May 26, 1931. J. M. SCHMIERER 1,807,177

GAS DISCHARGE TUBE

Filed Nov. 10, 1924

Fig. 1

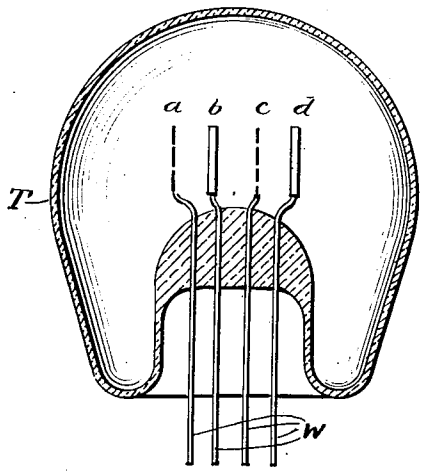
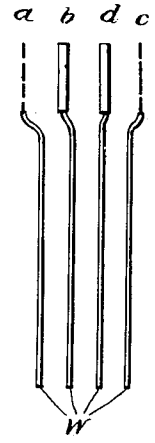


Fig. 2



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Patented May 26, 1931 1,807,177

UNITED STATES PATENT OFFICE

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GAS DISCHARGE TUBE

Application filed November 10, 1924, Serial No. 749,037, and in Germany December 31, 1923.

This invention relates to glow discharge tubes; especially discharge tubes for the regulation and control of electric currents.

An object of this invention is to provide a glow discharge tube of the well known variety, comprising a cathode and an anode with a pair of grids; but designed both to obviate the disadvantages heretofore incident to the use of such tubes and to afford greater simplicity of structure, with attendant ease of manufacture and production.

Additional objects and advantages of the invention will appear from the following description, taken with the drawings, upon which is illustrated one or more embodiments of my invention. The disclosure, however, is illustrative only, and I may make changes, not necessarily presented herein, but embraced within the scope and principle of my invention, as defined by the board and general meanings of the terms in which the appended claim is expressed.

On the drawings:

Figure 1 shows a glow discharge tube according to my invention; and

Figure 2 indicates a modification of the arrangement of the electrodes of the tube.

For the amplification of electric currents there are known to be glow discharge tubes having an anode, a cathode, and a pair of grids; one of the grids serving to maintain the glow discharge and the other to regulate the same. Such tubes are characterized by the disadvantage that the cross section or volume of the glow discharge stream is diminished by the action of the two grids; and thus not only is the internal resistance of the tube increased, but also the uniformity of the field is disturbed. In the practice of this invention the drawback in question is completely removed by a special arrangement of the electrodes.

For such a purpose, the grid serving to maintain the glow discharge is not placed between the cathode and the regulating or controlling electrode or grid; but is disposed on that side of the cathode which is turned away from the controlling grid. In such a position the grid serving to maintain the glow discharge does not need to be formed as a grid; and therefore, along with the improvement sought for, an important simplification in manufacture is secured.

Further, according to the distribution of tension between the several electrodes, the total discharge current goes through the grid serving to maintain the discharge, or in part through the anode. The glow discharge tube of this invention is consequently adapted for the amplification of variable direct current, for rectifying alternating current, even of fluctuating strength or tension; or for the amplification of alternating current and the generation of electrical oscillations.

To get a completely uniform and homogeneous field the controlling electrode or grid and the anode can be interchanged. In this case there is no obstruction or impediment at all between the two principal electrodes.

In Figure 1 the anode is indicated at *d*, the cathode at *b*, while the controlling grid appears at *c*, between the anode and the cathode; and the maintaining electrode or grid is at *a*, on the side of the cathode turned away from the grid *c*. These four electrodes are in a tube T, and are each attached to a separate wire or conductor W, leading from the inside to the outside of the tube. Figure 2 presents an arrangement of electrodes for a glow discharge tube having the anode *d* and cathode *b* between the discharge maintaining grid *a* and the regulating grid *c*, the latter being on the side of the anode *d* turned away from the cathode, and being itself designed to serve as a grid in this instance.

Having described my invention, what I believe to be new and desire to secure and protect by Letters Patent of the United States is:—

An ionic glow discharge tube containing

gas and comprising a non-thermionic cold operating cathode, an anode, a grid electrode for controlling a glow discharge between said cathode and anode and a control electrode positioned outside the discharge space between said cathode and anode and on the opposite side of said cathode from said anode to maintain the electric glow discharge between said cathode and anode.

Signed at Berlin, Germany, this 20th day of October, A. D. 1924.

JOHANNES MICHAEL SCHMIERER.