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G. A. YANOCHOWSKI

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AUDION TUBE

Filed Jan. 29, 1926

Fig. 1

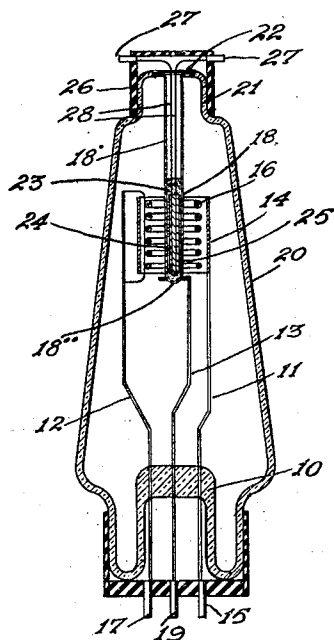


Fig. 2

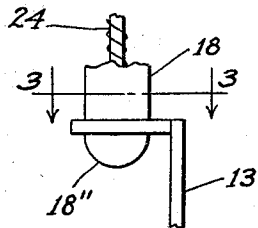
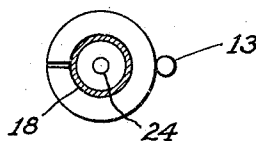


Fig. 3



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UNITED STATES PATENT OFFICE

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AUDION TUBE

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This invention relates to audion tubes and particularly to audion tubes of the type in which the cathode is heated indirectly by being mounted in engagement with a heating element of porcelain or other suitable material which may be heated by a resistance filament therein.

It has been found that tubes of this character are rendered more difficult to evacuate by the fact that the porcelain or other material employed as a mounting for the cathode continues to discharge gas, even after being heated for a considerable period of time.

The object of the present invention is the provision of a tube having means for preventing the gases discharged by the cathode heating element from entering the evacuated portion of the tube.

One of the features of the invention is the tubular cathode having one end closed and the edge or rim of the other end sealed into the glass envelope of the tube whereby the heating element positioned within the cathode is separated from the interior of the tube.

Other features and advantages will appear from time to time as the description of the invention progresses.

It is believed the further disclosure of the invention will be understood most readily from a detailed description thereof taken in connection with the accompanying drawings, in which Fig. 1 is a longitudinal section through a tube constructed in accordance with one embodiment of the invention, Fig. 2 is an enlarged view of a portion of the cathode and the split collar attached thereto, and Fig. 3 is a section taken along the line 3—3 of Fig. 2.

Referring now to the drawings, 10 indicates the usual stem of glass or like material in which are sealed the conductor elements 11, 12 and 13. Conductor 11 carries at its upper end the plate 14 and at its lower end the terminal 15. Conductor 12 carries the grid 16 and terminates at its lower end in the terminal 17. Conductor 13 is joined at its upper end to the cathode 18 by means of a split collar or any other suitable device and

at its lower end to terminal 19. The plate 14 and grid 16 may be of the usual construction.

Integral with or joined to the stem 10 is the bulb or envelope 20 of glass. The bulb, at the upper end thereof, has the reduced portion 21 and is provided substantially centrally of the upper end, with the opening 22.

The cathode 18 projects downwardly substantially centrally of the coil which, forms the grid 16, and in the present modification, may in shape resemble a slender, miniature test tube. As herein disclosed, it consists of a slender tube 18' closed at its lower end as indicated at 18". The upper end of the tube 18' is flared outwardly and sealed to the glass surrounding opening 22. This may be done before the reduced portion 21 is connected to the envelope 20. The tube 18' and cathode portion 18 may be formed of thin sheet metal and the portion 18 may, if desired, be coated with oxides or other compounds to assist in the emission of electrons.

The cathode acts to seal the evacuated interior of the tube from the recess within the cathode which is occupied by the heating element 24 of porcelain or other satisfactory refractory material. If desired, the core 24 may be tubular in form and cement may be inserted in the tube 18 at the opposite ends of core 24 as indicated at 23. Within the porcelain core 24 is the resistance filament 25 by means of which the core 24 and, therefore, the cathode 18 are heated.

Fixed to the reduced portion 21 of bulb 20 is a cap 26 of insulating material within which is secured the laterally extending terminals 27. Conductors 28 pass downwardly within tube 18' and connect the ends of filament 25 to the terminals 27.

In evacuating tubes of the character above described, it is common to heat the elements, such as the plate, grid and cathode within the tube, during the evacuating process, in order to drive off the gases contained therein. As above explained, it has been found that the porcelain core of the cathode, such as above disclosed, when heated will continue to give off more or less gas for a considerable time; thus rendering the evacuating process long and expensive or resulting in a less perfect

evacuation of the tube than is desirable. By the present invention the procelain core or heating element is contained within the closed cathode tube and, therefore, the gases given off by said score do not pass into the tube, but instead pass upwardly through the cathode element. If desired, a small ventilating hole may be provided in the cap 26 to permit the escape of the gas given off by the heater element.

While but a single form of tube is shown in the present disclosure, it is to be understood that many modifications are contemplated and the invention should be limited, therefore, only by the scope of the appended claims.

Having described my invention what I claim is new and desire to secure by Letters Patent of the United States is:

1. An audion tube including an evacuated bulb having reduced end portions, a tubular cathode member within said bulb the inner end of which is closed and its outer end flared and sealed to the upper reduced end portion of said bulb whereby the interior of the tubular cathode is separated from the evacuated portion of the bulb, a refractory member within said cathode having a pair of parallel orifices therein, a looped resistance element extending through said orifices, a top cap fitted onto the upper reduced portion of said bulb, terminals for said cap connected to said heating element, a base member fitted onto the lower reduced portion of said bulb, a terminal supported by said base member, and a split collar carried by said terminal making connection with said tubular cathode for positioning the same and for extending the electrical connection to said cathode.

2. An audion tube including an evacuated envelope having upper and lower reduced end portions, a supporting press connected to the lower reduced end portion of said envelope, a grid and a plate supported by said press, a tubular cathode extending within said envelope having its one end closed and its other end flared and sealed to the upper reduced portion of said envelope, a looped heating element enclosed in refractory material extending within said tubular cathode, a top cap fitted onto the reduced portion of said envelope and carrying terminals connected to said heating element, a support connected to said press and provided with a collar attached to said tubular cathode, and a bottom base fitted onto the lower reduced end portion of said envelope and carrying terminals connected to said grid, plate and cathode.

3. An audion tube including an evacuated envelope having reduced end portions, a lower press for said tube connected to said envelope, a tubular cathode enclosed in one end and having its other end sealed to the reduced upper end portion of said envelope,

refractory material within said tubular cathode having parallel orifices extending there-through, a heating element extending through said orifices, a grid and a plate supported by said press, a supporting member held by said press and provided with a split collar encircling said tubular cathode for holding the cathode in position relative to said grid and plate, a bottom base fitted onto the lower reduced portion of said envelope and supporting terminals connected to said grid, plate and cathode, and an upper cap fitted onto the upper reduced portion of said envelope and carrying terminals connected to said heating element, such structure separating the refractory material and its heating element from the evacuated portion of the tube.

In testimony whereof I have signed this specification.

GEORGE A. YANOCHOWSKI. 85

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