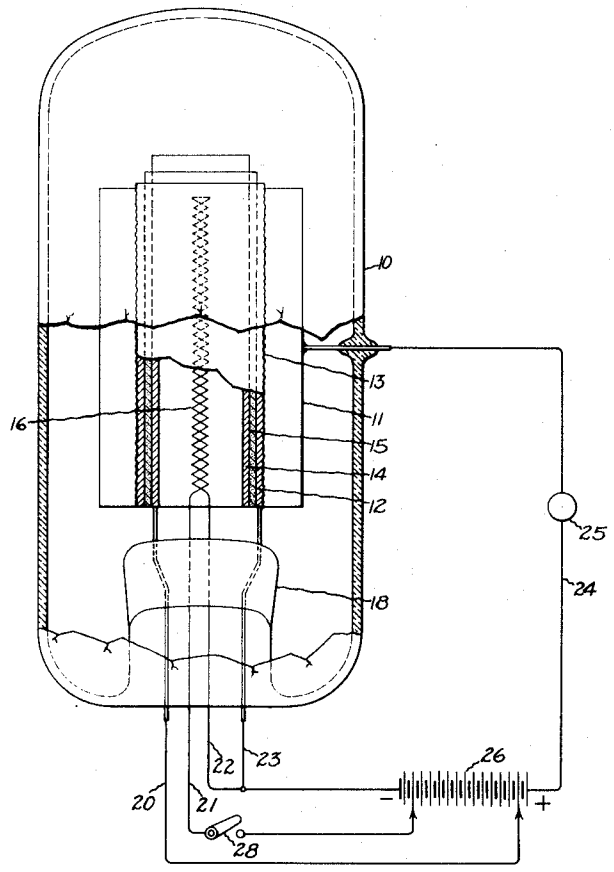
Feb. 11, 1941. G. BECKER 2,231,610

DISCHARGE DEVICE

Filed Sept. 12, 1938



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Patented Feb. 11, 1941 2,231,610

UNITED STATES PATENT OFFICE

2,231,610

DISCHARGE DEVICE

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Application September 12, 1938, Serial No. 229,586
In Germany September 18, 1937

2 Claims. (Cl. 250—27)

The present invention relates to improvements in discharge devices of the type which employs a thermionic cathode heated by means of an auxiliary discharge. In such devices, as heretofore constructed, the anode of the auxiliary discharge and the cathode of the main discharge have been provided by the opposite surfaces of a common metallic element. While this arrangement makes possible a simple and cheap construction, it involves the disadvantage of requiring a separate power source for the heating discharge.

It is the object of my present invention to provide an improved electrode arrangement such that the main discharge and the auxiliary discharge for heating the cathode can both be supplied with current from the same source. This is accomplished by providing an auxiliary anode which is electrically independent of the main cathode and which is in good heat-exchanging relation therewith.

The single figure of the drawing shows an exemplary embodiment of the invention. In the arrangement illustrated there is provided an enclosing envelope 10 which may be either of the evacuated or gas-filled variety. This encloses a main anode 11 and a main cathode 12 which is heated by means to be described in the following.

The cathode 12 comprises a metallic cylinder which is coated exteriorly with a layer 13 of an effective emitting material, such as an alkaline earth oxide. Within the cathode 12 and slightly spaced therefrom there is provided another metallic member 14 which is adapted to serve as the anode for an auxiliary discharge for heating the cathode 12. This member may be constituted of a heat-resisting metal such as nickel.

Between the anode member 14 and the cathode 12 there is provided a layer 15 of an electrically insulating material which has good heat-conducting properties. This layer may comprise, for example, a refractory oxide such as aluminum oxide, magnesium oxide, beryllium oxide or a suitable spinel. While it is shown as of substantial thickness for purposes of clarity, it may actually comprise a relatively thin coating applied to the cylinder 14 by spraying or by some other convenient method.

The cathode cylinder 12 should be in intimate contact with the layer 15 so that a good heat transfer path will exist through the insulating material and between the cylinders 12 and 14. If desired, the cathode body 12 may comprise a layer of metal which is sintered on to the layer 15.

For establishing a heating discharge to the auxiliary anode 14, there is provided an auxiliary cathode 16 arranged coaxially within the cylinder 14. This cathode may be either a straight filament or a serpentine filament of the type illustrated. It may include a coating of alkaline earth oxide or other activating material.

The various electrodes so far described are supported within the envelope 10 from a press 18 provided at the base of the envelope. A series of lead-in connections numbered 20 to 24 inclusive are provided for supplying current to the various electrodes, the conductor 24 containing a load device 25.

It will be seen that with the arrangement illustrated the auxiliary discharge is effectively separated from the main discharge so that a common power source may be used for supplying the current required by both. Such a circuit may comprise for example a battery 26 such as is shown in the drawing. It will be noted that connections are provided from positive terminals of this battery respectively to the main and the auxiliary anode, while connections from the negative terminal lead both to the auxiliary cathode and to the main cathode. With this arrangement the need for auxiliary apparatus for establishing the main discharge is obviated.

In order to render the device initially operative it may be desirable to establish temporarily a heating circuit for the cathode 16. This may be done by the use of a switch 28 by means of which the cathode can be connected to an intermediate tap of the power source 26. After the auxiliary discharge is once initiated, the heat which it creates in the space within the cylinder 14 is sufficient to maintain the cathode 16 in a condition of thermionic emission so that the switch 28 may be opened.

While I have described my invention in connection with a particular embodiment thereof, it will be understood that numerous modifications may be made by those skilled in the art without departing from the invention. I, therefore, aim in the appended claims to cover all such equivalent variations as come within the true spirit and scope of the foregoing description.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In combination, a discharge device comprising a main anode, a main thermionic cathode in cooperative relation with the main anode, a discharge-receiving member separated from the said cathode by a relatively thin layer of electrically insulating material continuously interposed between them, said insulating material providing an effective heat transfer path between the said

discharge-receiving member and main cathode, an auxiliary cathode in spaced relation to the discharge-receiving member, a power source, means connecting terminals of the said source to the discharge-receiving member and the auxiliary cathode for producing a heating discharge therebetween, and means connecting terminals of the source to the main anode and cathode for producing a main discharge therebetween, the said connecting means being such that the said discharges are in effect supplied in parallel from the said power source.

2. In discharge apparatus, the combination which includes a first cathode, a metallic cylinder surrounding the said cathode and spaced therefrom for receiving a discharge from the cathode, a layer of a refractory, electrically insulating substance covering the said cylinder over substantially its entire outer surface, a second cathode including a metallic base member applied directly to the outer surface of the said insulating layer so as to receive heat from the said metallic cylinder by thermal conduction through the layer, an anode for receiving a discharge from the said second cathode, a common power source, means connecting terminals of the said source to the said first cathode and the metallic cylinder for producing a heating discharge between them, and means connecting terminals of the said source to said second cathode and the said anode for producing a main discharge between them, the said connecting means being such that the said discharges are effectively supplied in parallel from the common power source.

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