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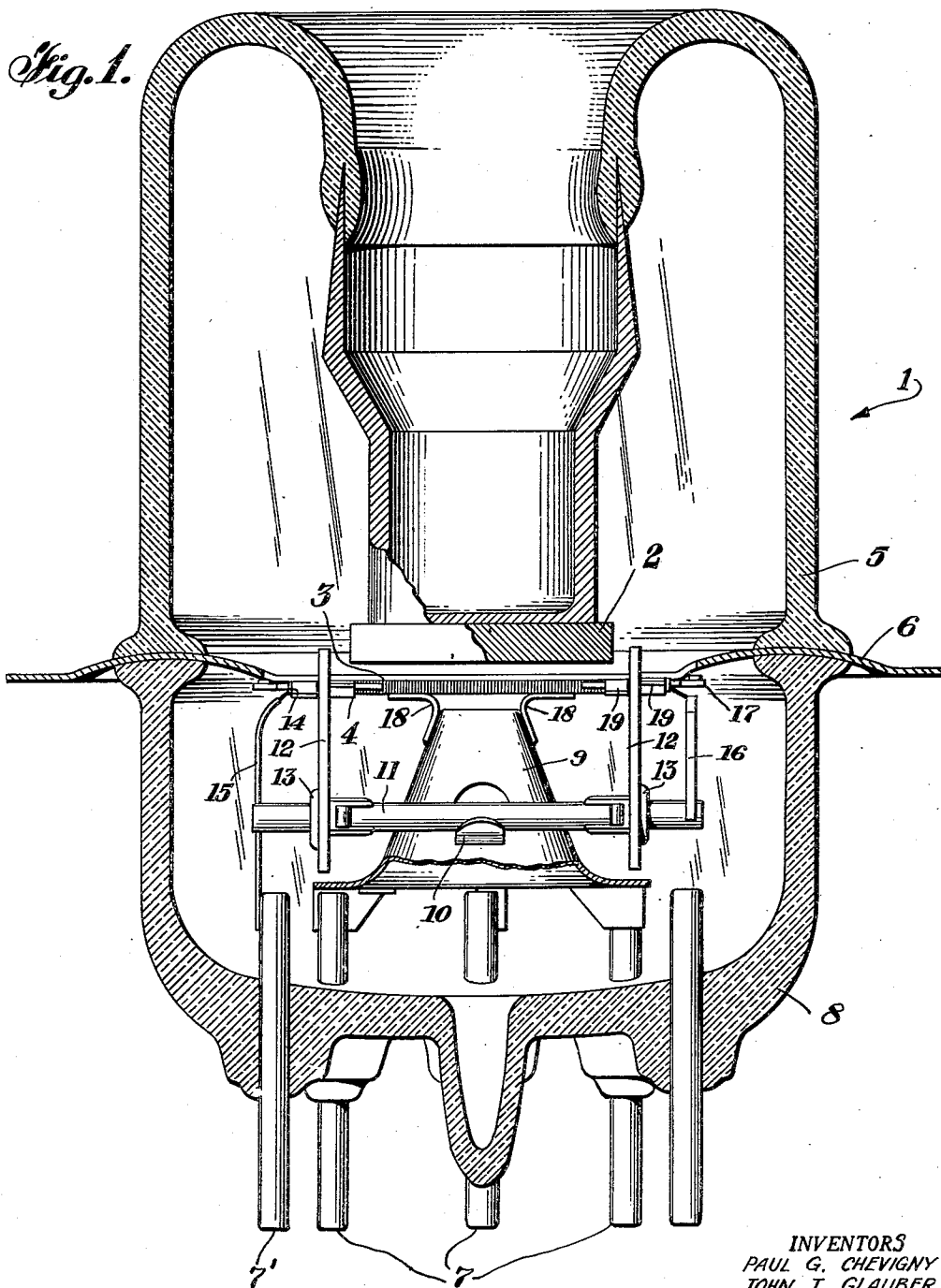
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2,411,523

ELECTRON DISCHARGE DEVICE

Filed July 4, 1944

2 Sheets-Sheet 1



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Fig. 2.

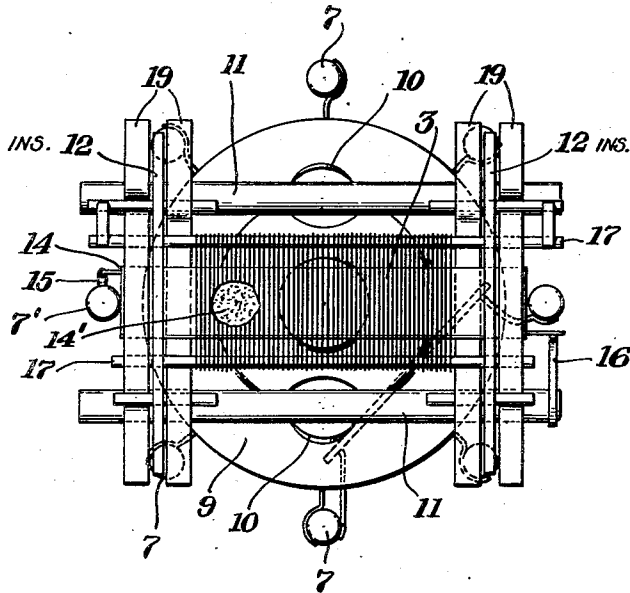


Fig. 3.

