United States Patent [19]

Davis et al.

[11] **3,876,899**

[45] **Apr. 8, 1975**

[54] **CATHODE RAY TUBE ELECTRICAL CONNECTIVE MEANS**

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[22] Filed: **June 27, 1974**

[21] Appl. No.: **483,555**

[52] **U.S. Cl.** ..... **313/482**; 313/364 X

[51] **Int. Cl.** **H01j 29/02**; H01j 31/20

[58] **Field of Search** 317/318, 325, 402, 407, 317/477, 482, 479, 449, 450, 352, 364, 470, 429, 406, 404, 405

[56] **References Cited**

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[57] **ABSTRACT**

Improved electrical connective means are provided for use in a cathode ray tube to effect a bridging connection between a funnel-oriented electrical transversal and a discrete area of the adjacent panel portion. The connective means comprises a metallic conductive button extending through the wall of the funnel and having a protuberance extending from the inner surface thereof. Mating with this protuberance, and affixed thereto, is a longitudinal resilient connective member extending to make pressured contact with a discrete area on the related panel portion of the envelope.

6 Claims, 4 Drawing Figures

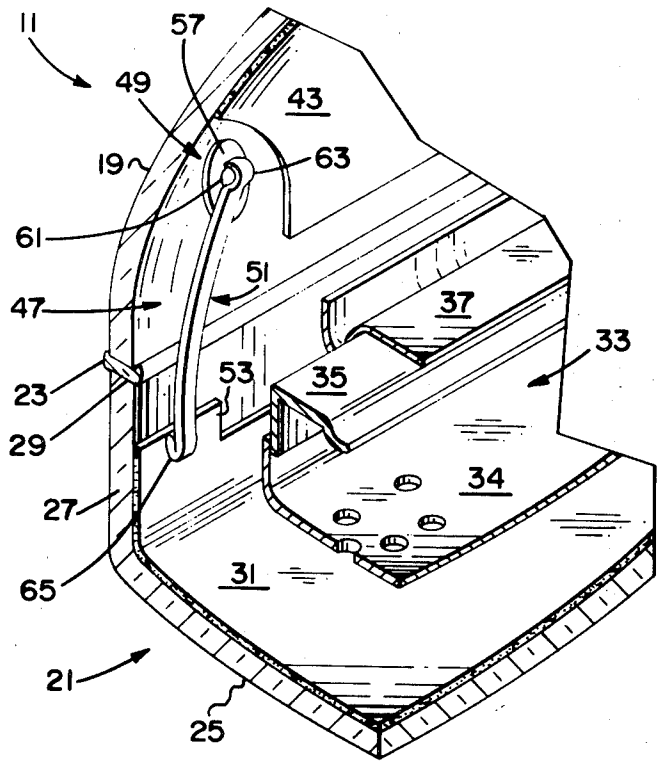
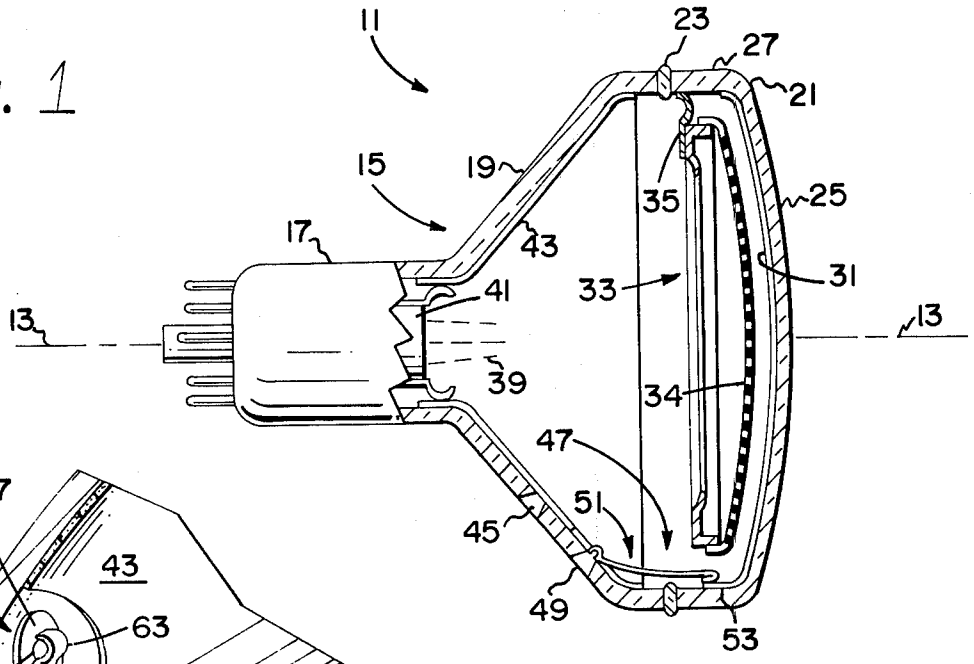


