July 4, 1967 J. L. BRAEUTIGAM ET AL 3,329,851

ELECTRICAL CONNECTION DEVICES FOR ELECTROLUMINESCENT PANELS

Filed Sept. 21, 1965 4 Sheets-Sheet 1

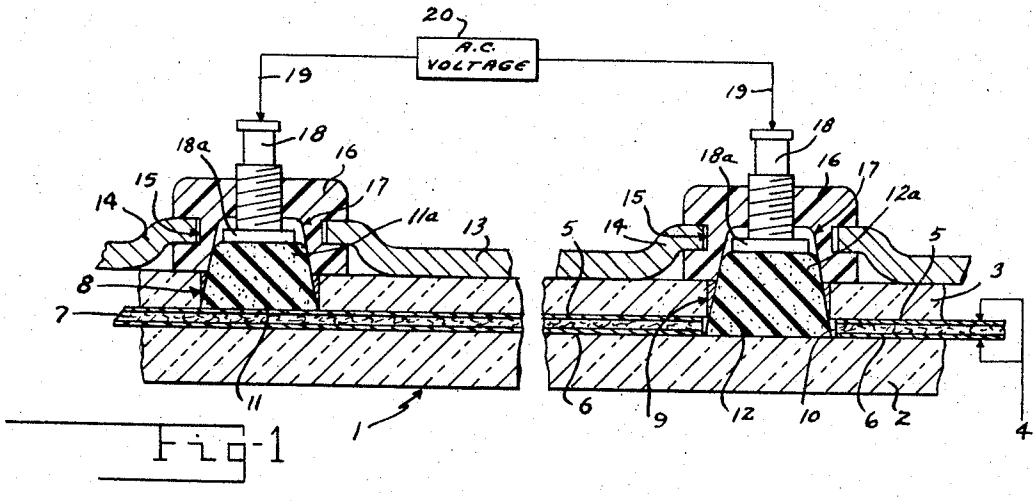


Fig-1

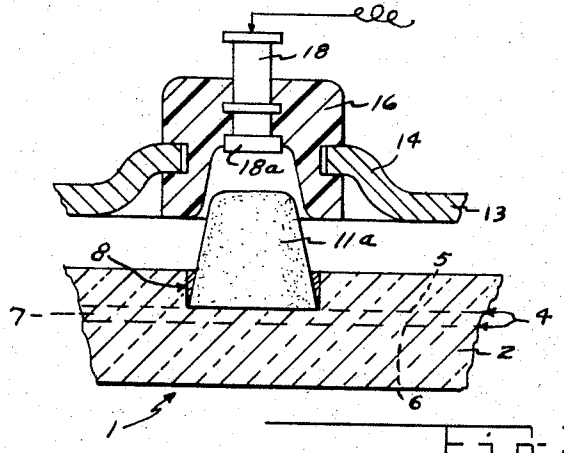


Fig-2

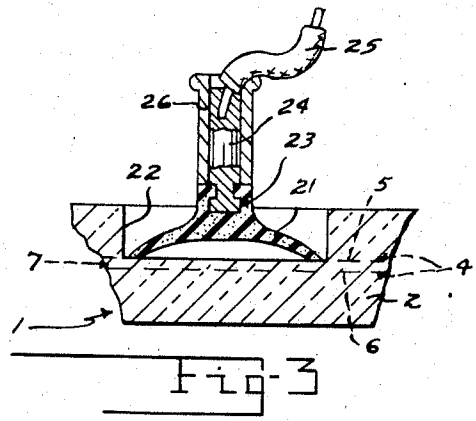


Fig-3

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ELECTRICAL CONNECTION DEVICES FOR ELECTROLUMINESCENT PANELS

