Dec. 1, 1931. R. G. BERTHOLD 1,834,761

ELECTRIC DISCHARGE VESSEL

Filed Dec. 23, 1927

Fig. 1

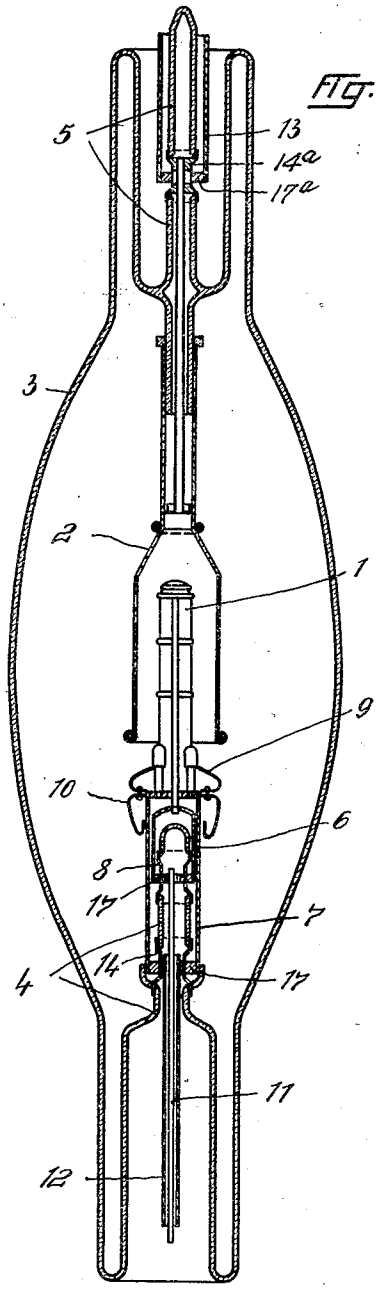
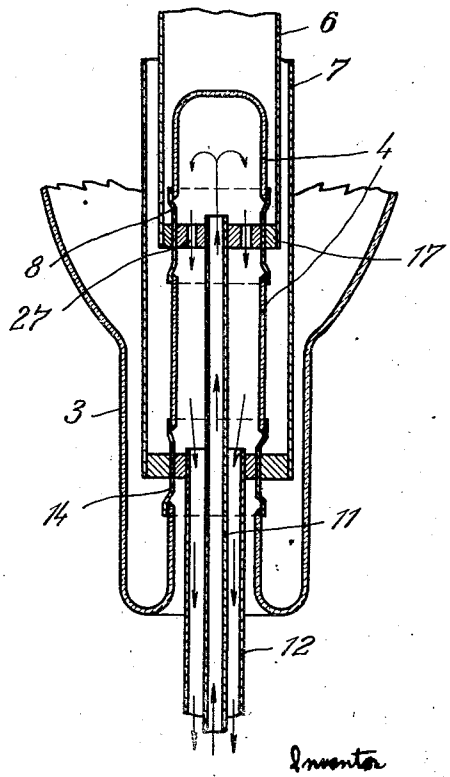


Fig. 2



Inventor

Rudolf G. Berthold

by Knight Bros

Attorneys

Patented Dec. 1, 1931 1,834,761

UNITED STATES PATENT OFFICE

RUDOLF G. BERTHOLD, OF BERLIN-SIEMENSSTADT, GERMANY, ASSIGNOR TO SIEMENS-SCHUCKERTWERKE AKTIENGESELLSCHAFT, OF BERLIN-SIEMENSSTADT, GERMANY, A CORPORATION OF GERMANY

ELECTRIC DISCHARGE VESSEL

Application filed December 23, 1927, Serial No. 242,243, and in Germany December 15, 1926.

My invention relates to electric discharge vessels, tubes, valves or bulbs, the envelope of which consists of an insulating material. It has been proposed to introduce the electrodes into such vessels by providing metal sleeves or collars which are sealed to the envelope at both ends and with which the electrodes are electrically connected. Such sealed-in sleeves are particularly suitable in the case of tubes with incandescent cathodes, inasmuch as it is then possible to feed strong heating currents to the cathode through these fused-in sleeves.