Fig. 1



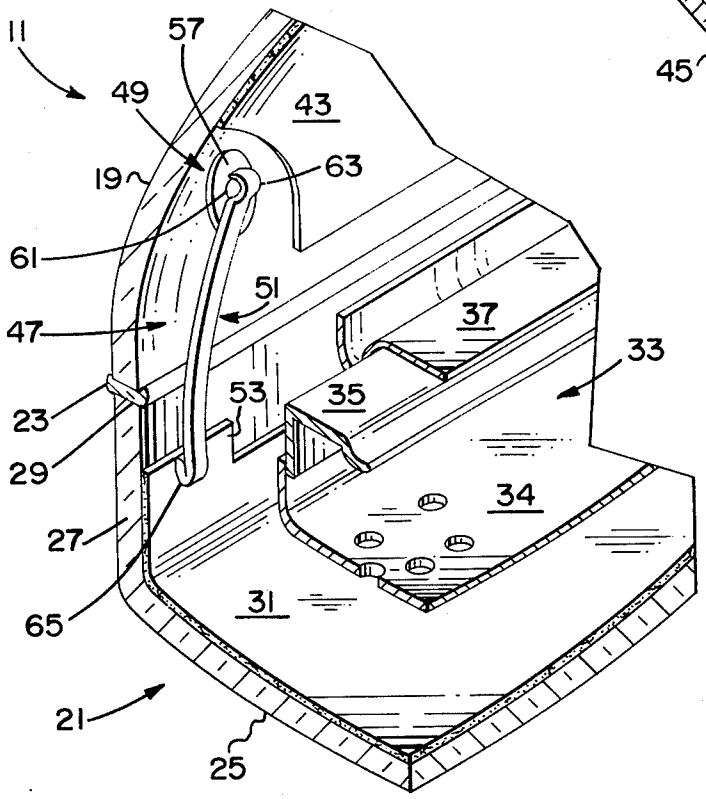


Fig. 2

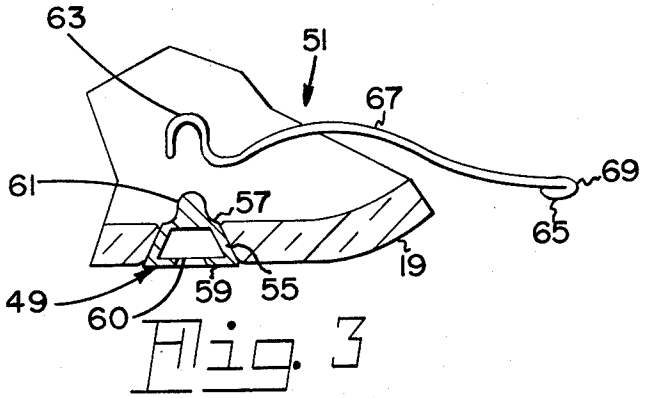


Fig. 3

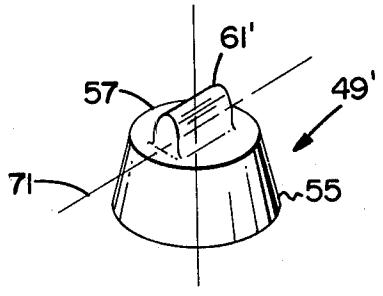


Fig. 4

CATHODE RAY TUBE ELECTRICAL CONNECTIVE MEANS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application contains matter disclosed but not claimed in two related applications filed concurrently herewith and assigned to the assignee of the present invention. These related applications are: Ser. No. 483,559 Attorney's Docket 8011, "Shielding Means For A Cathode Ray Tube", and Ser. No. 483,554 Attorney's Docket 8062, "Electrical Conductive Means For Traversing a CRT Envelope To Effect Multiple Connections Therein".