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Fig-4

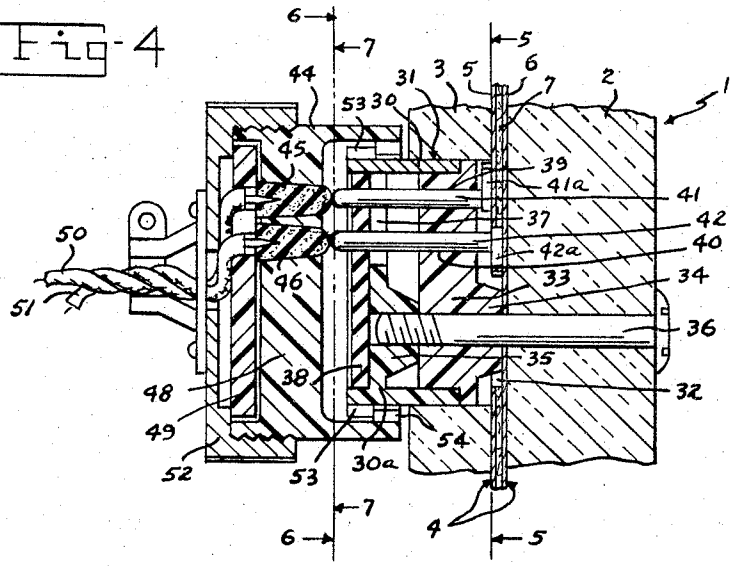


Fig-5

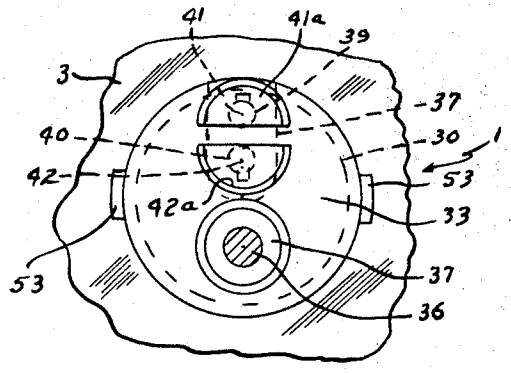


Fig-6

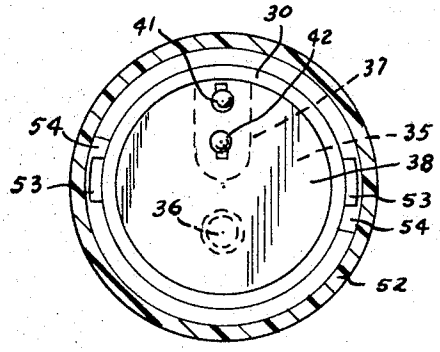
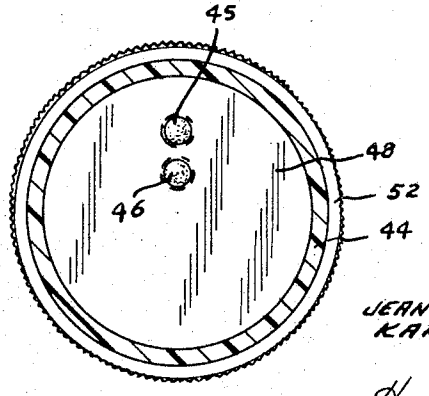


Fig-7



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ELECTRICAL CONNECTION DEVICES FOR ELECTROLUMINESCENT PANELS

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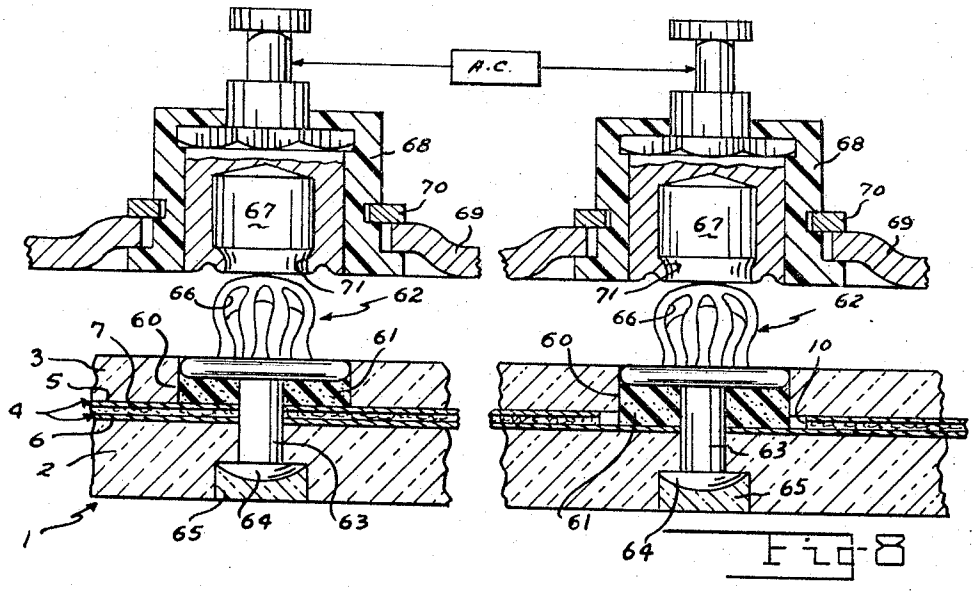


