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2,383,263

TUBE AND BASE STRUCTURE

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Fig. 1

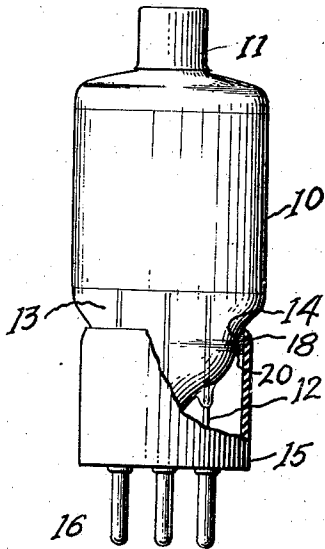


Fig. 2

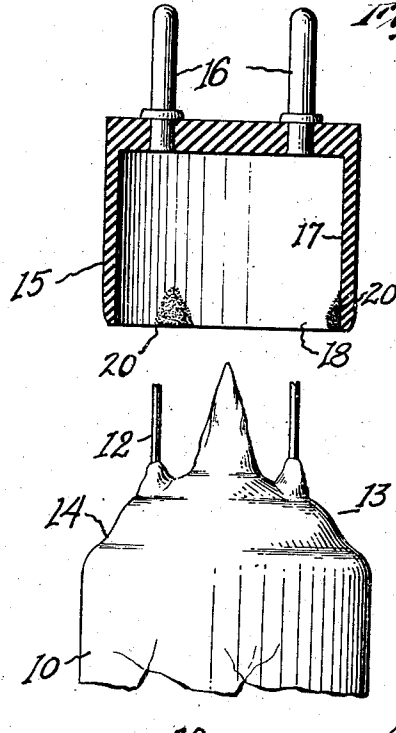


Fig. 3

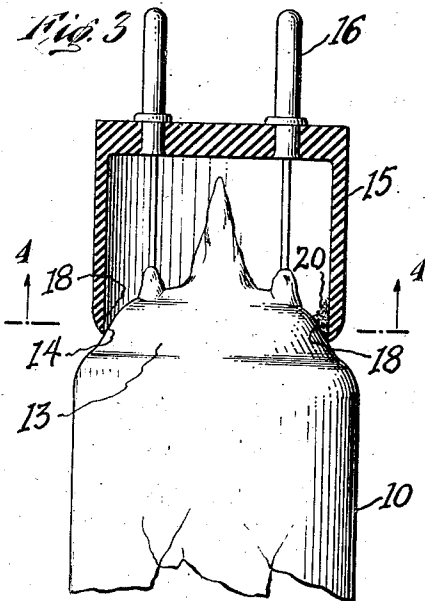


Fig. 4

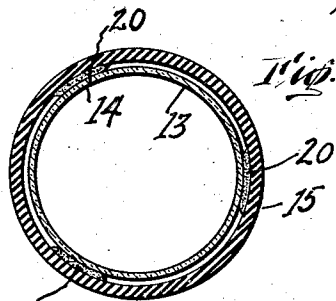
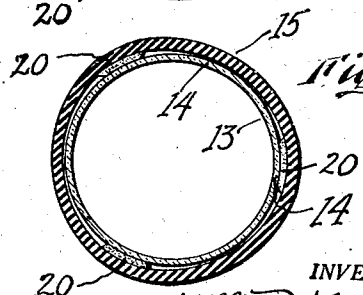


Fig. 5



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TUBE AND BASE STRUCTURE

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2 Claims. (Cl. 176—32)

This invention relates to the mounting of a glass bulb in a supporting base, and particularly to such a combination in an electronic tube.

The object of the invention is to provide a bond between the bulb and the base which will be permanently secure and unaffected by handling and by the variations in heating and cooling of the tube in service.

In the accompanying drawing illustrating the invention in connection with an electron tube

Fig. 1 is an elevational view with a part of the base broken away;

Fig. 2 is a view on enlarged scale of the bulb and base inverted and prepared for assembly;

Fig. 3 is a similar view showing the bulb and base bonded together and

Figs. 4 and 5 are transverse sectional views taken on the line 4—4 of Fig. 3, Fig. 5 illustrating on exaggerated scale the effect of temperature changes.

In the specific example shown in the drawing, the glass bulb 10 has an outer or upper cap terminal 11 and inner or lower terminal wires 12, the base end 13 of the tube being reduced in diameter and providing the slightly tapered or inclined annular surface 14 at the area of attachment to the base 15. In assembled position the wire terminals extend into and are fastened to the contact pins 16 of the base.

The base 15 is hollow with inner chamber walls 17 generally cylindrical and terminating in an annular edge 18 at the point of attachment to the bulb 10.

In the tube of this invention the bond between the base and bulb is provided by a number of separated areas of cement 20.

These separate masses of soft cement are preferably applied within the base edge 18 as shown and enough in amount to fill in between the base wall and the bulb surface 14 (Fig. 3) when the base 15 (Fig. 2) is lowered into place over the end of the bulb 10 (Fig. 3).

The parts are retained in this inverted position until the cement has hardened, for instance by setting under heat as with a Bakelite cement type No. BC-2360. This cement is a mixture of finely ground marble dust with phenol-formaldehyde thermo-setting plastic and with the addition of some shellac, the precise proportions not being critical. Preferably the heating is carried to the point of permanent polymerization and setting of the cement so that subsequent heating of the tube in service will not effect any substantial further change.

The cement hardening in this manner is free to accommodate itself to the surfaces and automatically change in size or shape during the hardening so that the initial internal stresses are reduced or avoided and very firm bonds to the base and to the bulb are secured.

Such cements have a different coefficient of

expansion (generally higher) than that of the glass of the bulb and the cracking of the glass bulb in service is believed to be often due to the stresses resulting from the greater contraction during cooling of the cement bond extending around the full or a large portion of the periphery of the bulb.

In the construction of this invention, such contraction stresses are avoided and the parts are relatively free to expand and contract without the development of excessive stresses. In Fig. 4 the parts are shown expanded by heating of the tube and in Fig. 5 the parts have contracted upon cooling, the effects being intentionally exaggerated in the figures of the drawing. During this cooling any tendency of the base to contract more or less than the bulb may be in part relieved by slight distortions of the base 15, mainly between the areas of cementing as indicated in Fig. 5 for relatively greater contraction of the base. At the same time the contracting of the cement masses 20 imposes substantially no stresses on the base or bulb leaving the parts free of any interaction tending to crack the bulb or weaken the bond between the bulb and the base.

This construction also permits partial residual setting of the cement 20 under the heating of the tube in service where, as is sometimes the case, the heating during assembly has not been carried to complete setting or polymerization. The tube of this invention thus has the bulb and the base permanently secured together in a manner which is unaffected by variations in the heating and cooling of the tube during manufacture and in service and maintains a firm bond under all conditions.

I claim:

1. A bulb and base comprising a glass bulb having an annular surface for attachment to a base, a base of material of different coefficient of expansion from the glass of said bulb and having a hollow formation with a deformable edge adapted for attachment to said annular surface of said bulb, and a plurality of individual masses of cement between said bulb and base spaced to leave intermediate open uncemented spaces and bonded to the bulb and base surfaces to form separated anchorages firmly attaching said edge to said annular surfaces while maintaining relatively extensive intermediate surfaces of said bulb and base unattached and free to shift relatively without overstressing the bulb under variations in heating and cooling of the tube.

2. A bulb and base structure as set forth in claim 1 in which the masses of cement are fully set and hardened in place between the bulb and base so that further heating under service conditions does not cause any substantial further setting and hardening.

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