July 4, 1939. E. SCHWARTZ 2,164,951

ELECTRODE HOLDING DEVICE

Filed June 4, 1937

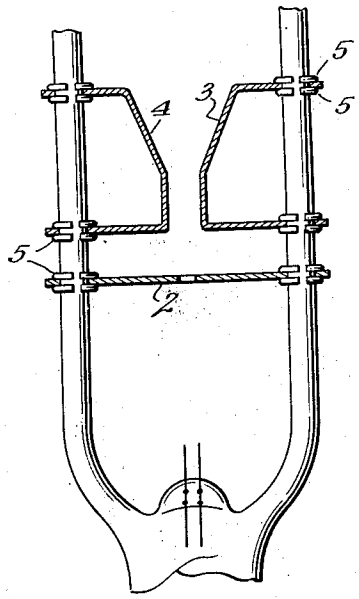


Fig. 1.

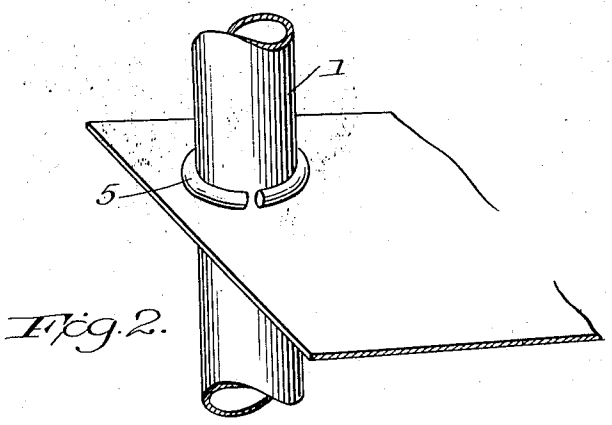


Fig. 2.

Inventor

Erich Schwartz

By Lipscomb & Metcalf Attorneys

Patented July 4, 1939

2,164,951

UNITED STATES PATENT OFFICE

2,164,951

ELECTRODE HOLDING DEVICE

Erich Schwartz, Berlin-Zehlendorf, Germany, assignor to the firm of Fernseh Aktiengesellschaft, Zehlendorf, near Berlin, Germany

Application June 4, 1937, Serial No. 146,479
In Germany June 12, 1936

4 Claims. (Cl. 250—141)

This invention relates to a device for holding electrodes in electron discharge devices, particularly cathode ray tubes. It is common practice to attach electrodes on holding rods, for instance isolating carriers, such as glass rods or glass tubes. In this method of electrode attachment the spacing of the electrodes has so far been accomplished by spacing elements, fusing of the electrodes with a glass carrier, or by means of welded distance pieces in handcuff form which surround the glass carrier. The use of distance pieces is complicated and expensive. Fusing of the electrodes with a glass carrier has the inherent danger of inaccurate electrode spacing, and the use of welded distance pieces may also lead to a displacement of the electrodes during welding, which also causes inaccurate spacing of the electrodes. Therefore, it is preferable to attach the electrodes to the carriers by purely mechanical means, such as resilient holders. This has not been tried so far because no suitable resilient material was available. Steel wire could not be used because of its magnetic properties. When using other materials the difficulty was that these materials lost their resiliency at the baking temperature of the discharge tube and the electrodes were then insufficiently suspended.

According to the invention, the suspension of electrodes by means of resilient members is made possible by using a suitable material, known also for other uses. Metals may be used which are known as beryllium alloys which can be hardened and which have the property of remaining resilient even at high temperatures. These metals are unobjectionable also from the point of view of vacuum technic, so that the possibility results of making resilient rings of wire consisting of this material, and using such rings to keep the electrodes in position. It has been found that contrazid-beryllium is especially suitable. When using these resilient rings, which consist of contrazid-beryllium, a nickel-beryllium alloy, comprising substantially 60% nickel, 15% chrome, 7% molybdenum, 0.7% beryllium, 17.3% iron, the assembly can be made without welding or fusing of glass, and the rigidity of the assembly remains unchanged also after the heat treatment of the tube.

Figs. 1 and 2 show an example of such an electrode suspension. The carrier rods, which may consist for instance of glass, are indicated by 1. The electrodes 2, 3, 4 are lined up on the rods 1. The holes in these electrodes secure the exact position of the electrodes in a radial direction. The suspension of the electrodes in axial direction is maintained by the resilient rings 5, one of which is placed below the corresponding electrode, whereas another one is placed above this electrode on the carrier rod, so that the electrode is held on each carrier rod between two resilient rings. This method of electrode suspension has given good practical results, and all displacements of electrodes which occurred in electric welding or fusing of glass when assembling the tube are surely eliminated when assembling with resilient rings.

I claim:

1. An electrode assembly for a cathode ray tube having a press, comprising insulating supporting arms formed integrally with and extending from said press, electrodes having apertured terminal portions arranged to fit over and around said supporting arms, and resilient retaining members disposed about said supporting arms on either side of and adjacent said apertured terminal portions.

2. In a cathode ray tube having a reentrant stem terminated by a press, electrode supporting means comprising rods of insulating material extending from said press, apertured engaging elements extending from said electrodes to be supported and positioned over and around said rods, and resilient restraining members positioned around said rods on either side of said engaging elements.

3. In combination with a cathode ray tube, electrode supporting means substantially as described in claim 2, wherein said restraining members are split resilient rings formed of contrazidberyllium.

4. In combination with a cathode ray tube having a reentrant stem terminated by a press, means for supporting electrodes, comprising glass supporting rods extending parallely from said press, apertured rod-engaging members extending from said electrodes to be supported and arranged to fit tightly around said rods, and means for restraining movement of said rod-engaging members axially of said rods, comprising split resilient rings formed of a nickel beryllium alloy.

ERICH SCHWARTZ.