Fig-8

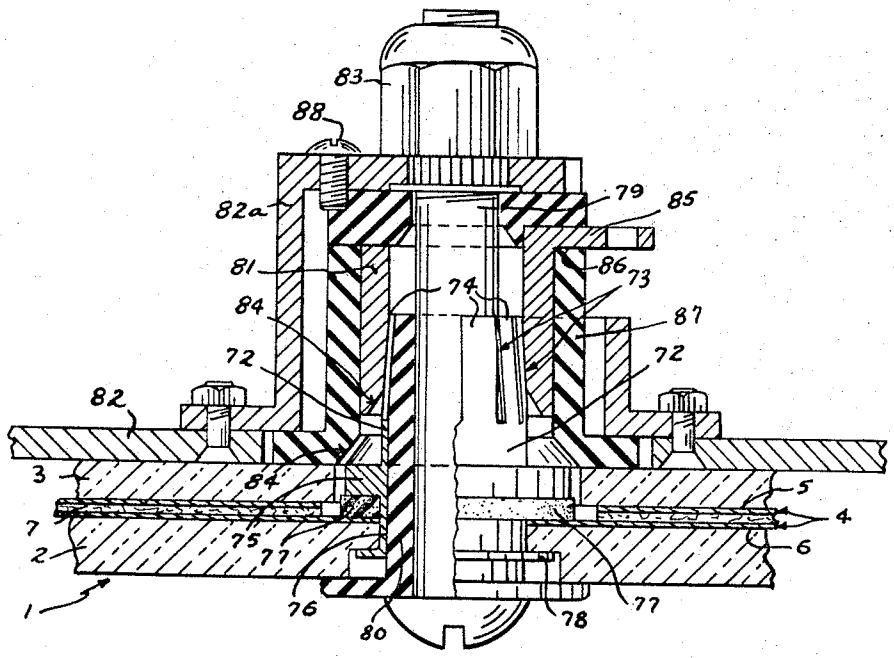


Fig-9

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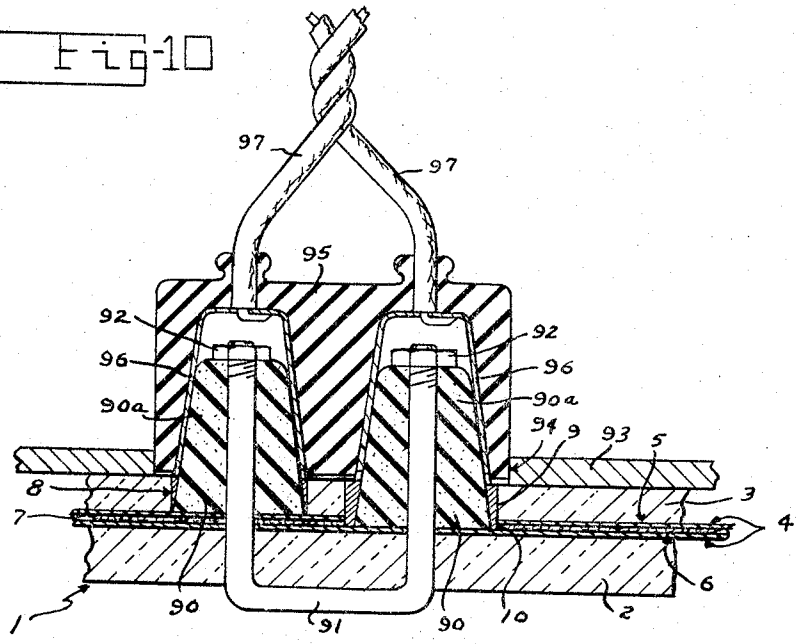
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ELECTRICAL CONNECTION DEVICES FOR ELECTROLUMINESCENT PANELS

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Fig-10



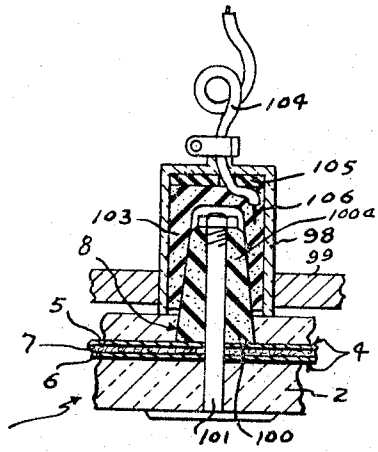


Fig-11

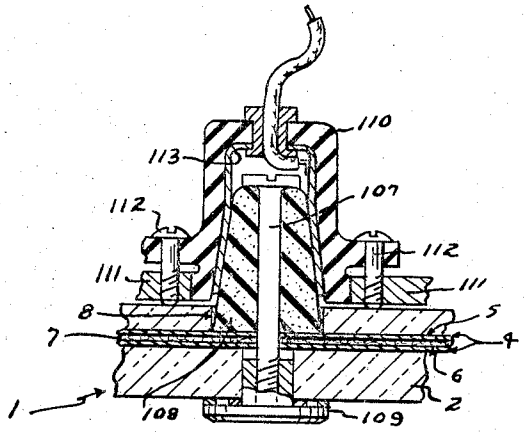


Fig-12

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United States Patent Office 3,329,851 Patented July 4, 1967

3,329,851

ELECTRICAL CONNECTION DEVICES FOR ELECTROLUMINESCENT PANELS

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Filed Sept. 21, 1965, Ser. No. 489,089
7 Claims. (Cl. 313—108)

ABSTRACT OF THE DISCLOSURE

An electroluminescent panel having spaced parallel electroconductive layers between the front and rear surfaces of the panel in which the front conductive layer is transparent and a luminescent phosphor is sandwiched between the electroconductive layers with a rearwardly tapering conical plug of electroconductive resilient rubber having its base area in entire electrical contact with each one of the electroconductive layers and extending materially rearwardly beyond the rear surface of the luminescent panel and including a supporting panel adapted to support the luminescent panel in close parallel relation having outwardly tapering conical electrical contact sockets of complemental shape and size to the rearwardly tapering conical rubber plugs to snugly receive the conical rearwardly extending electroconductive rubber plugs and frictionally retain the conductive rubber plugs therein to support the luminescent panel on the supporting panel in close parallel relation in which the sockets have electrical contact means therein contacting the outer ends of the resilient conical electroconductive plugs to energize the two electroconductive layers.

This invention relates to electroluminescent panels and detachable mounting means for mounting the panels and simultaneously establishing electrical circuit connections to the electroluminescent unit or electroconductive layers of the unit sandwiched in the transparent panel or panels at opposite sides of the luminescent phosphor layer.

