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Roeber

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[54] **LEAKAGE INHIBITING SHEILDING MEANS**

[75] Inventor: **Henry W. Roeber,** Waterloo, N.Y.

[73] Assignee: **GTE Sylvania Incorporated,** Seneca Falls, N.Y.

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[52] **U.S. Cl.** **313/313,** 313/219, 313/239, 313/242, 313/335, 313/356

[51] **Int. Cl.**.....**H01j 1/52,** H01j 61/04

[58] **Field of Search**.....313/219, 239, 242, 313/313, 331, 333, 335, 356

[56] **References Cited**

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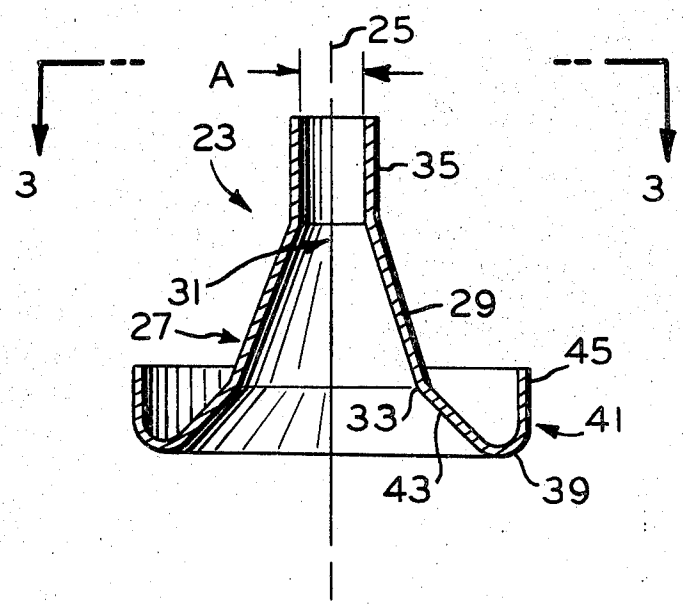
Primary Examiner—Ronald L. Wibert
Assistant Examiner—Paul A. Sacher
Attorney—Norman J. O'Malley et al.

[57] **ABSTRACT**

A shielding means for inhibiting the formation of electrical leakage between the stem leads of an electron discharge device, is a substantially infundibular shaped member formed for umbrella-fashion-attachment to an individual lead to effect better shielding of the bead area surrounding the lead. A hollow conic section, extending below a tube-like attachment portion, has an annular basal-oriented projecting portion with a peripheral upward turned portion therearound. The integral shaping of the upward turned portion with the contiguous projecting portion provides beneficial structural reinforcement and rigidity to the structure.

