Oct. 15, 1935. W. L. BETTS 2,017,647

ELECTRON DISCHARGE DEVICE

Filed April 15, 1931

FIG. 1

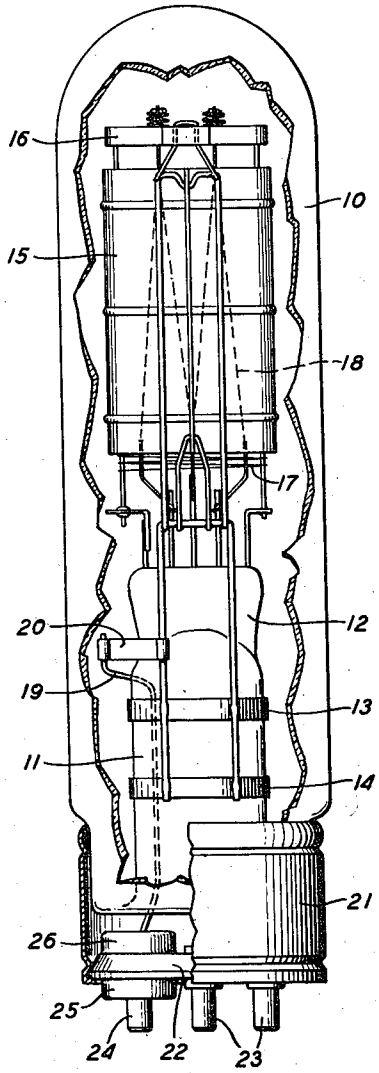


FIG. 2

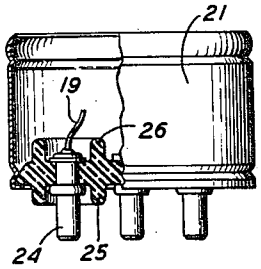
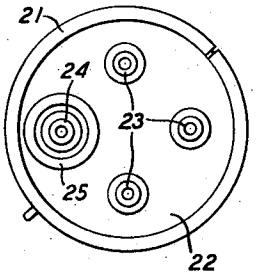


FIG. 3



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ELECTRON DISCHARGE DEVICE

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3 Claims. (Cl. 250—27.5)

This invention relates to electron discharge devices and more particularly to such devices employed in short wave aircraft transmitters.

In portable aircraft transmitters such as are employed in aeroplanes for use in short wave transmitting systems, a number of electron discharge devices are employed to obtain the required high power output to reach distant communicating points. These devices employ the usual filament, grid and anode enclosed in an evacuated vessel and provided with a base having terminals. The base of the device is usually inserted in a socket and connected to other elements which form the transmitting apparatus. Since a relatively high voltage is applied to the anode of the device to obtain the required power output, it is necessary to prevent flash-over or arcing between the anode terminal and the shell of the base. This flash-over or arcing occurs at high altitudes in electron discharge devices used heretofore, due to the rarefied atmosphere offering insufficient insulation across the gap between the anode terminal and the shell of the base.

An object of this invention is to overcome this difficulty in a simple and efficient manner without increasing the cost of the device.

In accordance with this invention the base for electron discharge devices having a metallic shell attached to the vessel and provided with an insulating disc supporting the terminals is also provided with an annular skirt or sleeve which surrounds the anode terminal. The annular skirt or sleeve may be formed integral with the insulating disc and extend on opposite sides thereof so as to increase the insulating path between the terminal and the shell of the base without increasing the diameter of the insulating disc. The high voltage applied to the anode, therefore, is prevented from flashing over to the metallic shell of the base even at high altitude where the air is rarefied. By surrounding the anode terminal on the insulating disc with the double sleeve arrangement of this invention, flash-over or arcing is prevented either on the exterior or interior of the base between the anode terminal and the shell.

The invention will be more clearly understood from the following detailed description in connection with the accompanying drawing in which:

Fig. 1 illustrates one example of an electron discharge device showing the electrode structure and a portion of the base cut away to illustrate the insulating shield or sleeve surrounding the anode terminal on the base;

Fig. 2 illustrates in elevation the base of this invention partly in section to show the arrangement of the annular insulating sleeve projecting from opposite sides of the insulating disc and surrounding one of the terminals on the base; and

Fig. 3 is a plan view of the base showing the arrangement of the terminals thereon and the segregation of the anode terminal by the surrounding insulating sleeve.