The purpose of the invention is to provide an inexpensive, satisfactory, and reliable means for mounting luminescent panels on mounting plates constituting means for establishing selective electrical circuit contacts between the two closely spaced thin electroconductive layers at the opposite faces of the intermediate luminescent phosphor layer in the panels.

It might be mentioned that a former method, on which the invention is an important improvement, consisted in drilling two terminal holes into the back of an acrylic panel plate, forming the rear plate portion of the luminescent panel. These holes were then plugged with "nylon" buttons during the preparation of the metalized and phosphorescent surfaces or layers. The buttons were subsequently removed and terminal pins were inserted in the holes and electrical contact between the pins and the contact surfaces (of the luminescent unit) were provided by means of painted paths of silver, the metalized surfaces of the panel and terminal pins being sealed with a potting compound. Other ordinary methods of connection included spring contact fingers as well as the soldering with the conductive pastes were not found to be practical or completely satisfactory and often resulted in damage to the ultrathin conductive layers of the luminescent units.

Also with these ordinary methods the electroconductive plates burned out due to the high electrical current surges present as the panels were energized, this damage occurring around the electrical contact areas in the thin transparent front vaporized gold layer, in the form of irregular shaped cracks.

The present invention provides means for eliminating this mechanical and electrical stress and shock, as well as breakdown between the thin conductive layers of the luminescent unit and the conductors due to other causes, for instance from expansion and contraction.

An object of the invention is the provision improved electrical contact means for luminescent panels which comprise a pair of resilient electrical contact members fixed in the suitable relatively large openings in the rear portion of the panels which establish resilient electrical surface contact with the respective thin electroconductive layers located in the panel at opposite sides of the luminescent phosphor layer, which contact members each include an enlarged resilient electrical contact base portion sealed in each of the openings in resilient surface area contact with one of the thin electroconductive layers of the electroluminescent unit.

A further object is the provision of an electroluminescent panel having closely spaced electroluminescent layers between the front and rear faces of a transparent panel, having a luminescent phosphor between the electrocondutive layers, with spaced enlarged openings formed in the rear of the panel, each opening exposing the surface of one of the electroconductive layers only, and a truncated conical electroconductive rubber-like plug member sealed in each of the openings with the base of the plug member in substantially entire resilient surface area contact in the opening with the exposed surface of one of the electroconductive layers that are exposed in that opening, in which said plugs taper outwardly and rearwardly from the rear face of the panel to form outwardly tapered conical electrical contact members.

A further object is the provision of electroconductive mounting means for the panel which includes spaced socket members fixed in, or, on the mounting panel for receiving the rearwardly tapered projecting portions of the plugs and formed with concentric recess openings or sockets for snugly receiving said tapered extremities of said plugs in frictional retaining and supporting engagement and includes electrical contact means therein for electrical contacting engagement with said plugs for establishing electrical connections through the electroconductive plugs to the electroconductive layers.

A further object is the provision of a panel mounting plate having spaced socket members fixed therein, formed with truncated conical sockets therein, complemental in shape and size to the rearwardly tapered conical electroconductive rubber-like projecting portions of the plugs for receiving and frictionally engaging the plugs to retain the panel on the mounting plate and including means in said socket members for establishing electrical connections with said electroconductive rubber plugs.

A further object is the provision of truncated conical electroconductive soft resilient rubber plugs snugly fitting the openings in the rear face of the panel which are yieldable to provide resilient entire base surface contact with the exposed conductive layers in the bottoms of the rear openings in the panel.

Other objects and advantages of the invention will become apparent from the following description and accompanying drawings in which:

FIG. 1 is a somewhat enlarged diagrammatic fragmentary cross-sectional view through one form of luminescent panel and mounting plate therefore, illustrating one form of the invention, showing the luminescent panel in supported relation on the mounting plate, employing truncated conical electroconductive rubber supporting contact members for electrical contact with the electroconductive layers of the luminescent units;

FIG. 2 is a fragmentary detail sectional view of one of the truncated conical electroconductive rubber panel mounting electrical contact plug members sealed in the

back of a luminescent panel, with the panel spaced from the mounting plate and a nylon dielectric grummet or plastic socket member in position to receive the rearwardly tapered plug portion therein, showing a fixed type of electrical contact terminal in the socket as compared with the axially adustable contact terminals shown in FIG. 1;

FIG. 3 is a modified electroconductive rubber contact member in contact with one of the electroconductive layers of the luminescent unit, employing the suction cup retaining electroconductive contact member;

FIG. 4 is an enlarged fragmentary cross-sectional view of a modified separable electrical contact connector unit, employing resilient truncated conical electroconductive rubber plug members in the electrical connections to the electroconductive layers of the luminescent unit of the panel;

FIG. 5 is a fragmentary view taken about on line 5—5 of FIG. 4 looking in the direction of the arrows with the terminal connection cap removed;

FIG. 6 is a sectional view taken about on the plane indicated by line 6—6, in FIG. 4, looking in the direction of the arrows;

FIG. 7 is a sectional view taken about on line 7—7 of FIG. 4, looking in the direction of the arrows;