BACKGROUND OF THE INVENTION

This invention relates to electrical connective means for a cathode ray tube and more particularly to electrical connective means for effecting the conduction of a potential from the funnel to panel portions of a cathode ray tube. In certain types of cathode ray tube construction, it is desired to effect an electrical connection between a discrete funnel-related area and an associated area disposed on the adjacent panel portion. For example, in color cathode ray tubes of post-deflection structure, it has been a usual practice to supply the screen potential by utilizing a separate high voltage connection through the tube envelope in conjunction with an associated conductive member to effect suitable connection with the screen.

Basically, color cathode ray tubes of the post-deflection type commonly employ at least one electrode member which is oriented between the electron gun assembly and the spacedly related patterned display screen. In its simplest form, this type of cathode ray tube is constructed to have a color-selection or focusing electrode that is positioned in spaced adjacency with the screen. The cathode ray tube of this type of construction permits the use of larger openings or apertures in the color-selection electrode than those normally used in the conventional shadow mask type of color tube. As a result, a screen display of increased brightness is possible in the post-deflection type of tube. Unfortunately, this achievement of improved brightness is not without attendant problems. In the post-deflection tube, the color-selection or focusing electrode is normally operated at an electrical potential which is of a value lower than that of the screen potential, this difference in related potentials is the primary determining factor as to whether the operation of the tube is post-deflection focusing or post-deflection acceleration.

In a post-deflection tube, the lower potential for the color-selection electrode is usually applied thereto by a resilient connector attached to the electrode in a manner to make contact with the conductive coating interiorly disposed on the inner surface of the funnel portion. This coating conventionally receives its electrical potential from an external source via a metallic conductive button traversing the wall of the funnel portion. Separate electrical conductive means are utilized to supply a higher electrical potential to the screen portion of the tube.

At least three means have been used in the art to convey the higher potential to the screen. One such means involves the utilization of a conductive button disposed in the sidewall of the panel portion in a manner to make

contact with the periphery of the screen. Since the magnitude of the screen potential may be in the order of 30 KV or higher, the proximity of the high voltage connection to the front of the tube may constitute a hazardous condition for the user. Another means for effecting an electrical transversal of the tube envelope has been an electrical conductor disposed through the panel-funnel seal. A common connector thus employed has been a rather light-weight metallic strip embedded in the sealing frit in a manner to traverse the seal. Usually this has been a fragile type of connection requiring external application of an insulative potting material thereabout to strengthen and shield the external portion of the connection. The fragility of such connections in the art have been a drawback to their commercial usage. A third type of electrical transversal is in the form of a separate conductive button disposed in the sidewall of the funnel portion adjacent to the seal edge thereof. With this type of connection, the prior art discloses the use of a configuration of integrated connective members supported and attached to the color-selection electrode in a manner that the connective members bridge the region of funnel-panel seal extending from a pad of conductive material disposed over the interior surface of the conductive button to the edge of the display screen disposed within the panel portion. This integral bridging connective member is of complicated shaping and construction and as a result, occupies a considerable amount of critical space between the frame of the color-selection electrode and the sidewall of the panel portion. The nearness of the two elements of different potentials aggravates the possibility of arcing therebetween.

OBJECTS AND SUMMARY OF THE INVENTION

It is an object of this invention to reduce and obviate the aforementioned disadvantages that have been evidenced in the prior art. Another object of the invention is to provide a safe and convenient means for effecting a bridging electrical connection between a discrete funnel-related area of a cathode ray tube envelope and an associated area disposed on the adjacent panel portion thereof. An additional object of the invention is to provide an improved electrical connection of the aforedescribed type that lends itself to expeditious fabrication and utilization.

These and other objects and advantages are achieved in one aspect of the invention wherein an improved electrical connective means is provided for usage in a cathode ray tube to make bridging connection between a conductive area disposed in the funnel portion with an associated conductive area disposed on the adjacent panel portion. A spanning connection of this kind is expeditiously employed, for example, in a post-deflection type of cathode ray tube wherein the connective means of the invention is comprised of a metallic conductive button traversing the wall of the funnel portion of the envelope and having a defined bonding region located on the inner surface whereupon a longitudinal resilient connective member is attached. This longitudinal metallic connective member has a jointure region formed at one end thereof and a contact area at the other with a bridging resilient intermediate section therebetween. The jointure region thereof is shaped to meet with and be affixed to the bonding region of the button in a manner to direct the connective member toward the screen. The contact area of the member is contoured to effect

slidable pressured contact with a peripheral connective portion of the panel-disposed screen.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view of an exemplary color cathode ray tube wherein the invention is illustrated;

FIG. 2 is an enlarged perspective view showing a portion of the tube incorporating the improved electrical connective means of the invention;

FIG. 3 is an enlarged cross-sectional view showing the components of the invention; and

FIG. 4 is a perspective illustrating one embodiment of the componential button member 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.