7 Claims, 6 Drawing Figures



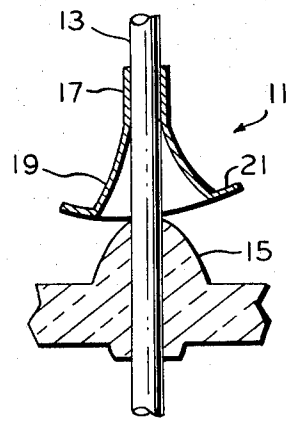


Fig. 1
PRIOR ART

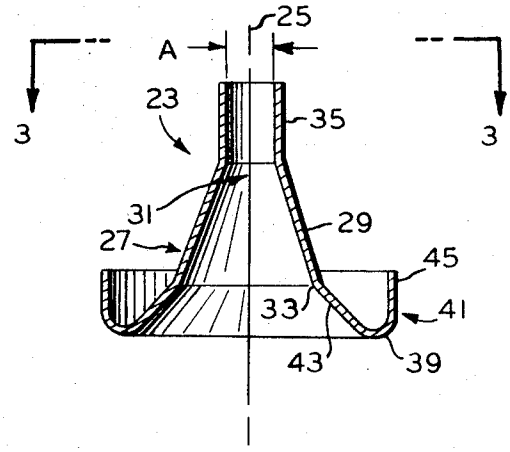


Fig. 2

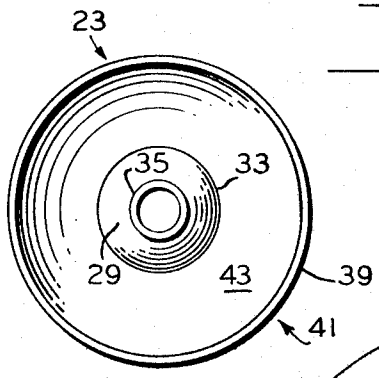


Fig. 3

Fig. 4

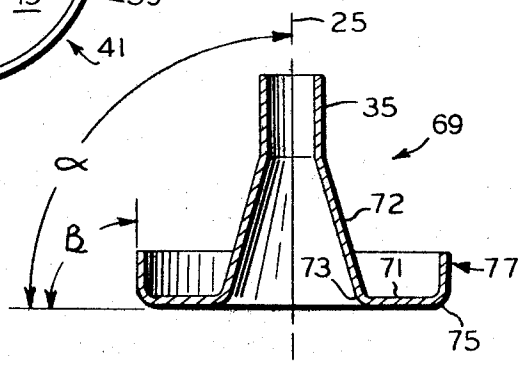
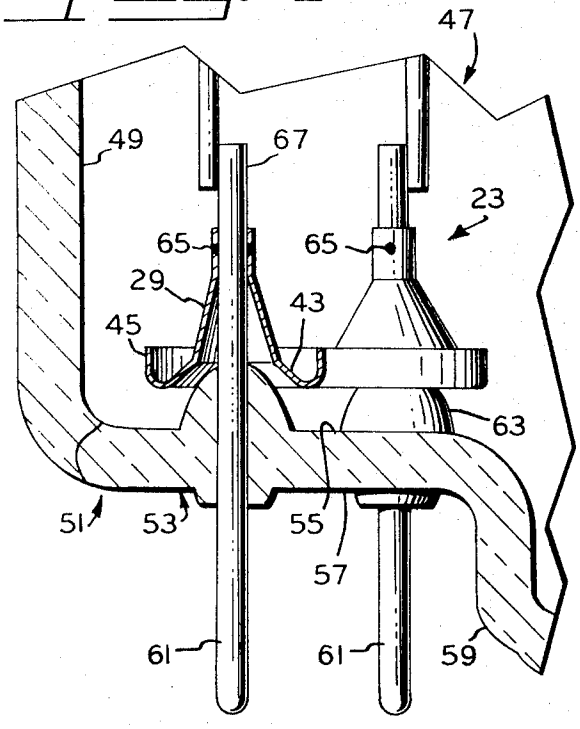


Fig. 5



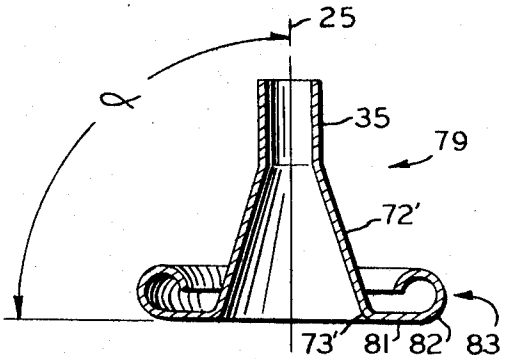


Fig. 6

LEAKAGE INHIBITING SHEILDING MEANS

CROSS-REFERENCE TO RELATED APPLICATION

Filed concurrently with this application and assigned to the assignee of the present invention, is application Ser. No. 277,617, filed Aug. 3, 1972 which also pertains to the art of leakage inhibiting shields.

BACKGROUND OF THE INVENTION

This invention relates to shielding means for an electron discharge device and more particularly to improved means for reducing electrical leakage therein.

A problem commonly associated with electron discharge devices, and with electron tubes in particular, is that of electrical leakage paths developing on the enclosure surface between the supportive and connective leads of the device during fabrication processing and subsequent operation.