FIG. 8 is a sectional view of a further modification of a connector for luminescent panels in which a relatively large surface resilient electroconductive rubber contact member in the form of a washer is employed in the connection between the resilient metal contact members and the thin electroconductive layers in the panel and showing the luminescent panel just prior to its supported electrical contacting relation with the adjustable contact sockets;

FIG. 9 is a further modification employing an electrical connector and supporting socket including the provision of a resilient electroconductive rubber contact member fixed in the connection next to the layers of the luminescent unit;

FIG. 10 is a modified form of a dual electroconductive truncated conical rubber plug member including a dielectric "U" bolt for securing the plugs in contacting relation, and a dual dielectric socket member in the mounting panel having spaced thin metallic truncated conical electrical contact sockets therein for receiving the projecting extremities of the plugs, in which the sockets are complemental in size and shape to the size and shape of the projecting portions of the rearwardly tapering extremities of the plug members;

FIG. 11 is a sectional view of a truncated conical electroconductive hard rubber male connector and a socket therefor in which the socket members is formed of soft electroconductive rubber and the truncated conical plug is secured in the panel against the electroconductive layer by a dielectric bolt member; and

FIG. 12 is a somewhat similar sectional view in which the electroconductive truncated conical rubber plug is bolted in the panel and the socket member is formed of dielectric plastic and contains a thin metallic contact sleeve or thimble shaped to snugly receive and frictionally and electrically contact and support the proecting tapered extension of the truncated conical electroconductive rubber plug.

Referring to the drawing, and more particularly to FIG. 1, the reference numeral **1** denotes a somewhat conventional electroluminescent panel comprising a front transparent portion **2** and a rear portion **3** with an electroluminescent unit **4** sandwiched therebetween. The front and rear portions **2** and **3** are preferably dielectric such as plastic or glass plates while the luminescent unit preferably comprises a rear thin electroconductive layer **5**, for instance a silver coating and a front coating comprising a vapor deposited thin layer **6** of gold, deposited on the back of the front transparent portion of acrylic base plate and a conventional luminescent phosphor **7** therebetween.

The plate is thin enough to be transparent, allowing the luminescent glow to be visible when the layers **5** and **6** are energized. This constituted a substantially conventional luminescent panel and the same reference characters, relative to the panel, will be used in all of the figures of the drawings.

The rear face portion **3** of the panel **1** is formed with spaced enlarged openings or recesses, preferably cylindrical openings **8** and **9** therethrough one of the openings, for instance **8**, exposing the surface of the electroconductive layer **5** (nearest the back of the panel) while the other opening **9** extends through the conductive layer **5**, and phosphor layer, and exposes the rear surface of the other thin substantially transparent gold conductive layer or film **6**.

The rear layer **5** and phosphor **7** may be provided with a concentric opening **10** which is larger in diameter than the opening **9**, so as to space the edge of the opening **9** inside the perimeter of the opening **10**.

Resilient truncated conical electroconductive rubber-like contact members or plugs **11** and **12** are snugly fitted in the openings **8** and **9** with the resilient wider base portions respectively in entire resilient surface electrical contact with the electroconductive layers **5** and **6**, these plugs **11** and **12** tapering outwardly beyond the rear surface of the panel **1** to form outwardly projecting truncated conical panel supporting electrical contact projections or extensions **11***a* and **12***a*. The space between the truncated conical electroconductive plugs and the openings **8** and **9** therefore in the panels may be sealed by any suitable potting or sealing compound.

The tapered extensions **11***a* and **12***a* provide supporting means for detachably and frictionally securing the luminescent panel **1** to the support or mounting plate **13**, as well as establishing electrical connections to the spaced electroconductive layers **5** and **6**.

Referring to FIGS. 1 and 2 the mounting plate **13** may be made of stiff metal, for instance an instrument panel which is dimpled at **14** with a concentric hole **15** in the dimple in which is fitted a resilient dielectric grummet **16**, for instance, formed of nylon having a peripheral groove receiving the edge of the dimpled portion which surrounds the opening **15**, and provides for limited lateral adjustments of the grummets **16** in the mounting plate **13**, the base of the grummets, of course, lying flush with the face of the mounting plate **13**. The grummets **16** are formed with truncated conical recesses **17** having substantially similar or complementary size and shape to snugly receive the tapered contact extensions **11***a* and **12***a* of the plugs **11** and **12** in the rear face of the electroluminescent panel **1**.

Suitable metallic contact members extend through the centers of the grummets **16** and **17** having electrical contact extremities for engaging the outer ends of the electroconductive plugs **11** and **12** when the panel is disposed to position the plugs in alignment with the recesses **17** in the grummets and pushed back against the mounting plate **13**, as shown in FIG. 1. These electrical contacts in the grummets are indicated at **18** and may be molded in the grummets, as shown in FIG. 2, or they may be adjustable in threaded openings formed in the grummets **16** and **17** as seen in FIG. 1. The inner contact ends of the terminals **18** have enlarged surface contact heads **18***a* disposed for contact with the extremities of **11***a* and **12***a* of the plugs **11** and **12**.

The outer ends of the central contact stems **18** have suitable terminals for connection to an AC power source such as indicated at **20** through conductors **19**.