While the bridging electrical connective means of the invention is generally applicable for effecting a connection between a funnel disposed electrical transversal and a related conductive area on the adjacent panel portion of a CRT envelope, for purposes of example, the invention is described and shown herein as relating to a tube of post-deflection classification.

With particular reference to FIGS. 1 and 2, a color cathode ray tube 11 of the post-deflection type of construction is shown as having a longitudinal axis 13 therethrough and an envelope 15 comprised of an integration of neck, funnel, and face panel portions, 17, 19 and 21 respectively, whereof the panel portion is hermetically joined to the funnel portion along the congruent seal 23 which is effected by a fritting procedure during tube fabrication. The face panel 21 has a viewing area 25 and a substantially perimetrical sidewall portion 27 which is terminated by the sealing seat 29 to which the funnel portion 19 is attached. Formed on the interior surface of the viewing panel is a patterned cathodoluminescent screen 31 comprised of discrete areas of color-emitting phosphor materials which are definitively disposed as stripes or dots in keeping with the state of the art. A discretely apertured structure, in this instance referenced as a color-selection electrode 33, having an apertured area 34 and a supporting frame 25, is spatially related to the patterned screen 31. This electrode is predeterminately positioned within the face panel by usual means in the art such as supporting stud-like members embedded in the side-wall of the panel in a manner to project therefrom and mate with locators integral with the electrode member. For purposes of clarity, these conventional stud-like supporting members and associated mask locators have been eliminated from the drawings. Attached to the framing portion 35 of the color-selection electrode is a peripheral strip-like beam shielding means 37 which is positioned to extend from the frame of the electrode, in a bridging manner, to make contact with the panel sidewall 27 thereby protecting the patterned cathodoluminescent screen 31 from deleterious electron excitation resultant from the peripheral overscan of the several electron beams 39 emanating from the electron gun assembly 41 positioned in the neck portion 17 of the tube envelope. As illustrated, the interior of the funnel portion 19 has a skirt-like conductive coating 43 disposed thereon in a manner extending substantially from the neck portion to the forward region adjacent the sealing zone 23. This envelopic coating, which is usually of the potential of the final electrode of the electron gun assembly 41, is formed of a material, such as Aquadag, such being electrically connected to the color-selection electrode, by means not shown. The electrical potential is normally supplied to this skirt-like coating by a related conductive metallic button 45 which is disposed to traverse the wall of the funnel portion 19.

The embodiment of the invention, as illustrated in FIGS. 1, 2, and 3, is an integrated conductive formation 47 comprising an envelope traversing electrical conductor 49 in the form of a metallic conductive button which is disposed in the wall of the envelope funnel 15 portion in the region thereof adjacent to the panel-funnel seal 23; conjunctive therewith is a substantially longitudinal resilient metallic connective member 51 that is affixed or bonded to the interior surface of the funnel-disposed button 49, and extended therefrom to make contact with a peripheral portion of the screen. As shown, a conductive tab 53 is formed as an extended area of the screen 31, such being disposed on the panel sidewall 27 in a manner to extend toward the seal edge 29 of the panel to expedite electrical contact with the connective member 51 of the connection combination 47.

The conductive button 49, which is sealed in the wall of the funnel portion 19 to traverse therethrough, is of substantially frusto-conical shaping having a circumscribing sidewall 55 and substantially parallel spacedly related inner 57 and outer 59 portions, the integration thereof producing a substantially hollow conductive element 49 with an opening 60 formed in the outer surface. Electrical connection is made therewith by inserting the expandable terminal of an external source through the opening. The inner portion 57 of the button, which is oriented to the interior of the funnel, is fabricated to have a solid stud-like jointure protuberance 61 oriented in substantially the center region of the inner surface.

