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J. BÖHME

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ELECTRON DISCHARGE DEVICE

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Fig. 1

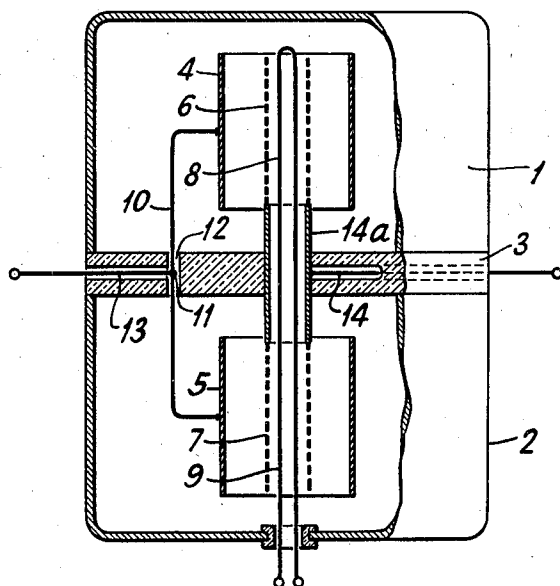
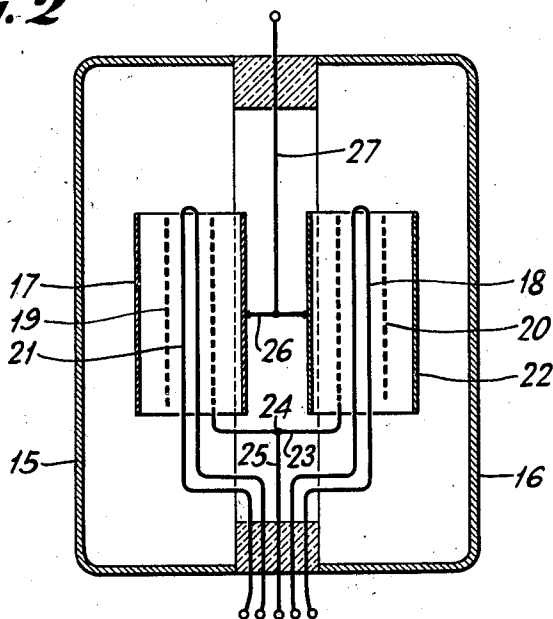


Fig. 2



INVENTOR.

JOACHIM BÖHME

BY

Charles McVair
ATTORNEY.

UNITED STATES PATENT OFFICE

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ELECTRON DISCHARGE DEVICE

Joachim Böhme, Berlin-Schöneberg, Germany,
 assignor to Fides Gesellschaft für die Ver-
 waltung und Verwertung von gewerblichen
 Schutzrechten mit beschränkter Haftung,
 Berlin, Germany, a corporation of Germany

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2 Claims. (Cl. 250—27.5)

This invention relates to an electron discharge device particularly suitable for use at high frequencies.

Push-pull tubes in which the two electrode assemblies operating in push-pull as well as the essential parts of the oscillatory circuit have been accommodated inside one and the same glass vessel or bulb have previously been suggested. The particular purpose of such an arrangement has been to make it unnecessary for the current leads to carry RF currents, and as a result such difficulties as are attendant upon the sealing of the current supply wires arising in tubes of the conventional types are obviated. To this end the lead for the high potential supplied to the plate is connected with a point along the internal oscillatory circuit where the alternating potential is of zero value. The RF energy generated in the tube is delivered from the tube and fed to the consumer or load by means of capacitive coupling from the outside. This coupling is usually effected by having on the outside of the tube metallic surfaces such as laminations or sheets or gauzes, which, conjointly with the plates or anodes confined within the vessel, result in coupling condensers.

Now, the present invention is concerned with an improvement upon the type of tube previously disclosed and which results in an appreciable simplification both in structure as well as in operation.

According to this invention, in a push-pull tube the metallic parts which represent the outer coats of the coupling condensers form the wall or shell of the vessel. Inside these walls are two push-pull connected electrode systems including the essential elements of the oscillatory circuit. Inasmuch as each anode or plate must cooperate with an outer coat of the coupling condenser the tube either in transverse or longitudinal sense is divided by an insulating, for example ceramic, partition into two parts which are electrically separated from each other. This partition, of course, concerns merely the walls or shell of the vessel.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims, but the invention itself will best be understood by reference to the following description taken in connection with the accompanying drawing in which Figure 1 shows a schematic section of an electron discharge device made according to my invention, and Figure 2 shows a schematic section of a

modification of the electron discharge device shown in Figure 1.

