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PROCESS OF HERMETIC SEALING OF AN EVACUATED ENCLOSURE, APPLYING IN PARTICULAR TO THE LUMINESCENT DISCHARGE TUBES

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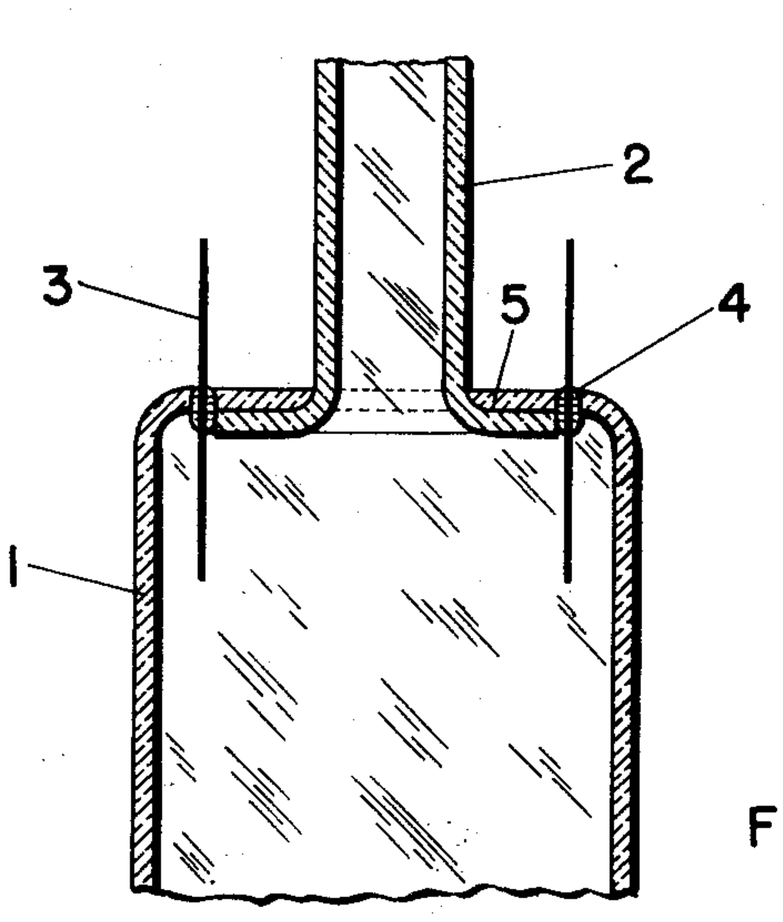

FIG. 1

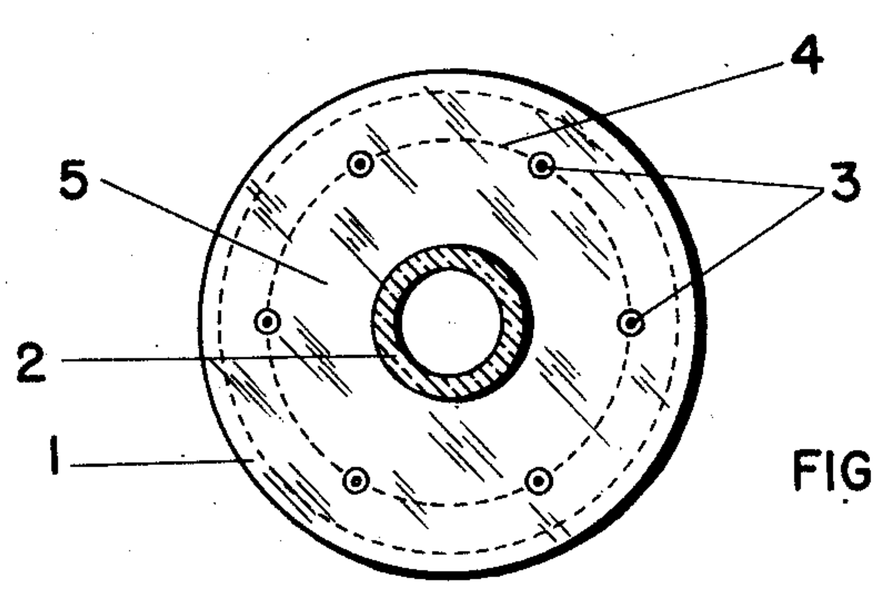

FIG. 2

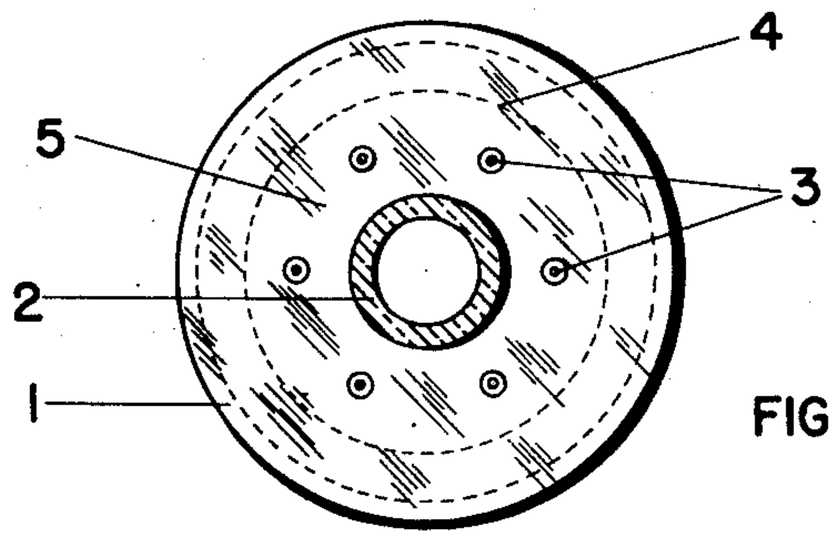

FIG. 3

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PROCESS OF HERMETIC SEALING OF AN EVACUATED ENCLOSURE, APPLYING IN PARTICULAR TO THE LUMINESCENT DISCHARGE TUBES

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3 Claims. (Cl. 250—27.5)

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My invention relates to a process of execution of an hermetic sealing between an evacuated enclosure or bulb and the extremity of an exhaust tube which constitutes a stem for the said bulb.