My invention consists in providing means for cooling the fused-in metal sleeves or collars by, for instance, cooling the outwardly directed portions of the sleeves by means of a cooling liquid. This may be effected by providing on the vessel a central glass nipple projecting into the interior of the envelope and part of which is formed by two metal sleeves or collars sealed to the central glass nipple at their ends. These metal sleeves serve as connections for the supply of the heating current to the incandescent cathode. The external connections of the metal sleeves are designed as concentric pipes. Through one of these pipes is supplied a cooling liquid which flows along the inside of the two sleeves and is discharged through the other pipe.

An embodiment of my invention is illustrated in the drawings affixed hereto and forming part of my specification.

In these drawings:

Fig. 1 represents a longitudinal section through a rectifier tube or valve, and

Fig. 2, in larger scale and in detail the connection for the incandescent cathode consisting of metal sleeves sealed to the glass nipple.

Like parts are indicated by like numerals of reference in both figures of the drawings.

Referring to Fig. 1 of the drawings, 1 is the incandescent cathode of a high-tension discharge tube, 2 the bell-shaped anode surrounding the cathode. 3 is the glass envelope or bulb on which are provided the tubular central nipples 4 and 5 for introducing the current into the envelope of the tube. For this purpose at two places the tubular nipple 4 consists of sheet metal sleeves or collars 8 and 14 which are sealed to the glass portions of the nipple at their ends. Each of the sheet metal sleeves is surrounded by an annular clamp 17. On these clamps are fixed respectively the internal tubular conductor connections 6 and 7, for instance by a screw joint. The cathode is electrically connected with these internal connections. At the point of junction of the connections with the cathode, dome-shaped or rounded sheet metal screens 9 and 10 are provided in order to avoid discharges which are liable to start from places of high field intensity. The connection of the anode is designed in a similar manner as shown at the top of Fig. 1 at 14^a, 17^a. The external connections to the lead-ins are likewise designed as tubes such as 11, 12 at the lower end, and 13 at the upper end. The complete electric discharge vessel, tube, valve or bulb may then be mounted upon a suitable supporting framework suitable insulation being provided between the two parts. The external cathode connection of the electric tube consists of two concentric tubes 11 and 12, of which the tube 11 is rigidly joined to the metal sleeve 8 and the tube 12 to the metal sleeve 14. For cooling these sealed-in sleeves a cooling liquid, such as oil or water is supplied through the inner tube 11, see in particular Fig. 2 of the drawings. The liquid then passes through perforations 27 in the clamps 17 joining the tube 11 to the sleeve 8 and thus cools the metal sleeve 8. The cooling liquid then reaches the metal sleeve 14 and hence escapes through the external tube 12.

Various modifications and changes may be made without departing from the spirit and the scope of the invention, and I desire, therefore, that only such limitations shall be placed thereon as are imposed by the prior art.

I claim as my invention:—

1. A seal for an electric tube having an envelope of insulating material comprising in combination, metal sleeves sealed at their ends to the insulating envelope of the tube and forming part thereof, internal and external electrode connections on said electric tube joined to the inside and outside of said

metal sleeves, said external electrode connections being tubular, and one being disposed within the other to permit the supply and discharge of a cooling medium flowing along said sleeves.

2. A seal for an electric tube having an envelope of insulating material comprising in combination, metal sleeves sealed at their ends to the insulating envelope of the tube and forming part thereof, internal and external tubular electrode connections on said electric tube joined to the inside and outside of said metal sleeves, said internal and external electrode connections being disposed one within the other.

3. An electric tube having an envelope of insulating material comprising in combination, an anode and a cathode adapted to be heated to incandescence within said envelope, a nipple consisting of two metal sleeves, the adjacent ends of which are sealed to a tubular insulating portion and the free ends of which are sealed to a reentrant portion of the envelope and to an insulating cap portion respectively, internal and external electric connections for said cathode joined to the inside and outside of said metal sleeves respectively, said external electric connections being designed as pipes for the supply and discharge of a cooling medium adapted to flow along said sleeves.

In testimony whereof I affix my signature.

RUDOLF G. BERTHOLD.