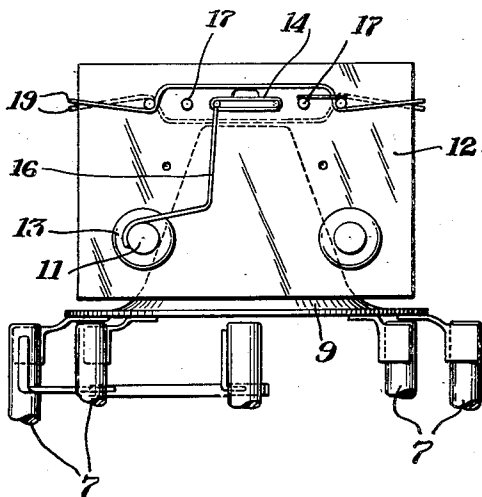
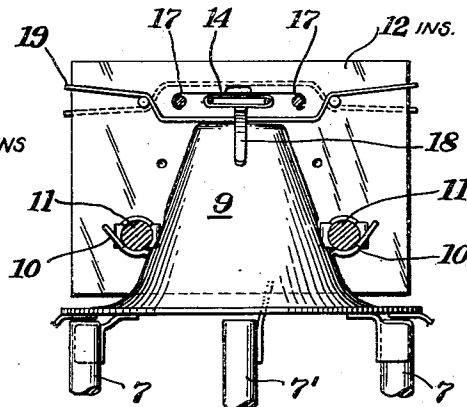


Fig. 4.



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ELECTRON DISCHARGE DEVICE

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This invention relates to improvements in electron discharge devices and more particularly to an improved grid-cathode assembly for use in such devices.

An object of this invention is to provide in electron discharge devices, a simple, easily assembled and sturdy grid-cathode assembly structure.

Another object of this invention is to provide a grid-cathode assembly mounting of sturdy construction which, at the same time, serves as a low impedance cathode lead conductor.

Still another object of this invention is a low inductance cathode support and conductor adapted for use with standard, prefabricated multi-lead base stems.

Further objects and advantages of this invention will become apparent from the following description of this invention taken in connection with the attached drawings wherein:

Fig. 1 is a longitudinal cross-sectional view of a vacuum tube, drawn on an enlarged scale and illustrating the grid-cathode assembly according to the present invention;

Fig. 2 is a top plan view of the grid-cathode assembly;

Fig. 3 is an end view of the grid-cathode assembly; and

Fig. 4 is an end view looking in the same direction but with one of the end plates removed.

The invention has been illustrated in Fig. 1 in connection with a vacuum tube generally indicated at 1, provided with an anode 2, a grid 3 and a cathode 4, all mounted within an insulating envelope generally indicated at 5. The anode 2 is shown, by way of example, as a hollow anode attached to a reentrant end of the envelope 5 in any well-known manner. The hollow construction of the anode permits the insertion of an anode connector in a manner known to the art. It is to be emphasized, however, that any suitable anode structure may be used in conjunction with the grid-cathode assembly of the present invention. Intermediate the two ends of the envelope 5 is attached a grid ring 6 which will be interconnected with the grid 3 in a manner to be described hereinafter.

The other end of the envelope is formed with a plurality of leads 7, 7', passing through a base construction 8 of the usual type. It is common, for example, in this art to purchase base stems consisting of the lead wires and insulating support and use such base stems for different types of vacuum tubes.

In accordance with the present invention and more particularly for use in connection with vac-

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uum tubes operating at very high frequencies, we attach to the inner ends of certain of the leads 7, a hollow metal support 9, here shown in the form of a truncated cone. Opposite sides of this cone may be provided with punched-out ears 10, to which are attached in any suitable manner, transversally extending metal rods 11. At the opposite ends of these rods and supported by them, are provided insulating electrode spacers 12. These spacers may be attached to the rods 11, for example by providing metal eyes 13 in the spacers, through which the rods 11 pass and are welded thereto.

Supported across the upper ends of the spacers 12 is a flattened cathode sleeve 14 extending, for example, through openings near the upper edge of the insulating spacers 12. This cathode sleeve is of the indirectly heated type, and contains therein a heating element (not shown), and is provided with an electron emitting coating as indicated at 14' in Fig. 2, on its upper plate like surface. A conductor 15 will be connected to one end of this heating element, this conductor in turn being attached to one of the leads 7' which is not interconnected with the flange on the hollow metal support 9. The other end of the heating element is interconnected with the cathode as by lead wire 16, attached to one of the rods 11.

