

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This invention relates to an improved filament construction for vacuum tubes.

The primary object of this invention is the provision of a multi-filament vacuum tube which is particularly well adapted for use in radio work as a detector or amplifier.

A further object of this invention is the provision of a vacuum tube, such as an audion detector, which provides a filament construction, embodying a series of filaments, which may be selectively used, so that the life of the tube is not limited to the period in which one or any less number than the whole of the filaments will function.

A further object of this invention is the provision of an improved filament construction for vacuum tubes, which contemplates the provision of a plurality of filaments which may be independently used, the filament construction embodying means whereby the filaments, should any of the same break, will be properly supported in non-short circuiting position with respect to other electrodes within the vacuum tube.

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

In the accompanying drawing, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views.

Figure 1 is a longitudinal cross sectional view, taken through a vacuum tube, showing the relative positioning of the parts thereof and the novel construction of filaments.

Figures 2, 3, and 4 are transverse cross sectional views, taken on their respective lines in Figure 1 of the drawing.

In the drawing, wherein for the purpose of illustration is shown but the preferred embodiment of this invention, the letter A generally designates the improved audion detector, which may embody a vacuum tube or vessel 10; base construction 11; and novel filament arrangement 12.

The tube 10 may be a vessel of any well known formation, having a vacuum in the compartment 13 therein. This tube 10 may be of the elongated type, including the depending lower reduced and tapered part 15 which is cast in the base construction 11, as will be subsequently described. The annular shoulder 17 is provided by the vacuum tube or vessel 10, extending substantially at right angles to the axis of the tube and against which the base construction 11 rests, as will be subsequently described. The glass supporting post 20 extends upwardly axially within the tube 10, preferably in accordance with well known construction, and which includes the lower portion 21 of cylindrical formation, extending upwardly out of the base end 15 of the vacuum tube into the compartment thereof, and the solid relatively long stem 22, which extends upwardly within the main compartment of the tube.

Referring to the base construction 11, the same may include well known parts, such as the provision of the brass or other metal shell 25, cemented or otherwise secured by insulation 26, to the outer surface of the tube end 15, as to enclose the latter within the base. The top end of the base shell 25 is preferably annularly crimped, as at 28, to provide the annular shoulder 29, on which the ring shaped switch member 30 is positioned for annular circumferential movement about the base. The ring shaped insulation portion 31, preferably of "bakelite," is provided, intermediate the base shell 25 and the tube shoulder 17, within which a plurality of relatively insulated contacts 33 are secured, as by dove tail construction. The "bakelite" end disc 35 is preferably carried in any approved manner by the base shell 25, supporting a plurality of metal terminals or prongs 37, 38, 39, etc.

Referring to the filament construction 12, the same preferably includes fixed filaments 40, arranged longitudinally within the compartment 13 of the tube 10. A metal cap 45 is preferably supported at the top of the glass stem 22, and has a wire or other conducting element 46 embedded in conducting relation therewith, said wire 46 extending axially through the stem 22 and through the lower portion 21 of the supporting post 20, for connection in any approved manner to the exterior vacuum tube terminal or prong 39. The filaments 40 at their upper ends are preferably connected by means of filament supports 47 to the cap 45, to be in conducting relation therewith. From this construction, it is obvious that all of the filaments 40 are in conduction with the metal cap 45 and consequently have the exterior terminal or prong 39 as a common connection. The filaments 40 extend parallel with the glass stem 22, in spaced relation therewith, and with respect to each other, and have their lower ends embedded in the insulation post portion 21, for connection with

leading in wires 50 of any suitable material. The leading in wires 50 preferably extend into the base construction 11, being embedded in the cementitious insulating material 26 and extend therethrough into conducting relation with the contacts 33 mounted on the insulation ring 31. In this manner each filament 40 has a contact 33 in conduction with an end thereof; said contacts 33 of course being relatively insulated as above mentioned.

The switch member 30 is annularly movable about the base shell 25, being in conducting relation therewith, and providing a spring contact arm 60, which extends for engagement with the contacts 33 as said switch member 30 is moved about the base construction 11. The terminal or prong 37 of the vacuum tube A is preferably placed in conducting relation with the base shell 25, as by the ordinary metal conducting strip 62. It is obvious that when the switch member 30 is moved so that the arm 60 thereof engages any of the contacts 33, the filament represented by the contact 33 which is engaged by the arm 60 will have the terminals 37 and 39 of the vacuum tube in operating conduction therewith. The remaining filaments 40 will then be inoperative, as they will be connected to the terminal 39 only, and will be disconnected from terminal 37.

As used on vacuum tubes, such as audion detectors, a grid 65 and a plate 66 may be carried within the evacuated vessel 10 in adjacent relation to the filaments 40. As is illustrated in Figure 1, the grid 65 is of the spiral type, and preferably supported by the nickle rod 68, which is carried by the insulating post 20. The rod 68 may be connected with a prong or terminal (not shown) mounted upon the base disc 35. The plate 66 may be of the hollow cylindrical type, supported by means 70ª, which is in conducting relation with the prong or terminal 38 above mentioned. To prevent short circuiting which might occur through contact of a fragment of a broken filament 40 with any other filament, or with either of the electrodes 65 or 66, it is contemplated to provide means intermediate the connected or mounted ends of the filaments which will prevent a broken filament from falling upon any other electrodes. This means preferably includes a pair of mica discs 70 provided with central openings therein which are crimped into annular grooves 71 in the glass supporting stem 22, to support said discs in a plane substantially at right angles to the axis of the stem 22. These mica discs are preferably provided with annular series of transverse openings 78 therein, through which the filaments 40 extend. Of course, the openings 78 of the two discs are in aligning relation, and it is preferred that the filaments extend through said openings 78 free of contact with said discs during the life of the filaments. These discs are of such diameter as to fit within the spiral grid 65, free of contact with said grid. Should a filament break, it is obvious that the fragmentary ends thereof will be maintained from lateral swing or displacement, so that the same will be suspended or held free of contact with any of the electrodes in the vacuum bulb.

From the foregoing description of this invention, it is apparent that a practical type of multi-filament vacuum tube has been provided, which permits of the filaments being independently and selectively utilized for incandescence; the switch means which permits of the selective operation of the filaments being so associated with the details of the vacuum bulb as not to interfere with the vacuum of even the "hardest" types of vacuum tubes, where the degree of evacuation is practically perfect.

Various changes in the shape, size and arrangement of parts may be made to the form of invention herein shown and described, without departing from the spirit of this invention or the scope of the claim.

I claim:

In a multifilament vacuum tube the combination of an evacuated tube, a plurality of filaments supported in the tube, a terminal exterior of the tube having permanent positive conductive connection with similar ends of all of the filaments to make the same a common terminal for said filaments, a second terminal insulated from the first mentioned terminal, a rotatable ring-shaped switch member in movable conductive contact with said second terminal at all times, a contact for each filament exteriorly on the tube at the opposite ends of the filaments from their connections with the common terminal, said last mentioned contacts being relatively insulated and exteriorly exposed on the tube adjacent said ring-shaped switch member, and a resilient finger carried by the ring-shaped switch member adapted for individual engagement with only one of the last mentioned contacts at a time, whereby any of the filaments may be selectively operated independent of all others.

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