Figure 1 illustrates a tube whose metallic shell is divided in the transverse sense by an insulation body 3, the cup-shaped halves of the metal envelope being denoted 1 and 2. Conjointly with the anodes or plates 4 and 5, these halves constitute the coupling condensers before mentioned. The leads brought to the consumer or load circuit are united in some suitable manner with the wall parts 1 and 2. The two cathodes 8 and 9 are united into a common construction unit, and the same is true of the two grids 6 and 7. The anodes 4 and 5 are inter-connected by a clip 10 whose inductance primarily governs the frequency of the oscillations generated in the tube. The lead 13 for the high potential of the plate is connected with the symmetry point 11 of this clip. In a similar way the grid lead 14 is united with the symmetry point of the connection between the grids 6 and 7 preferably in the form of a metallic cylinder 14a. The insulation body 3 has a hole 12 through which the clip 10 may be passed. Similar holes are formed in the insulation body for the grid and the plate leads, the said holes being conveniently sealed, say, by solder at the end where the lead-wires come out of the insulator piece.

The tube here disclosed, as will be noted, combines in a simple way an electrode system suited for the generation of ultra-short waves together with the necessary coupling elements, and arrangements are so made that none of the leads is called upon to carry RF energy, with the result that such difficulties as will otherwise arise in the construction of these leads are obviated. Contrasted with other tubes of the push-pull type described, a tube as here disclosed offers principally the merit that the mounting of distinct coupler means outside the tube shell is obviated, and such mounting may in some instances tend to make the mounting of the device more difficult. For the purpose of supporting the tube in the rack the tube preferably is propped at suitable points of the insulator part 3. The latter may, in fact, be built so as to make it more adapted to this end.

Another embodiment of a tube according to the invention is shown in Fig. 2. This tube is divided longitudinally by an insulator part resulting thus in two wall parts 15 and 16. Cooperating with wall portion 15 is the anode or plate 17, grid 19 and cathode 21, while with the wall part 16 cooperate the plate 22, grid 20 and the filament 18. The lead 27 designed to bring in

high potential for the plate is united again with the point of symmetry of the connector bridge 26 between the two anodes 17 and 18; similarly the grid lead 25 is connected with the point of symmetry of the connecting conductor 24 of the two grids. These leads are brought through the insulator part in a suitable manner.

Ceramics are particularly suited for the making of the insulation body for the reason that these may be readily fashioned in all kinds of forms and shapes, and since they are easy to work. Moreover suitable methods have been suggested or disclosed in the prior art by which the metallic wall may be intimately united with the ceramic partition piece. The material most convenient for the metallic parts of a tube or vessel wall or shell is copper, though also other metals or alloys are serviceable, most especially those adapted to result in excellent fusion or soldered junctions with vitreous or ceramic intermediary part.

While I have indicated the preferred embodiments of my invention of which I am now aware and have also indicated only one specific application for which my invention may be employed, it will be apparent that my invention is by no means limited to the exact forms illustrated or the use indicated, but that many variations may be made in the particular structure used and the purpose for which it is employed without departing from the scope of my invention as set forth in the appended claims.

I claim:

1. An electron discharge device having an envelope comprising a pair of metallic cup-shaped members with their open ends oppositely disposed to each other, a partition of insulating material between said cup-shaped members and sealing said cup-shaped members together with an air-

tight seal, a cathode member extending through one of said cup-shaped members and through said partition to provide a cathode in each of said cup-shaped members axially of said cup-shaped members, a grid in each cup-shaped member surrounding the cathodes, said grids being connected and supported by a tubular member extending through and supported by said partition, an anode surrounding each of said grids, a conductor connecting said anodes, and separate conductors connected to said anode conductor and to said tubular member for providing voltage leads to said grids and anodes.

2. An electron discharge device having an envelope comprising a pair of metallic cup-shaped members with their open ends oppositely disposed to each other, a partition of insulating material between said cup-shaped members and sealing said cup-shaped members together with an airtight seal, a cathode member extending through one of said cup-shaped members and through said partition to provide a cathode in each of said cup-shaped members axially of said cup-shaped members, a grid in each cup-shaped member surrounding the cathodes, said grids being connected and supported by a tubular member extending through and supported by said partition, an anode surrounding each of said grids, a conductor connecting said anodes and separate conductors connected to said anode conductor and to said tubular member for providing voltage leads to said grids and anodes, said partition enclosing the separate conductors connected to the anode conductor and the tubular member and providing a seal therefor between the metallic cup-shaped members.

JOACHIM BÖHME.