In general, a conventional form of an electron tube comprises an evacuated envelope wherein an electron source with elements for generating and controlling electrons is usually supported by a plurality of leads hermetically sealed in a wafer closure member and extended therethrough to provide electrical connections to associated external circuitry. The supportive and connective leads are conventionally spaced in close vertical array and extend through the closure member in a manner to conserve space, thereby keeping the physical magnitude of the tube structure to a desirable minimal size. Such compactness often creates a problem in achieving desired electrical isolation of the leads which individually conduct electrical potentials of different levels.

During the manufacture and subsequent operation of electron discharge devices, there is a tendency for conductive materials to spuriously sublimate from the heated electron generating structure and deposit or collect on the adjacent closure surface. Continued sublimation results in the forming of an electrically conductive film on the surface of the closure bridging the interlead spacings thereby producing a detrimental electrical leakage condition which markedly interferes with the intended operation of the device. To insure and maintain a satisfactory level of operational performance, this electrical leakage film must be eliminated or made discontinuous between the individual leads in the closure member.

In certain types of electron tubes, such as for example, in cathode ray tubes, it is conventional practice to form beads at discrete areas on the interior surface of the closure member where the hermetically encompassed leads protrude therethrough. A lead-bead formation of this nature provides additional material and enhances the reliability of the hermetic bonding of the leads within the closure member, but usually the bead itself has no properties to inhibit the formation of a sublimed leakage film thereover. To deter the forming of a continuous sublimation film, a metallic shielding member of "eyelet," fashioned as a hollow substantially infundibular shaped article, is fitted on each of the several leads and attached thereto at a position proximal to the bead. The umbrella effect of the shielding means is intended to prevent the formation of a continuous leakage path between leads. The "eyelet" shielding means of the prior art is of funnel-like construction having an annular ledge outstanding from the perimeter of the funnel. In bonding the shield to the lead, the cylindrical tube-like portion of the funnel is pressured against the lead and often deformed by the attaching procedure. Degrees of this reshaping pressure are transferred to the cone portion causing deformation thereof and a resultant bowing of the annular ledge. Such deformation of the shielding means reduces the protective efficiency thereof; as an elliptical shaping of the conic section and resultant upward bowing of the ledge diminishes the amount of desired shielding, thereby lessening the inhibition of leakage path formation.

OBJECTS AND SUMMARY OF THE INVENTION

It is an object of the invention to reduce the aforementioned disadvantages and to provide an improved shielding means for inhibiting leakage between the stem leads of an electron discharge device thereby promoting greater reliability of operation.

Another object of this invention is to provide an improved shielding means embodying reinforcement and structural rigidity characteristics that are retained in the completed device to accomplish the intended protectional results.

The foregoing objects are achieved in one embodiment of the invention by the provision of an improved shielding means that is a substantially infundibular shaped metallic structure formed to be attached in umbrella-fashion on each of several leads to effect shielding of the bead area surrounding the lead. The hollow conic section, extending below the tube-like attachment portion, has an annular projecting portion outstanding from its basal perimeter. From the outer periphery of the projection, an integral upward turned portion extends in a discretely shaped relationship to effect beneficial structural reinforcement and rigidity, and provide improved uniform shielding, thereby inhibiting the formation of deleterious electrical leakage paths between leads.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary sectional view showing a prior art shielding means oriented for utilization on the lead of an electron discharge device;

FIG. 2 is a sectional view illustrating an embodiment of the improved shielding means of the invention;

FIG. 3 is a plan view of the shielding means taken along the line 3—3 of FIG. 2;

FIG. 4 is a partion sectional view illustrating utilization of the afore-cited embodiment of the invention in an electron discharge device; and

FIGS. 5 and 6 are sectional views showing additional embodiments of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

For a better understanding of the present invention, together with other and further objects, advantages and capabilities thereof, reference is made to the following specification and appended claims in connection with the aforedescribed drawings.

With reference to the drawings, there is shown in FIG. 1 a sectional view of a prior art funnel-like shielding member 11 oriented on a stem lead 13 adjacent to

the bead area 15 surrounding the lead. During attachment to the lead, the encompassing cylindrical tube-like attachment portion 17 of the shielding member 11 was pressured against the lead 13 and somewhat deformed by the bonding procedure. In many cases, sufficient pressure from this deformation was transferred to cone portion 19 causing a substantially elliptical reshaping thereof and effecting a resultant upward bowing of the annular ledge 21. Such reshaping and bowing decreased effective shielding protection.