Directly above and parallel to the flattened side of the cathode sleeve and also supported by the insulating spacers 12 is the grid 3. The grid 3, as illustrated, consists of a plurality of closely spaced wires arranged in an extended plane parallel to the upper surface of the cathode member 14, the wires being attached at their end to grid side rods 17 held at their ends in the insulating spacers 12. One or more short conductors or tabs 18 interconnect the top of the conical member 9 to the under side of the hollow cathode sleeve 14. Attached to the grid side rods 17 are a plurality of metal fingers 19. These fingers may be sprung to make contact with the inner edge of the grid ring 6 upon assembly of the tube and are additionally, preferably welded to the inner periphery of this grid ring.

It will be seen that the aforescribed construction provides a simple and sturdy arrangement for supporting the planar cathode and grid of the electron discharge device in fixed spaced relation with the anode. At the same time the hollow support member 9, in itself, acts as a low inductance cathode lead and by its interconnection with a plurality of lead wires in the base stem interconnects these lead wires in parallel to provide a plurality of parallel cathode input

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channels, resulting in a low inductance cathode lead-in, permitting the use of a standard base stem for high frequency tube structures. The hollow conical member 9 thus serves the double function of supporting the cathode and grid in proper spaced relationship in a sturdy and easily assembled manner and simultaneously acts as a low inductance cathode lead.

While we have shown the metallic member 9 as being in the form of a hollow truncated cone, it will be clear to those skilled in this art that this shape may be varied, as desired, for example a hollow cylindrical construction could be used. Additionally, the use of a hollow support and low inductance lead-in member provides a simple and advantageous high frequency cathode assembly apart from the supporting of the grid structure. In other words, the principles of our invention are of importance even though the grid may be supported otherwise than from the same structure supporting the cathode.

Accordingly, while we have described above the principles of our invention in connection with a specific form of electron discharge device, it is to be clearly understood that this description is made only by way of example and not as a limitation on the scope of our invention as set forth in the objects and the accompanying claims.

We claim:

1. An electron discharge device comprising, an insulating envelope, a cathode, a grid, an anode, means mounting said anode within one end of said envelope, a plurality of leads extending through the other end of said envelope, and means mounting said grid and cathode in said envelope in spaced relation with said anode, said means including a hollow metal support having a flanged base attached to the inner ends of certain of said leads, and insulating spacers attached to said hollow support, said cathode and grid being carried as a unit by said spacers, and one or more conductors interconnecting the top of said hollow support with said cathode.

2. Cathode assembly comprising, in combination, a base stem having a plurality of circularly arranged leads extending therethrough, a hollow, truncated, conical metallic member provided with a flanged base coaxial with the leads and attached to certain of the leads, a cathode, means supporting said cathode above the top of said metallic member, and one or more conductors interconnecting the top of said conical member with said cathode.

3. The combination according to claim 2, in which said cathode supporting means includes a pair of ears extending outwardly from opposite sides of said metallic member, transverse rods fastened to said ears, said insulating spacers being attached to the ends of said rods.

4. Cathode assembly for electron discharge devices and the like, comprising an insulating base stem having a plurality of leads extending therethrough, a hollow metal member having a

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flanged base attached to the inner ends of certain of said leads, a pair of rods, one attached on the outside to one side of said metal member and the other attached on the outside to the opposite side of said metal member, both of said rods extending transversally to said leads and projecting beyond the parameters of said metal member, a pair of insulating spacers supported on the ends of said rods on opposite sides of said metal member, a cathode supported between said insulating spacers above the top of said metal member, and one or more conductors interconnecting the top of said metal member with said cathode.

5. An electron discharge device according to claim 1, in which said grid and cathode mounting means further includes a pair of transverse rods respectively attached to opposite sides of said metal support, said insulating spacer being respectively attached to the opposite ends of said rods, an electron-emitting cathode plate supported between said insulating spacers above said hollow support, and in which said conductors interconnect the top of said hollow support with the underside of said cathode plate, and the grid is supported between said insulating plates above said cathode plate.

6. A cathode assembly comprising an insulating base having a plurality of lead-in wires projecting therethrough, a cathode, and means supporting said cathode from said base and electrically interconnecting said leads to said cathode, comprising a hollow metal support having a flanged base electrically interconnected with and supported by the inner ends of a plurality of said lead-in wires, said cathode being mechanically attached to said metal support and arranged above the top of the same, and means electrically interconnecting the top of said support to said cathode.

7. A tubular envelope, a tubular metal member in one end of and coaxial with said envelope, a planar anode in the opposite end of said envelope normal to the envelope axis, a planar cathode supported across and electrically connected to the inner end of said tubular member, the cathode being in parallel close-spaced relation to said anode, and a plurality of lead-in conductors connected to the outer end of said tubular member.

8. In the combination of claim 7, a rectangular planar grid between and spaced from said anode and cathode, parallel insulating spacers on opposite side of said tubular metal member, and mechanically attached to the member, and the grid and cathode being attached to said spacers.

9. In the combination of claim 7 in which said cathode and said inner end of the tubular member are connected, the connection comprising a plurality of metal tabs.

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