Aug. 3, 1948. E. F. DILLABY 2,446,460

TOP CAP FOR ELECTRON TUBES

Filed April 7, 1944

Fig. 1.

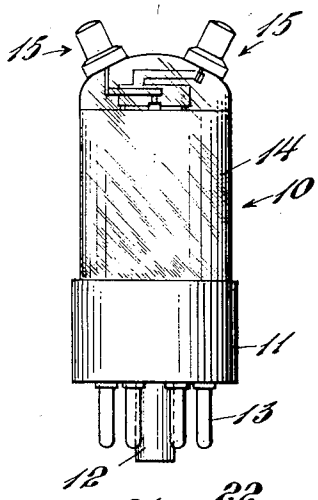


Fig. 2.

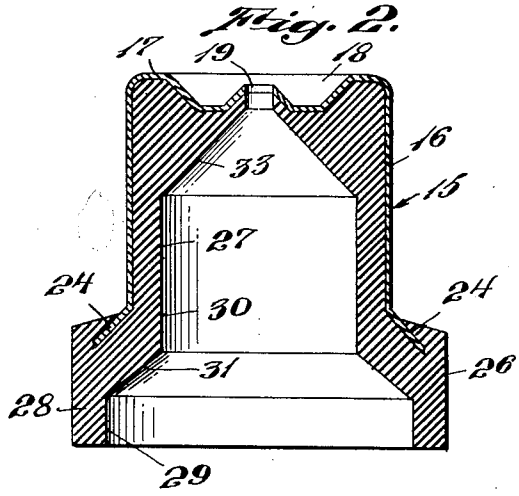
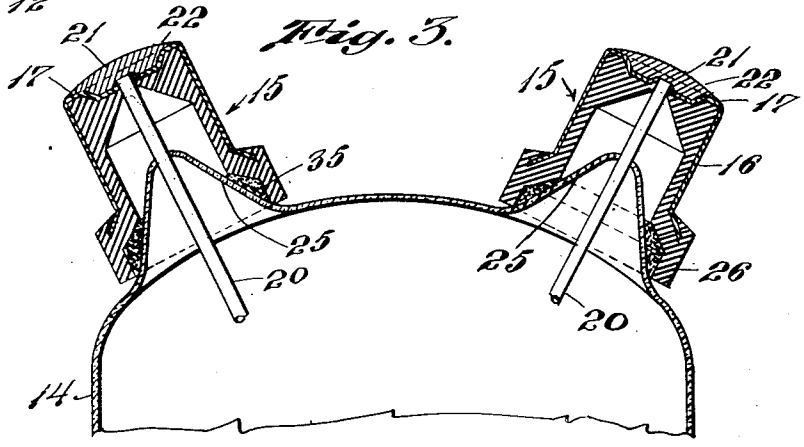


Fig. 3.



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TOP CAP FOR ELECTRON TUBES

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4 Claims. (Cl. 250—27.5)

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This invention relates to an electron tube, more particularly to a top cap for such tube.

In the use of equipment which utilizes an electron tube having two top caps between which a potential is applied, a high voltage breakdown may occur between these caps in the rarified air which is found at high altitudes, such altitudes being reached with airborne equipment. It is known that prior to the occurrence of a discharge between the top caps, a corona is first exhibited at each cap in the vicinity of the largest diameter of the cap. The largest diameter of the cap is usually adjacent the contact of the cap with the glass. The coronas which are exhibited rapidly change to an arc spanning the distance between the caps and the arc usually travels on the surface of the glass. The corona is sometimes lessened by rolling inwardly the edges of the caps which lessens the initiation of the corona discharge.

One of the objects of this invention is to provide an electron tube with external or top caps which may be used at higher altitudes than electron tubes of this character which are at the present time in existence.

Another object of this invention is to provide an electron tube with top caps between which a high voltage will not break down when in high altitude.

Another object of this invention is to increase the dielectric along the surface of the tube at the junction of the caps with the glass envelope to an extent at least as great as the dielectric of the surrounding air between the caps at a point removed from the surface of the tube.