To overcome the structural deficiencies and shielding inadequacies evidenced in the above-described prior art shielding member 11, an improved shielding means was produced to better inhibit the development of deleterious electrical leakage paths between the stem leads of an electron discharge device. In FIGS. 2 and 3, there is shown an embodiment of the improved shielding means 23, which has a longitudinal axis 25 therethrough, is comprised of a hollow conic section 27 having a conical wall portion 29 with an open apex 31 and an opposed basal perimeter 33. Integral with the open apex 31 and extending longitudinally upward therefrom is a terminal cylindrical tube-like section 35 through which a stem lead is inserted for attachment. The tube-like section has an inner diameter A which is sufficiently larger than the diameter of the stem lead to facilitate insertion thereon. Extending substantially outward from the aforementioned basal perimeter 33 is an annular projecting portion 43 which has a defined outer periphery 39. An upward turned portion 41 is formed to extend integrally from the outer periphery of the annular projecting portion in a manner to effect substantial encompassment of the basal perimeter thereby providing a shielding means having improved structural reinforcement and rigidity. In the embodiment illustrated in FIGS. 2 and 3, the annular projecting portion 43 is flared outward as a substantially conical shaping extending from and forward of the basal perimeter 33. In this instance, the upward turned portion 41 is formed as an upstanding closed wall 45 integrally extending from the periphery of the conical projecting portion 43 in acute angular orientation, the wall being directed toward the tube-like section 35 in a manner substantially parallel with the longitudinal axis 25. This acute angular relationship between the upstanding wall 45 and the flared annular projecting portion 43 provides beneficial structural reinforcement and rigidity.

In referring to FIG. 4, a partial sectional portion of a representative electron discharge device 47 is shown, which may be the basal end of a cathode ray tube though not necessarily limited to such. The envelope portion 49 is hermetically sealed to a substantially disc-shaped stem 51 which comprises a wafer member 53 having an interior surface 55 and an exterior surface 57. The wafer closure member 53 includes a concentrically located sealed exhaust tubulation 59 about which a plurality of spaced electrical conductors or leads 61 are vertically disposed in substantially circular array and hermetically sealed in the wafer member 53 in parallel alignment to extend through both surfaces 55 and 57 thereof. Also, forming an integral part of the wafer's interior surface 55 are a plurality of formed beads 63, each hermetically encompassing a section of each individual lead 61. As previously mentioned, a function of the beads is to provide increased glass-to-metal seal area and also give support and impart rigidity to the leads 61. As shown, the aforedescribed improved shielding means 23 are attached, as by welds or swages 65 to the leads 61 in umbrella-fashion at a position thereon adjacent to the beads to provide adequate shielding protection to the bead areas 63. The interior terminal ends 67 of the leads 61 are suitably disposed for attachment to the mount structure or electron gun assembly, not shown, from whence sublimation emanates during device operation, a portion of which is directed toward the beads 63 and the interior surface 55 of the stem 51. It is evident that unless some protection is afforded, a sublimation film of conductive material spuriously emanating from the electron gun or emission source will result in the formation of electrical leakage paths on the interior surface 55 between the several leads 61 disposed therethrough.

The improved shielding means 23 is advantageously formed to retain its intended shaping. The angular relationship between the annular projecting portion 37 and the upward turned portion 41 effects positive structural reinforcement and rigidity which minimizes distortion of the conical wall portion 27 and prevents bowing of the structure.

In referring to FIG. 5, there is shown another embodiment of the invention 69 wherein the annular projecting portion 71, extending outward from the basal perimeter 73 of the conical wall 72, is formed as a plane substantially normal to the longitudinal axis 25, as indicated by the 90° angle α. The planar projection 71 has an outer periphery 75 from which an upward turned portion 77 is formed as an upstanding wall in a manner substantially normal to the plane of the planar projection, as referenced by the 90° angle β. The angular relationship of the projecting portion 71 and the upward turned wall 77 likewise effects structural reinforcement and rigidity in this embodiment.

