

July 20, 1937.

N. R. SMITH

2,087,307

MOUNT FOR ELECTRON DISCHARGE DEVICES

Filed March 21, 1936

Fig. 1

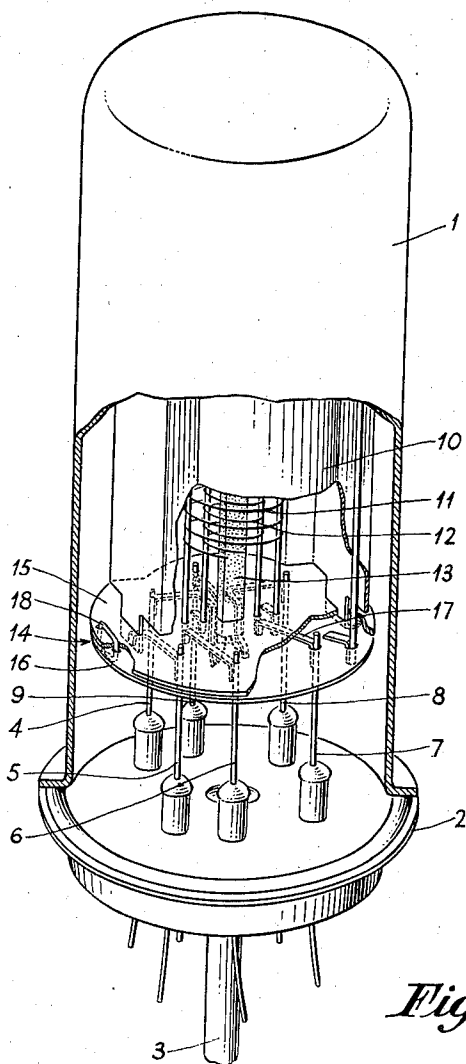


Fig. 2

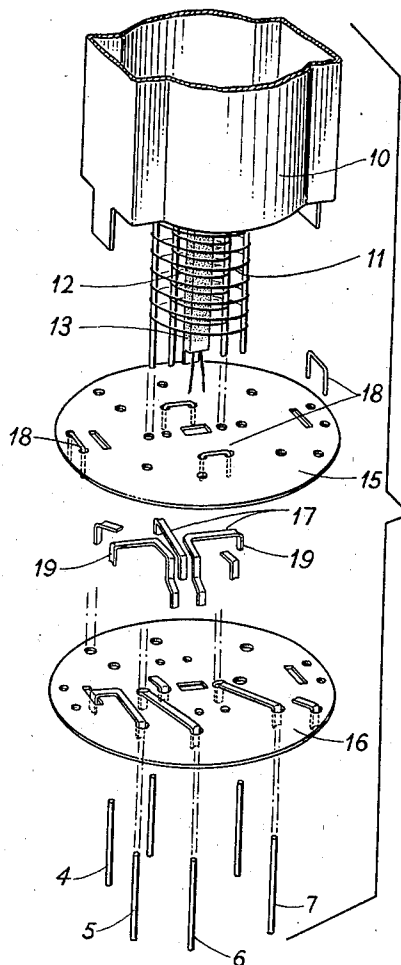
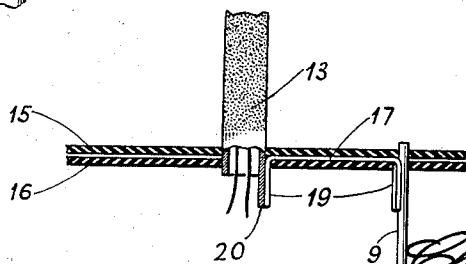


Fig. 3



INVENTOR
NEWELL R. SMITH

BY
Charles M. Clair
ATTORNEY

UNITED STATES PATENT OFFICE

2,087,307

MOUNT FOR ELECTRON DISCHARGE
DEVICES

Newell R. Smith, Bloomfield, N. J., assignor, by
mesne assignments, to Radio Corporation of
America, New York, N. Y., a corporation of
Delaware

Application March 21, 1936, Serial No. 70,018

4 Claims. (Cl. 250—27.5)

My invention relates to electron discharge devices, particularly to means for assembling and supporting electrodes.