Referring to FIG. 3, showing one of the luminescent panel connectors comprising an electroconductive rubber suction disk **21** for reception into the opening **22** in the back of the panel portion **3** having a recess **23** in which a metallic contact stem **24** is secured establishing electrical contact through the conductive rubber suction head or disk **21** with one of the exposed electroconductive layers,

for instance 5 of the electroluminescent unit 4. The electrical conductor 25 connects the end of the metallic stem 24, and a rubber sleeve 26 covers and insulates the stems 24 while they are manipulated to bring the conductive cups 21 into contacting relation with the layer or layers 5 or 6. It should be noted that electrical contact is made with the fragile electroconductive layers through large surface contact by the enlarged resilient soft electroconductive rubber contacting suction cups 21.

Referring to FIGS. 4 to 7, a detachable dual contact means is provided employing resilient surface electrical contact means and truncated conical electroconductive rubber plugs for establishing a relatively large resilient surface area contact with the respective electroconductive layers 5 and 6 of the luminescent unit 4 in the panel 1.

A hard plastic cylindrical shell 30 which is fitted into an opening 31 formed in the rear panel portion 3 (somewhat like the openings 8 or 9 or 22 aforesaid) exposes one of the conductive layers 5 in the bottom thereof. An adjacent opening 32 in the bottom of the recess 31 opens through the first or rear conductive layer 5 and the luminescent phosphor 7. A flanged soft rubber insulator disk 33 is fitted in the bottom end of the shell 30 having an offset resilient mounting boss 34 disposed for mounting contact of the device against the exposed conductive layer or film, or against the rear of the front panel portion 2.

The shell 30 has transverse partition 30*a* formed with a threaded boss 35 receiving the clamping or securing screw 36 passing through the front portion of the panel to seat and fix the shell in the panel. The partition is also formed with a U shape opening 37, and an insulator disk 38 is fixed in the outer end of the sleeve 30.

The disk 38 and the rubber insert or mounting flanged disk 33 have offset aligned guide passages 39 and 40 therethrough in which are mounted the spaced electrical contact stems 41 and 42. These stems 41 and 42 have enlarged semicircular surface contacting heads 41*a* and 42*a* the contact head 41*a* being in entire surface area contact (for instance) with the electroconductive layer 5 while the other head 42*a* is in entire surface area contact with the other conductive layer 6 through the opening provided in the layers 5 and 7.

The stems 41 and 42 project rearwardly beyond the plate or disk 38 and are resiliently forced into contact by the removable cap member 44, more particularly by truncated electroconductive rubber plugs 45 and 46 seated in suitable openings in alignment with the stems 41 and 42, in the partition 48. The cap 44 is formed of dielectric material and an insulator disk 49 is seated in the rear of the cap for receiving the electrical conductors 50 and 51 which pass through a screw closure cap 52 preferably metal screwed on the end of the main cap member 44. The conductors 50 and 51 have exposed barbed ends inserted or forced into the ends of the conductive rubber truncated conical plug members 45 and 46.

As shown the cap 52 forces or holds the disk 49 and barbed ends of the conductors in electrical contact with the plugs 45 and 46 and the resiliency of the plugs holds the contact surfaces 41*a* and 42*a* in flat surface contact with the respective electroconductive layers 5 and 6. Any suitable connection is provided between the sleeve 30 and the cap member 44 for instance a conventional bayonet slot interlock as shown in FIGS. 5 and 6 in which ears or lugs on the sleeve 30 are indicated at 53 and bayonet slots in the cap 52 are indicated at 54. Some type of spline must, of course, be provided to prevent rotation of the stems 41 and 42 in the opening provided in the soft rubber flanged insulator 33 in the sleeve or shell 30.

The operation is self-evident, however it should be observed that resilient electroconductive truncated conical rubber plug members are employed in the contact connections to the luminescent unit, providing wide resilient surface area contact without likelihood of damage between the contact members and the fragile electroconductive films or layers of the electroluminescent unit 4.

Referring to FIG. 8 the electroluminescent panel 1 is formed with spaced openings 60 (similar to the opening 8 and 9 aforesaid) one exposing one conductive layer surface 5 and the other exposing the surface of the other layer or film 6. In this instance a washer member 61 of resilient electroconductive rubber is disposed in each opening in resilient surface area electrical contact respectively the exposed surfaces at the bottom of these recesses or holes 60 of the electroductive layers 5 and 6.

A metallic resilient flanged snap action contact 62 is seated, in electrical contact, in the recesses, on the surface of the resilient electroconductive rubber washers 61 having a stem 63 extending through a bore in the front panel portion 2 with a flanged head 64 seated in the front panel surface, as shown, the opening being sealed by a suitable potting or sealing compound 65.

The spring head portion 66 projecting rearwardly for supporting contact relation with a metallic contact member 67 seated or molded in a molded plastic casing 68 which is mounted on the backing plate 69 and retained by a snap ring 70. The member 67 has turned-in flanges 71 for retaining the heads 66 in the recesses in electrical contacting relation when the resilient contact heads 66 are snapped in position in the recesses.

The arrangement besides providing an electroconductive resilient rubber contact with the fragile film layers 5 and 6 of the luminescent unit provides means for lateral adjustment and alignment of the head receiving opening 71 in the member with the resilient head 66 of the contact member.

