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P. KNIEPEN

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VACUUM TUBE CONDUCTOR

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Fig. 1.

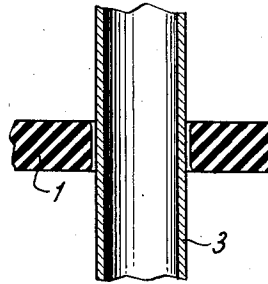


Fig. 2.

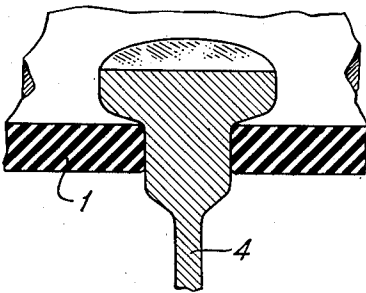


Fig. 3.

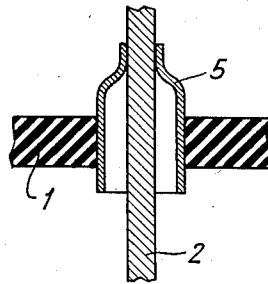


Fig. 4.

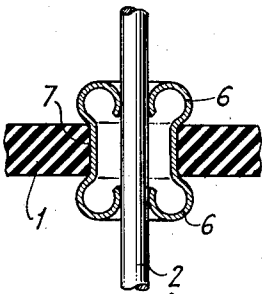
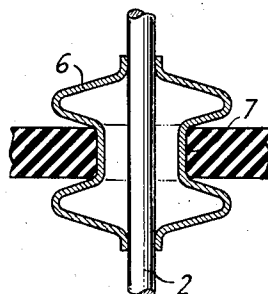


Fig. 5.



BY

INVENTOR.
PETER KNIEPEN

Charles M. Clair
ATTORNEY.

UNITED STATES PATENT OFFICE

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VACUUM TUBE CONDUCTOR

Peter Kniepen, Finkenkrug, near Berlin, Germany, assignor to Allgemeine Elektrizitäts Gesellschaft, Berlin, Germany, a corporation of Germany

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2 Claims. (Cl. 250—27.5)

In electron discharge devices such as transmitter tubes insulating members are often used for supporting and spacing high voltage conductors. Ordinarily metal rods or columns on which electrodes are mounted are inserted through the insulator which holds them in place. Such metal rods in order to facilitate de-gasifying and to reduce weight, are generally made only heavy enough to insure the proper strength and electrical and thermal conductivity. The same is true in the case of springs or spring shafts used in electrical discharge devices for the tensioning of cathodes. Since these metal rods and springs carry electrical voltages, disturbances may occur in the usual construction, especially where high voltages are applied to the metal parts. In view of the small radius of curvature of the surface of the usual conductor, the field intensity, at the place at which conductors and insulator touch each other, is very high. Even at comparatively small voltage differences between adjacent conductors, is it possible that the field intensity may assume dangerously high values.

To reduce the electrical field intensity on insulators adjacent the places where the voltage carrying conductors touch or pass through the insulating parts, according to this invention, the cross section of the conductor is increased at said place to a greater radius of curvature.

Several examples of construction are shown in the drawing in which Figures 1 to 5 show preferred embodiments of the device made in accordance with this invention.

The usual construction comprises a small supporting rod passed through a ceramic insulating plate.

Figures 1, 2, 3, 4, and 5 represent several modes of execution of the arrangement in accordance with this invention. To increase the radius of curvature of a conductor without increasing its mass, the conductor may be formed as a tubing such as 3 shown in Figure 1. This tubing is mechanically strong, has a large radius of curvature, and can be easily de-gasified.

In Figure 3 the electrode support 4 is increased in diameter at the place where it touches the insulating plate 1, and to facilitate fastening the ends may be forged down as shown. The forged portion prevents downward movement of the supporting member, and the part of the member in the insulating member will be tightly clamped in

the insulator opening by the deformation resulting from the forging.

In the structure of Figure 3 a tubing 5 of greater diameter than the conductor 2 is placed over the conductor and may be secured to the conductor at one end, for example, by crimping or welding.

The structures shown in Figures 4 and 5 are of special advantage when the voltages on the conductors are extraordinarily high. Rings or annuli 6 may be rolled or otherwise formed at the ends of the cylinder 7 to overlie the insulator surrounding the conductor. The cylinder may, if desired, be of greater diameter than the conductor and the in-turned ends may be constricted to engage the conductor. In some cases it may be preferable to not fasten the rings 6 to the supports to permit the same, due to temperature variations, to move relative to the insulating member. This arrangement will likewise be of frequent advantage in the example shown in Figure 4. Where two conductors pass through the insulating member, it has been found best results are obtained if the distance between centers of the two conductors relative to the radius thereof has the proportion 5.85 to 1.

I claim:

1. In an electron discharge device, an insulating member and a conductor extending through an opening in said member larger in diameter than said conductor, means for reducing electrostatic stresses in said member adjacent the conductor comprising a metal cylinder fitted in said opening and engaging intermediate its ends the wall of said opening, the cylinder being rolled out at one end to form an annulus overlying the insulating member and having a constriction to engage the conductor and hold the conductor centrally of said cylinder.

2. In an electron discharge device, an insulating member with a conductor extending there-through, said conductor being enlarged in cross section where it passes through said member by a concentric metal cylinder engaging intermediate its ends the wall of said opening and having at each end thereof an annulus of greater diameter than said opening to overlie the insulation therearound and having a constricted portion to engage said conductor.

PETER KNiePEN. 50