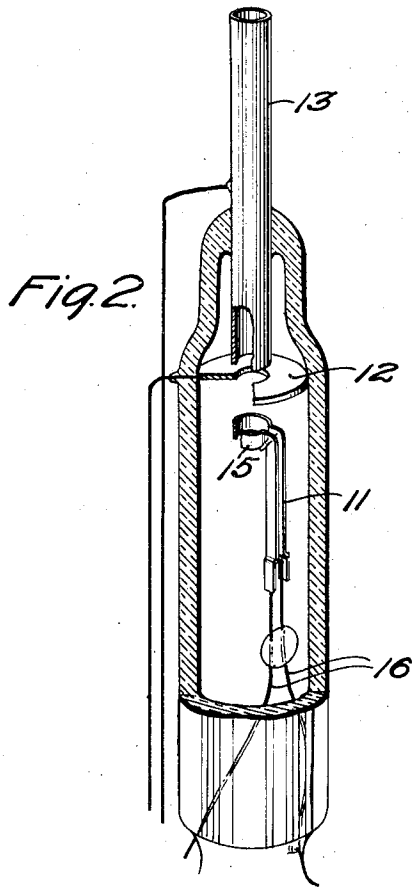
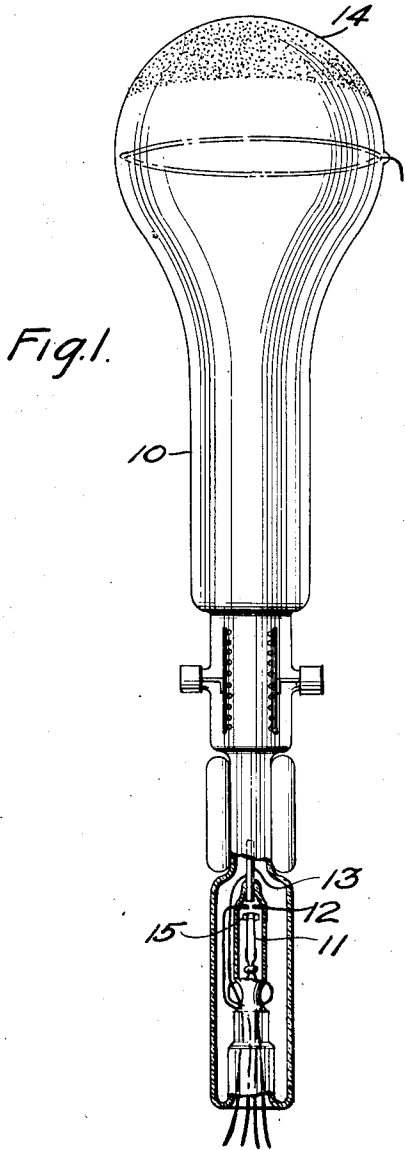


June 14, 1927.

1,632,080

J. B. JOHNSON
ELECTRIC DISCHARGE DEVICE

Filed Dec. 27, 1921



Inventor:
John B. Johnson,
by C. C. Sprague, ATT'Y.

UNITED STATES PATENT OFFICE.

JOHN BERTRAND JOHNSON, OF ELMHURST, NEW YORK, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

ELECTRIC DISCHARGE DEVICE.

Application filed December 27, 1921. Serial No. 524,874.

This invention relates to electric discharge devices and more particularly it pertains to an electrode structure for an electric discharge device of the gas-containing type.

5 For convenience, this invention will be hereinafter described in connection with the type of electric discharge devices known in the art as the Braun tube, which is used primarily for the measurement or the indication of electric power, the wave form of alternating currents or potentials or similar conditions in electrical circuits.

10 In certain embodiments of the Braun tube, the source of cathode rays comprises an electron emitting electrode, which may be a filament heated by a battery or other suitable source. A narrow pencil of cathode rays is obtained by having a small aperture in the anode of the tube so that only a narrow beam of the rays pass beyond the anode to a receiving screen. The anode is so arranged that its aperture is directly in line with the filament. In these embodiments the life of the device has been relatively short because of the decreased activity of the filament after a few hours of operation due to the destruction of the filament from bombardment of positive ions passing through the aperture in the anode.

15 It is the principal object of this invention to increase the life of tubes of this character by preventing the bombardment of the filament by positive ions. This object is accomplished by locating the filament out of the direct path of the positive ions, for example by arranging it in the form of a ring coaxial with the axis of the aperture in the anode and of substantially the same diameter as said aperture. The positive ions passing through the anode also pass through the ring and do not strike the filament.

Other objects and features of this invention will be apparent from the following specification and appended claims.

20 Fig. 1 of the accompanying drawings, is a side elevation partially in section of a device embodying the invention, and Fig. 2 is an enlarged detail of the cathode and anode.

25 Referring to Fig. 1, the cathode ray or Braun tube, illustrated, comprises an elongated vessel 10 containing a hot cathode 11, a perforated plate electrode 12, and a tubular anode 13. Within the tube is contained

a gas or vapor, such as, for example, mercury vapor at a pressure of one or two microns. As is well known in the art, a narrow beam of cathode rays will pass through the anode 13 when a sufficient source of voltage is connected between the hot cathode and the anode. A beam of cathode rays passing through the tubular anode 13, produces a luminous spot on the coating 14 on the opposite end of the vessel, which coating may be of a suitable fluorescent material, such as calcium tungstate deposited directly on the glass and held in place by sodium silicate.

The cathode ray stream ionizes the gas in the anode 13 and the space immediately adjacent thereto, thereby setting free positive ions, which because of the field existing in this region, travel in the direction of the cathode 11. In order to prevent the positive ions from striking against the cathode and causing the destruction thereof, the cathode is formed of a metal ribbon bent at its middle portion to form a ring of internal diameter at least as great as the aperture within the anode. The ends are bent parallel to the axis of the ring 15 and the whole structure is supported from the lead wires 16 in such a way that the ring is coaxial with the anode and the ends lie out of alignment with the anode. The disc 12 serves to protect the cathode against bombardment by ions set free in the space adjacent the lower end of the anode and the inertia of the ions set free in the anode and the space directly above it, causes them to pass, in a straight path, through the ring-shaped portion of the cathode and prevents them from striking the active portion of the cathode.

30 Except for the cathode, the structural features of this tube are fully set forth in applicant's Patent 1,565,855 issued December 15, 1925.

It is of course, understood that various modifications may be made in the structural arrangement of the cathode without departing in any way from the spirit of the invention as defined in the appended claims.

What is claimed is:

1. In an electron discharge device an enclosing vessel containing a gaseous atmosphere, a substantially cylindrical tubular anode, a cathode comprising a metallic ribbon having a substantially ring-shaped por-

tion, said ring-shaped portion being spaced from and substantially in alignment with said anode, the interior diameter of said ring-shaped portion being at least as great as the interior diameter of said anode, means for supplying heating current to said cathode and means for establishing a difference of potential between said anode and cathode. ribbon having its ends connected to said leading-in wires and its intermediate portion forming a substantially annular cathode having an interior diameter at least as great as the interior diameter of said anode, said anode and cathode being spaced from and in substantial alignment with each other.

2. In an electron discharge device an enclosing vessel containing a gaseous atmosphere, a cylindrical tubular anode supported therein, a pair of leading-in wires, a metallic In witness whereof, I hereunto subscribe my name this 14th day of December, A. D. 1921.

JOHN BERTRAND JOHNSON.