FIG. 9 discloses a more complicated supporting contact member for detachably supporting and electrically connecting the electroconductive layers to the supporting back panel 82. However, utilizing an electroconductive resilient rubber connection between the electrical connector unit and the thin electroconductive film is employed.

The male portion of the connector is a hollow metallic cylinder 72 with its mating end slit at 73 to provide spring contact fingers 74. The other end is flanged at 75 for making electrical contact with an additional length 76 for mounting purposes. Electrical contact is made to the electroconductive layers by compressing a resilient electroconductive rubber washer 77 under the flange 75 as a flaring operation at the outer end is performed to provide the turned-out retaining flange 78 in the front panel portion 2. A humidity seal is also accomplished by this operation. The male contact is insulated from the mounting screw 79 by a suitable dielectric 80 such as rubber or resilient plastic.

The female connection consists of an insulator 87 and an electrical receptacle assembly mounted in a metal housing 82*a* also containing a mounting nut 83. The receptacle is a closed entry type that is beveled at 84 at its leading edge to allow easy asembly with the male terminal. The other end of the contact sleeve in the receptacle 81 provides a solder terminal at 85 which is bent through a slot 86 in the insulator 87 and this insulator is prevented from rotating by a pin 88 or any other means in the metal housing 82*a*. The nut 83 is fixed so that tightening the screw 79 draws the parts into tighter condition.

FIG. 10 illustrates a simple dual connector employing truncated conical electroconductive rubber 90 plugs mounted in contact with conductive layers or films in side by side relation and secured in position by a dielectric U bolt 91 for instance made of nylon with the extremities threaded to receive the retaining nuts 92 which may be metal or plastic. The mounting plate 93 is recessed at 94 to receive a rubber or nylon dielectric connector 95, which is suitably secured in the recess 94 to the mounting panel, for instance, by securing means like the securing means for the receptacle seen in FIG. 12.

Metallic truncated conical electrocontact sleeves 96 are molded or fixed in the receptacle 95 having inner plug receiving recesses complementary in size and shape to the rearwardly projecting portions 90*a* of the plugs.

The inner or bottom ends of the contact sleeves 96 are respectively connected to the electrical conductors 97 for establishing electric current supply through the conductive rubber plugs 90 to the respective layers of the electroluminescent unit 4.

In FIG. 11 an insulated plastic case 98 is provided, for instance in the mounting plate 99 and the electroconductive truncated conical plug 100 is formed of hard conductive rubber and retained in the panel in contact with the electroconductive layers 5 or 6 by a nylon bolt 101 and nut. The interior of the casing 98 is formed of soft resilient electroconductive rubber 103 having a recess, similar and complemental to the shape and size of the rearward extensions 100*a* of the plug members.

An electrical contact wire 104 extends through the casing 98 and a washer 105 having a barbed exposed end 106 stuck in the conductive rubber socket 103, establishing electrical contact with the electroluminescent unit 4 when the panel is moved to force the rearwardly extending plug portions into frictional supporting electrical contact with the recesses in the conductive rubber sockets 103.

The final form in FIG. 12 is a similar to that shown in FIG. 10 and comprises a bolt member 107 passing through the resilient electroconductive truncated conical rubber plug member 108 with the nut 109 at the front of the panel. The plastic case receptacle 110 is mounted on the mounting plate 111 with screws 112 and contains a truncated conical through metallic receptacle or lining 113 to snugly receive and frictionally engage the rearwardly tapered projecting portion of the plug 108 and establish through the plug the base or wide surface resilient electrical contact with the surface of the electroconductive layer or layers of the electroluminescent unit 4, sandwiched between the front and rear surface portions 2 and 3 of the panel 1.

We claim:

1. In an electroluminescent panel and mounting structure, a transparent luminescent panel comprising closely spaced front and rear electroconductive layers having an intermediate luminescent phosphor layer therebetween, sandwiched between the front and rear surfaces of the panel, a pair of spaced electrical contact members extending through the rear surface of the panel, selectively in resilient surface electrical contact, one with one of said electroconductive layers only and the other contact member in resilient electrical surface contact with the other electroconductive layer only, said electrical contact members each comprising a truncated conical resilient electroconductive rubber plug-like member fixed in a complemental opening formed in the back of the panel behind the electroconductive layers, each having an electroconductive resilient contact base at its forward end in entire surface area electrical contact with the surface of one of said electroconductive layers only, and tapering rearwardly from the conductive layers beyond the rear surface of said panel to a material extent, for insertion into supporting and frictional contacting engagement into a complementary shaped conical electrical contact socket, forming a supporting structure for the panel.

2. An electroluminescent panel and supporting structure as set forth in claim 1 including the provision of a substantially flat mounting plate for the panel, resilient plastic panel supporting means disposed in openings formed in the mounting plate in substantially concentric relation to said rearwardly tapering portions of said truncated conical electroconductive rubber-like contact plug members, said resilient plastic supports each having an inwardly tapering conical socket, complemental in shape and size to said rearwardly projecting conical portion of said contact members for receiving and frictionally engaging and supporting said rearwardly tapering portions of said conical contact members, and electrical contact means fixed in the conical interior of said resilient plastic supports for electrical contact with the rear ends of said rearwardly projecting portions of said truncated conical resilient electroconductive rubber electrical contact members in the panel to support said luminescent panel on said mounting plate.