Another object of this invention is to eliminate the formation of a corona at any point along the cap.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Fig. 1 is an elevation of an electron tube embodying this invention;

Fig. 2 is a sectional view of one of the top caps used in this tube shown on a greatly enlarged scale;

Fig. 3 is a sectional view showing fragmentally the upper part of the tube with two top caps in position on the tube.

In proceeding with this invention, it is unnecessary to roll in the flaring flange of the sheet metal cups which are utilized for the top caps. The dielectric path along the glass between the top caps is increased by imbedding the lower edges

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of the cups in a low loss resin which is molded about the top caps and up into the inside thereof. The dielectric between the terminals by this arrangement being increased to an extent greater than the dielectric of the air between metallic surfaces of the terminals. By such imbedding of the lower edges of the caps no coronas are formed about the lower edges of the caps which are usually initiated prior to breakdown or discharge between the caps of the tube.

With reference to the drawing 10 designates generally an electron tube having a base 11 with a guide 12 and contact pins 13. An envelope 14 is fixed to the base and has caps 15 mounted thereon at its top.

Each cap 15 is a drawn sheet metallic cup having a cylindrical side wall 16 and an integral end wall 17 which is recessed as at 18 and pierced as at 19. A lead in wire 20 is secured to this top wall 17 by being positioned in the opening 19 and soldered in place by solder 21 which fills the recess 18 providing a smooth contact or rounded surface 22.

The envelope 14 at the points of location of the caps 15 bulges outwardly as at 25 into the hollow interior of the caps 15.

Each cap 15 has a low loss material 26 moulded about it which embeds the flaring edge or flange 24 on the cap which is closest to the envelope 14. This molded material completely embraces this flange 24 and extends up into the interior of the cap to contact with the inner surface of the wall 16 as at 27 and also provides an extension of the cylindrical side wall as at 28 providing a hollow portion bounded by the cylindrical wall 29, a portion bounded by the cylindrical wall 30 and an inclined boundary surface 31 extending between the two. While at the upper end the molded portion tapers inwardly to provide a conical surface 33 to the junction with the opening through the top wall as at 19.

Each of the caps, complete as shown in Fig. 2, is placed in position over the bulging portions 25 of the envelope and some filling of a cementitious character 35 is positioned in the recess or hollow portion between the interior of the cap and the bulging portion 25 for the securing of the cap in position. Soldering of the lead in wire to the cap takes place after the cap, as shown in Fig. 2, is cemented in position by the adhesive 35.

The dielectric which is used is any one of the many known low loss moldable materials, such as thermo-setting resin, pressed steatite, mica bonded glass, porcelain, glass, or others.

From the above construction and arrangement

it will be readily apparent that I have increased the distance between the exposed metallic surfaces of the caps and as for the path of travel along the glass envelope it will also be apparent that this surface between metallic contacts is also very materially increased.

By this arrangement I have increased the dielectric which previously existed between the enlarged portions of the cap, formerly in contact with the curvature of the end of the envelope, to a point where this dielectric between these enlarged flanges is greater than the dielectric of the air between the metallic parts of the cap outwardly from the tube. The result is such that where satisfactory operation previously could only be had at an altitude of forty thousand feet above sea level with the arrangement here shown satisfactory operations may be had in excess of sixty thousand feet above sea level. Thus airborne equipment which requires electron tubes of the type here shown may be utilized at higher altitudes than heretofore.

I claim:

1. In an electron discharge device, a glass envelope, a pair of top caps, each comprising an inverted metallic cup having a top wall and a flaring flange at the free edge of its side wall terminating concentric with the axis of the cup, and a low loss material molded about said flange and along the inner surface of the side wall.

2. In an electron discharge device, a top cap, each comprising an inverted metallic cup having a top wall and a flaring flange at the free edge of its side terminating concentric with the axis of the cup, and a low loss material molded about said flange and along the inner surface of the side wall.

3. In an electron discharge device, a top cap comprising a cup of two different diameters, means embracing the portion of said cup of greater diameter to eliminate a corona occurring thereabout.

4. A terminal for an electron tube comprising a top cap with a conductive cup having two different diameters, the portion of said cup having two different diameters and the portion of said cup of greater diameter being embedded in dielectric material to eliminate a corona occurring thereabout.

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