A well known type of electron discharge device comprises an envelope enclosing an electrode assembly carried on lead-in wires arranged in a circle in a flat header or stem. It is common practice to make the electrode assembly as a unit, in which the electrodes are supported in telescoped relation upon spaced parallel rods inserted at their ends in a straight line of holes in insulating spacers, with the rods held against longitudinal movement in the holes by various forms of rivets and metal straps secured to the spacers and the rods. The electrode assembly is then placed upon the stem and each electrode is connected to its lead-in wire by short conductors, each conductor being welded at one end to the lower end of an electrode rod and the other end to a corresponding lead-in wire. These conductors criss-cross beneath the electrode assembly, and the small clearance between the lower spacer and the stem makes it difficult to insert welding tools and is apt to result in haphazard connections with many open and short circuiting contacts. As these conductors aid but little in the mechanical support of the electrode assembly, auxiliary braces or supporting rods are usually required between the electrode assembly and the stem.

An object of my invention is to provide an electrode assembly, which is rugged in construction and easy to manufacture, with electrical connections between the electrodes and their respective lead-in wires which are simple and strong.

It is another object of my invention to provide an electrode assembly which is directly connected to and supported by circularly arranged lead-in wires.

A further object of my invention is to provide an electrode assembly which accurately spaces the electrodes and positively secures the electrodes against transverse or longitudinal movement.

Other objects and benefits of my invention will appear as the following description proceeds.

The novel features of my invention are set forth with particularity in the appended claims, but the invention itself will be understood by reference to the following description taken in connection with the accompanying drawing in which

Figure 1 shows a sectioned perspective view of an electron discharge device embodying the characteristic features of my invention;

Figure 2 is an exploded detailed view showing

an electrode spacer embodying the characteristic features of my invention; and

Figure 3 is a detailed view of an electrode connection made in accordance with my invention.

Figure 1 shows an electron discharge device with a metal envelope comprising a cup-shaped shell 1 closed at the lower end by a metal stem or header 2 with an exhaust tube 3. Electrode lead-in wires 4, 5, 6, 7, 8, and 9 are insulatingly sealed in a circle in the header and are connected to electrodes within the shell, shown by way of example as anode 10, grids 11 and 12, and an indirectly heated cathode 13. The electrodes are held in telescoped spaced relation and electrically connected to their respective lead-in wires by means which act both as a spacer and as an electrical connector.

According to my invention, the electrodes are supported as a unit upon an insulating spacer 14 comprising two discs 15 and 16 of insulating material, such as mica. The two discs are formed with registering holes through which may be inserted extensions of the electrodes, such as the supporting side rods of the grids and ears or tubes of the anode. Other openings in the spacers are formed to receive the upper ends of the lead-in wires. Short connectors 17, preferably ribbon-like conductors, are laid between the two insulating discs, and the discs are clamped together by rivets or staples 18 to firmly hold the conductors in place and the openings in the discs in registry. Each conductor is bent or turned downward at its ends to form ears or tabs 19, which pass through the openings in the lower disc to lie in parallel contact with the rods or wires inserted in the disc openings. Welding the tabs of the conductors to the electrode side rods or lead-in wires locks these rods or wires against longitudinal movement in the openings, and, at the same time, electrically connects each lead-in wire to its corresponding electrode. An integral extension on the anode is shown held between the two discs.