An additional embodiment of the invention 79 is shown in FIG. 6. In this construction, the annular projecting portion 81, extending outward from the basal perimeter 73′ of the conical wall 72′, is formed as a plane substantially normal to the longitudinal axis 25, as delineated by the angle α. In this embodiment, the upward turned portion 83 is formed from the periphery 82 of the planar projecting portion 81 as an inwardly turned annular roll formed toward the basal perimeter 73′ in a manner to encompass the same and effect positive structural reinforcement.

With reference to the embodiments 23 and 79 as shown in FIGS. 2 and 6, it is within the scope of the invention to incorporate the inwardly turned annular roll 83 of embodiment 79 as an alternate formation for the upward turned portion 41 in the first embodiment 23.

Thus, there is provided a structurally reinforced shielding means for more positively inhibiting the formation of sublimation induced electrical leakage paths between the several stem beads in an electron discharge device, thereby assuring greater reliability of operation.

While there has been shown and described what is at present considered the preferred embodiment of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made

therein without departing from the scope of the invention as defined by the appended claims.

What is claimed is:

1. Metallic shielding means for inhibiting leakage between the stem leads of an electron discharge device employing a wafer closure member wherethrough a plurality of supportive and electrical connective leads are hermetically disposed in a spaced array, said shielding means being a substantially infundibular shaped member formed for separate attachment to individual leads of said wafer and comprising:

a hollow conic section having a conical wall portion, an open apex, an opposed basal perimeter and a longitudinal axis extending therethrough;

an integral terminal section extended from said open apex to provide a lead attachment provision;

an annular projecting portion extending substantially outward from said basal perimeter, said projecting portion having a defined outer periphery; and

an upward turned portion integrally extending from the outer periphery of said annular projecting portion, said projecting portion and said upward turned portion effecting substantial encompassment of said basal perimeter to provide a shielding means having improved structural reinforcement and rigidity.

2. The shielding means according to claim 1 wherein said annular projecting portion is formed substantially as a plane substantially normal to said axis.

3. The shielding means according to claim 2 wherein said upward turned portion is formed as a closed wall upstanding from said periphery in a manner substantially normal to the plane of said planar annular projecting portion.

4. The shielding means according to claim 2 wherein said upward turned portion is formed from the periphery of said planar projecting portion as an inwardly turned annular roll formed toward said basal perimeter in a manner to encompass the same.

5. The shielding means according to claim 1 wherein said annular projecting portion is flared outward as a substantially conical shaping from and forward of said basal perimeter, and whereof an upstanding-closed wall is integrally formed about the periphery of said conical projecting portion in acute angular orientation with said projecting portion, said wall being directed toward said terminal section in a manner substantially parallel with said longitudinal axis.

6. The shielding means according to claim 1 wherein said annular projecting portion is flared outward as a substantially conical shaping from and forward of said basal perimeter, and whereof said upward turned portion is formed from the periphery of said projecting portion as an inwardly turned annular roll formed toward said basal perimeter in a manner to encompass the same.

7. In a cathode ray tube having a wafer closure member wherethrough a plurality of electrical connective and supportive leads are arranged to accommodate an electron gun, said leads being hermetically disposed in spaced array whereof each of said leads has an encircling bead of glass therearound integral to the interior surface of said closure member; a plurality of substantially infundibular shaped metallic shielding members individually attached to separate leads proximal to said beads for inhibiting electrical leakage between said leads, each of said shielding members comprising:

a hollow conic section having a conical wall portion, an open apex, an opposed basal perimeter and a longitudinal axis extending therethrough;

an integral terminal section extended from said open apex to provide means for accommodating a respective lead whereat attachment is effected;

an annular projecting portion extending substantially outward from said basal perimeter, said projecting portion having a defined outer periphery; and

an upward turned portion integrally extending from the outer periphery of said annular projecting portion, said projecting portion and said upward turned portion effecting substantial encompassment of said basal perimeter to provide a shielding means having beneficial structural reinforcement and rigidity.

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