In the sealing processes of the edge to edge seal type heretofore utilized for the discharge tubes, a rough provisory seal is first utilized between the tube and the stem, through heating by a flame, and there remains to be realized the tightness of the seal thus obtained, which is shaped by a further heating operation carried out in a flame at a relatively high temperature, of the order of 900–950°, accompanied by a blowing of air inside the tube for avoiding deformation of the latter.

This second operation of heating results in developing mechanical stresses which compromise the tightness of the tubes, especially if their leading-in wires extend through the glass enclosure in the immediate neighborhood of the stem, such stresses being, moreover, hardly tolerable in the tubes which contain fragile components.

My invention does away with these drawbacks: It consists in proceeding, after the execution of a rough assembly seal, instead of shaping the bulb as I have mentioned above, in placing, at the spot reserved to the seal, a fusible glass (or enamel) having practically the same dilatation coefficient as the assembled pieces, and in making it flow through a moderate heating (for instance at a temperature of the order of 550° C.).

It appears therefrom that the process of my invention is simpler than the prior processes (since it needs no special shaping and no blowing of air). On the other hand, by the fact that my process uses a heating of less intensity and shorter duration, it does not risk to injure the internal components of the tube, nor to alter the shape of the glass parts, and moreover it does not result in a defective tightness due to mechanical stresses—the duty of mechanically supporting the components of the device being incumbent upon the glass and not upon the enamel.

My invention will be more clearly understood by reference to the accompanying drawings which set forth my invention in an illustrative sense and not in a limitative sense as applied to a process of making an electronic discharge tube wherein the lead-in wires extend through the tube envelope in the position where the seal is made and in which:

Figure 1 represents a cross-sectional longitudinal view of a tube envelope, in which the lead-in wires traverse the envelope through the stem-bulb seal;

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Fig. 2 is a top view corresponding to Fig. 1; and

Fig. 3 is a top view of an electronic tube envelope, in which the lead-in wires are sealed through the flange of the tubular stem.

The bulb or tube 1 shown in Fig. 1 has an annular cross section to which must be sealed the flanged extremity of the exhaust tube 2, in proximity to the leading-in wires 3, embedded in a bead of glass 4 and previously sealed to the flange.

In the manufacture of the tube 1 a common rotary movement is communicated to the tube or envelope and the exhaust tube 2. Then the tube is heated tangentially, at the level of its seal, by means of an extremely thin flame to a softening temperature variable from 700° C. to 800° C. according to the kind of glass to be shaped.

Then, by means of a graphite tool the edges of the tube are turned down on the flange. If the inward diameter of the bulb exceeds by an infinitesimal amount the diameter of the stem flange, no bending is necessary, but in every case the edges of the bulb and of the stem must be brought in close contact all along the flange circumference. The heating and the rotation are then stopped for a few moments, and an addition is made, on the spot, of a certain amount of finely pulverised glass having a low melting point as shown in 5 on the figure.

Then the assembly is again rotated and heated; so that the enamel melts and flows, thus closing the holes eventually existing, and completing a seal which offers a smooth surface quite exempt of asperities.

What I claim is:

1. The method of air-tight sealing of the finished tubular stem of a space current tube and a bulb, the stem having the form of a flanged tube whose flange is traversed by the electrode leads and supports, the bulb being made of the same glass as the stem and having an annular cross-section whose inside diameter is at least equal to the flange diameter, which comprises placing the stem flange in the bulb so that the rim of the bulb slightly overlies the edge of the flange, heating the exterior face of the bulb rim to the softening temperature, bringing this rim in close contact with the stem flange in all points of its edge, depositing on the stem edge a layer of pulverized glass having practically the same dilatation coefficient as the parts to be sealed and a melting point much lower than the above-mentioned softening temperature and heating and melting this glass layer to form an air-tight seam between the flange and the rim of the bulb after cooling.

2. A space current tube having an air-tight

glass envelope comprising, a glass stem having the form of a flanged tube, a bulb having an annular cross-section formed from the same kind of glass as the glass stem and placed over the flanged tube so that the rim of the bulb slightly overlies the exterior face of the flange on the tube, and a glass seam interposed between the exterior face of the flange and the interior overlying face of the glass bulb.

3. A space current tube having an air-tight glass envelope comprising a glass stem terminating in a circular flange extending in a plane normal to the axis of the stem, a glass bulb enclosing the peripheral edge of said circular flange and having an inturned flattened portion coextensive with the surface of said circular flange and encircling the exterior of said glass stem, glass beads extending transversely through both said flattened portion of said glass bulb and through the peripheral edge of said circular flange, lead-in wires extending through said glass beads and a layer of pulverized glass interposed between one side of said circular flange and the flattened portion of said glass bulb and coextensive therewith, said pulverized glass forming a seam extending in an annular path contiguous with the flattened

portion of the glass bulb and the circular flange of said glass stem for sealing said bulb, beads and flange in an air-tight envelope.

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