Referring to Fig. 1 the electron discharge device comprises an enclosing vessel 10, having an inwardly projecting glass stem 11, terminating in a press 12 in which the leading-in wires for the electrode are sealed. A pair of spaced metallic collars 13 and 14 surround the glass stem and carry wire supports which engage a metallic anode 15. An insulating member or plate 16 is supported beyond the anode 15 and supports a wire wound grid 17 and an incandescent filament 18 which are connected to the leading-in wires in the press 12. The electrode structure while illustrative of one form of device to which this invention is applicable does not form part of this invention but is clearly described and claimed in Patent No. 1,984,992, granted December 18, 1934, to V. L. Ronci and J. E. Clark. A leading-in wire 19 sealed through the side of the glass stem 11 is connected to the frame support of the anode 15 by a strap 20 in order to impress a high voltage on the anode 15.

The leading-in wires of the electrodes projecting from the end of the enclosing vessel 10 are usually attached to metallic terminals carried by a base portion attached to the enclosing vessel. These terminals should be insulated from each other so as to prevent destruction of the electrodes within the device by disruptive discharges. Therefore, it is essential that the terminals should be supported from material having relatively high insulating properties. Of course, when feasible, it is desirable to form the cup-shaped base carrying the terminals wholly of insulating material since this expedient overcomes difficulties due to arcing. However, in large size electron discharge devices it is extremely difficult from a manufacturing standpoint to mold or otherwise shape the conventional form of cup-like base for discharge devices. In order to overcome the manufacturing difficulties of the wholly insulated cup-shaped base, the base is usually formed of an insulating disc supporting the terminals and the disc rigidly fastened in one end of a tubular metallic shell which is easily affixed to the discharge device by cement or similar ma-

terial. This base is entirely satisfactory under certain working conditions. However, when an electron discharge device embodying the composite base, heretofore described, is used in aircraft signaling systems, such as a portable short wave transmitter, the high voltage impressed on the anode of the device causes arcing or flash-over to occur between the anode terminal and the metallic shell of the base. This flash-over is prevalent at high altitudes, due probably to the rarefied state of the atmosphere at such altitudes offering insufficient insulation between the metallic parts of the base.

In order to overcome the insufficient insulation path between the anode terminal and the metallic shell of the base at high altitudes, the insulating disc 22 held in one end of the metallic shell 21 is provided with integral sleeve portions or annular rings 25, 26 on opposite sides of the surfaces thereof which form a tubular sleeve or shield around the anode terminal 24 and serve to increase the insulating path between the anode terminal and the shell and also the other terminals 23 carried by the insulating disc 22. Experiments have shown that the tubular sleeves extending from opposite sides of the insulating disc 22 form a barrier which prevents flesh-over at high altitudes between the anode terminal and the shell base 21.

While the invention has been disclosed in connection with a specific discharge device it is, of course, understood that the terminal base of this invention may be applied to other discharge devices which may be used in communicating systems employed under conditions where the air is highly rarefied. Therefore, the invention is only to be limited within the scope of the appended claims.

What is claimed is:

1. An electrical device comprising a receptacle, means in said receptacle to be connected to an electrical circuit, a metallic shell open at each end, said receptacle extending into one end of said shell, an insulating disc in and closing the other end of said shell, terminal members embedded in and projecting from said disc, said disc having a protuberance on each side thereof, spaced from and surrounding one of said members, and means in said shell connecting the means in said receptacle with said members.

2. An electron discharge device comprising an enclosing vessel containing a plurality of electrodes, a base member for said device having terminal members, said base member comprising a metallic shell open at each end, said enclosing vessel extending into and closing one open end of said shell, a disc of insulating material secured in the other open end of said shell, terminal members for said electrodes embedded in and projecting from said disc, said disc having an annular projection from each side thereof, surrounding and spaced from one of said members, and conductors extending within said shell from said vessel to said members for connecting said members and said electrodes.

3. A base for a discharge device comprising a metallic shell, and an insulating plate in one end of said shell carrying terminal prongs, said plate having protuberances of insulating material on each side of said plate and surrounding one of said terminals, the inner boundary of said protuberances being spaced from the outer boundary of said one terminal.

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