The metallic material from which the conductive button 49 is fabricated has a coefficient of thermal expansion which substantially matches that of the glass of the funnel portion 19. An exemplary material is a nickel-iron alloy referenced as No. 4 alloy, which is commercially available from GTE Sylvania Incorporated, Warren, Pennsylvania.

Associated with the discretely shaped conductive button 49, is a substantially longitudinal resilient metallic connective member 51 formed of a suitable material, such as stainless steel, and having a jointure region 63 formed at one end thereof, a contact area 65 at the other, with a bridging resilient intermediate section 67 therebetween. The jointure region is formed as a substantially U-shaped configuration which is invertedly positioned on and affixed to the stud-like protuberance of the conductive button. With particular reference to FIG. 3, the jointure region 63 of the connective member is mated with and bonded to the conductive button 49 prior to the joining of the panel and funnel portions. The affixation of the U-shaped jointure configuration of the connective member to the projecting stud 61 of the button is expeditiously accomplished by welding across the U-shaping through the solid protuberance sandwiched therebetween. A forward contact area 65

is formed to have a substantially reverse-turned leading edge **69**, whereof it is preferred to have the turned-under terminal end located to effect slidable pressured contact with the connective portion **53** of the screen **31**. The reverse-turn of the contact area **65** provides a substantially rounded leading edge which facilitates sliding contact when the panel portion **21** is positioned and frit-seated on the funnel portion **19**. Orienting the reverse-turn portion of the contact area **65** toward the panel sidewall **27**, eliminates a projection extending toward the color selection electrode **33** and thereby reduces the possibility of an arc-inducing condition between the connective member and the electrode. It is to be noted in FIGS. **1** and **2** that the assembled connective means provides for close positioning to the sidewall of the envelope. This is particularly advantageous since the spacing between the color-selection electrode **33** and the panel sidewall **27** is of narrow dimensioning.

Another embodiment of the conductive button **49'** is illustrated in FIG. **4**, wherein the jointure protuberance **61'** is formed as a substantially flattish stub-like tongue projecting from the inner surface **57** of the button. When such is utilized, orientation of the plane of the stub **71** is substantially parallel with the seal line **23** joining the funnel and panel portions. By such orientation of the tongue, the forward directional placement of the metallic connective member **51** is accurately predetermined.

Thus, there is provided an improved internal connective means for use with a cathode ray tube wherein a separate electrical connection is effected from a defined wall-oriented electrical traversal to a discrete area of the panel. The connective means of the invention provides a simple but efficient connective combination that is both expedient and appropriate for cathode ray tube utilization.

While there has been shown and described what are at present considered the preferred embodiments 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. An electrical connective improvement in a cathode ray tube incorporating an envelope formed of an integration of a neck portion having an electron gun assembly located therein, a funnel portion joined thereto, said funnel portion being sequentially sealed to a contiguous panel portion having a cathodoluminescent screen formed on the inner surface thereof with an electrode member oriented in spatial relationship thereto, said improvement being the means for effecting a bridging electrical connection from said funnel portion to said panel portion comprising:

an isolated metallic conductive button traversing the wall of said envelope, said conductive button having a substantially defined bonding region located on the inner surface thereof oriented within said tube; and

a substantially longitudinal resilient metallic connective member having a jointure region formed at one end thereof and a contact area at the other with a bridging resilient intermediate section therebetween, said jointure region being mated with and affixed to the bonding region of said button in a manner to direct said connective member toward said panel, said contact area of said connective member being contoured to effect slidable pressured contact on a related area in said panel.

2. The connective improvement according to claim **1** wherein said bonding region of said conductive button is formed as a solid stud-like jointure protuberance oriented in substantially the center region of the inner surface of said button.

3. The connective improvement according to claim **2** wherein said stud-like jointure protuberance is formed as a substantially flattish stub-like tongue, the orientation of the plane of said stub being substantially parallel with the seal line joining said funnel and said panel portions.

4. The connective improvement according to claim **1** wherein the jointure region of said connective member is formed as a substantially U-shaped configuration invertedly positioned on and affixed to said stud-like protuberance on said button.

5. The connective improvement according to claim **1** wherein the forward contact area of said connective member is formed to have a substantially reverse-turned leading edge to facilitate sliding contact with a related panel-disposed conductive area.

6. The connective improvement according to claim **1** wherein said conductive button traverses the funnel portion of said envelope in the region substantially proximal to the region of the panel-seal.

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