The exploded view in Figure 2 shows the relative position of the parts of my improved spacer during assembly. Each conductor is placed in the lower mica 16 with its end ears or tabs extending downwardly through selected holes in the disc. The top disc 15 is then placed upon the bottom disc with its holes in registry and is secured in place by staples or rivets. It has been found convenient in manufacture to hold the several electrodes in assembled spaced relation by a tool such as a jig or vise and to slip my assembled spacer over the ends of the electrode

support rods and to spot-weld the ends of the rods to the conductor tabs. The electrode assembly may then be attached to the stem by inserting the electrode lead-in wires of the stem through their respective openings in the spacer and secured to the conductor tabs by spot-welding. By locating the openings for the electrode lead-in wires in the spacer so as to over-lie the lead-in seals in the stem, the lead-in wires may be extended in straight parallel lines from the seals to the spacer openings. The direct attachment of the electrode unit to the stem by straight unbent lead-in wires provides a particularly rigid support for the electrodes and eliminates the usual auxiliary braces and supports between the electrodes and stem. The electrical connectors between the lead-in wires and their respective electrodes are positively held in insulating spaced relation to eliminate short circuits and in manufacture welding tools are easily applied to the exposed tabs of the connectors to join them to the rods and wires in the holes of the spacer. The tabs of the connectors may, if desired, be turned upward to extend through the top disc 15. The spacer 14 may if desired be molded of an insulating material, such as ceramic, with the conductors 17 embedded therein and tabs 19 protruding from the face of the spacer.

Figure 3 shows in enlarged sectional view one convenient way of mechanically fastening a cathode sleeve in my improved spacer and electrically connecting the sleeve to its lead-in wire. Cathode sleeve 13 with ear 20 is inserted in the spacer hole in contact with tab 19 of the connector ribbon 17. Ear 20 and tab 19 may conveniently be secured together by welding to positively secure the cathode sleeve against longitudinal movement through the spacer opening, and the cathode may be electrically connected to its lead-in wire 9 by welding the other end of the connector to the side of the lead-in wire. The connectors may conveniently be stamped from nickel ribbon stock and their ends turned up and formed with a slight concavity to snugly engage the rods or wires to which they are welded.

It will be obvious to those skilled in the art that a tube constructed in accordance with my invention affords a rigid and accurate supporting means for the electrode assembly in the envelope. Since various modifications may be made in my invention without departing from the scope thereof, it is desired that my invention be limited only by the prior art and the appended claims.

I claim:

1. In an electron discharge device, an envelope with a stem and lead-in wires insulatingly sealed in the stem, an electrode assembly in the envelope comprising a plurality of electrodes held in spaced cooperative relation by an insulating disc having openings, extensions on the electrodes extending through said openings in said disc, conductors held against one face of said disc by a second insulating disc, the discs being secured together to clamp the conductors therebetween and connections between the electrode extensions at one end of the conductors and connections between the lead-in wires and the other end of the conductors.

2. An electrode spacer for discharge devices comprising two insulating discs with openings in registry secured together, a plurality of flat conductors clamped between the discs, with the ends of the conductors extending through said openings.

3. An electron discharge device comprising an envelope with a stem and lead-in wires insulatingly sealed in the stem in a circle, an electrode assembly in the envelope comprising an insulating disc having a straight line or holes and a plurality of electrodes held in spaced cooperative relation by extensions on the electrodes extending through said holes in said disc, conductors held against one face of said disc by a second insulating disc, the discs being secured together to clamp the conductors between the discs and tabs on one end of each of said conductors extending through said holes and attached to said electrode extensions, one of said discs having a series of openings arranged in a circle to overlie said lead-in wires, tabs at the other ends of said conductor in said openings attached to said lead-in wires.

4. An electron discharge device comprising an envelope with a stem and lead-in wires insulatingly sealed in the stem, an electrode assembly in the envelope comprising cooperating electrodes held in spaced relation by an insulating disc having holes, an extension on one of said electrodes extending through one of said holes in said disc, a second disc with holes in registry with the holes of the first-mentioned disc fastened to said first-mentioned disc, a flat conductor clamped between the discs with one end secured to the electrode extension, an opening in one of said discs to receive one of said lead-in wires, the other end of said conductor being secured to said wire.

NEWELL R. SMITH. 55