3. Apparatus as set forth in claim 2, in which said electrical contact means in said rearwardly inwardly tapering portions of said sockets are axially adjustable in the sockets into axial contacting relation with the rearwardly tapered extremities of the truncated conical electroconductive rubber plug-like contact members.

4. In an electroluminescent panel structure, a substantially rigid flat panel mounting plate having spaced openings formed therethrough, molded plastic contact receiving socket members fixed in said openings in said mounting plate, metallic contact receiving sockets concentrically fixed in said socket members, a plastic electroluminescent panel adapted to seat in juxtaposed flat relation against said mounting plate, said panel having closely spaced rear and transparent thin front electroconductive layers formed with an electroluminescent phosphor layer therebetween, sandwiched between the front and rear surfaces of said panel, said panel having a pair of enlarged spaced recesses formed in the rear face thereof, for spaced concentric axial alignment with the axes of said socket members, one of said recesses extending inwardly from the rear surface of said panel to expose the surface of said electroconductive layer nearest said rear surface of said panel, and the other recess extending inwardly through the last mentioned electroconductive layer and said luminescent phosphor layer to expose the surface of the other electroconductive transparent layer, an electrical contact member concentrically fixed in each of said recesses, having an enlarged resilient electroconductive rubber electrical contact surface disposed in entire surface area contact with the exposed surface of the electroconductive layer in each of said recesses, and in electrical contact with said electrical contact member in each of said socket members, said electrical contact members in said luminescent panel each having a resilient electrical contact extension projecting rearwardly through openings in said panel materially beyond the rear surface of said panel for insertion into, and frictional holding electrical contacting engagement with the metallic electrical contact receiving sockets in said mounting plate.

5. In an electroluminescent panel structure, a substantially rigid flat panel mounting plate having spaced openings formed therethrough, molded resilient plastic contact receiving socket members adjustably fixed in said openings of said mounting plate for limited lateral shifting movement, metallic electrical contact receiving sockets concentrically fixed in said socket members, a transparent electroluminescent flat panel member adapted to seat in juxtaposed flat parallel relation against said mounting plate, said panel having closely spaced thin electroconductive layers therein formed with a thin luminescent phosphor layer therebetween, sandwiched between the front and rear faces of said panel member, said panel member having spaced enlarged circular recesses formed in the rear face thereof, for concentric axial alignment with the respective axes of said socket members, one of said recesses extending inwardly from the rear face of said panel to expose only the surface of said electroconductive layer nearest the panel rear face and the other recess extending inwardly from the rear face of the panel through the last mentioned electroconductive layer and the intermediate luminescent phosphor layer to expose the other electroconductive layer only, a resilient conical electrical contact member fixed in each of said circular recesses having an electroconductive soft rubber base surface disposed in entire surface area electrical contact with the surface of the electroconductive layer exposed in said recess, and in electrical contact with said metallic contact receiving socket in said plastic contact receiving socket member, said resilient conical electrical contact members each formed with a resilient electrical contact

extension tapering outwardly materially beyond the rear surface of said panel for insertion into and frictional electrical contacting and supporting engagement with said metallic electrical contact receiving sockets in said socket members, for establishing an electric circuit through said electroconductive layers to produce luminescence therein and detachably support said panel on said mounting plate.

6. In a luminescent panel and mounting structure therefor, a luminescent panel having closely spaced thin electroconductive layers with an intermediate luminescent phosphor layer therebetween, sandwiched between the front and rear faces of the panel, a spaced pair of circular plug receiving recesses extending inwardly from the rear face of the panel to said electroconductive layers, one of said recesses exposing the surface of the conductive layer next to said rear face of the panel, the other recess extending inwardly through the last mentioned conductive layer and said luminescent layer to expose the surface of the other electroconductive layer, a soft truncated conical resilient electroconductive rubber electrical contact plug member snugly fitting each of said recesses in fixed relation in said panel with their larger base areas in surface contact throughout with the respective exposed surface areas of said electroconductive layers in said circular recesses, and tapering outwardly through said recesses to points materially in rear of said rear face of said panel to form outwardly tapered electroconductive rubber electrical contact extensions, projecting rearwardly from the rear face of said panel, a rigid mounting plate for said panel having complementary shape inwardly tapered electrical contact socket members fixed in said mounting plate in position for receiving in frictional electrical contact and retaining engagement with said outwardly tapered extensions, including electric energizing means connected thereto adapted to be connected to an AC source to produce luminescence in said phosphor layer.

7. An electric connection for electroluminescent panels having a luminescent layer unit therein comprising, a truncated conical electroconductive soft rubber plug fixed in the panel with the base thereof in flat surface contact with the electroluminescent layer unit in the panel, said truncated conical electroconductive soft rubber plugs projecting rearwardly in sealed relation through the back of the panel to form a truncated conical outwardly tapering conductive rubber electrical contact terminal, a rigid mounting plate for said panel comprising electrocontact socket means fixed in said plate having a truncated conical socket complemental in shape and size to the aforesaid conical truncated soft rubber plug projection to receive said projecting plug portions therein in snug frictional retaining electrical contact relation, including electrical contact means in said socket for establishing an electrical contact and frictional holding with said truncated conical conductive rubber plug.

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