

Oct. 2, 1962

W. J. KNOCHEL ETAL

3,056,898

LIGHTING UNIT AND METHOD OF MANUFACTURE

Filed July 9, 1959

2 Sheets-Sheet 1

FIG. 1.

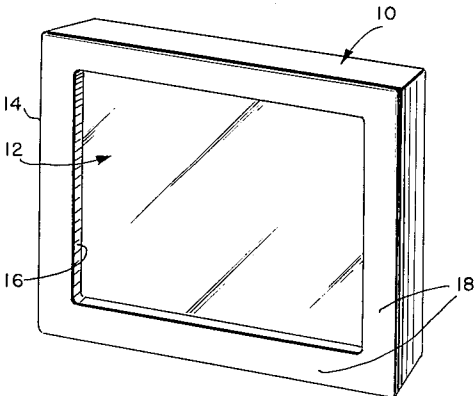


FIG. 2.

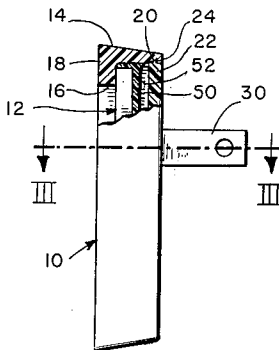


FIG. 3.

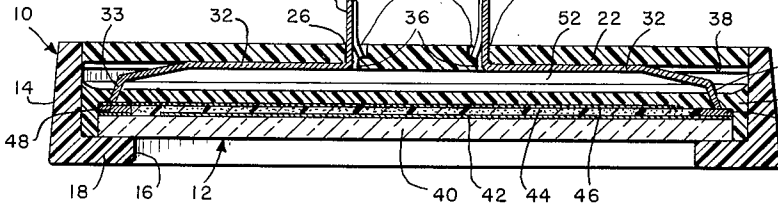


FIG. 4.

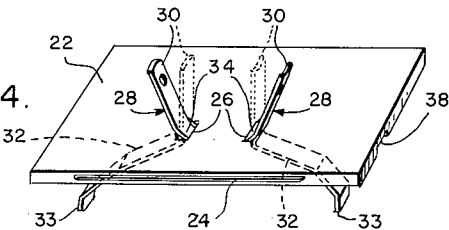


FIG. 6.

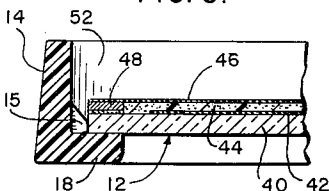


FIG. 7.

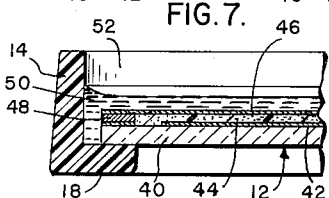


FIG. 8.

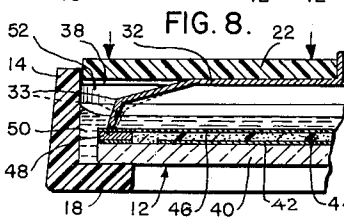
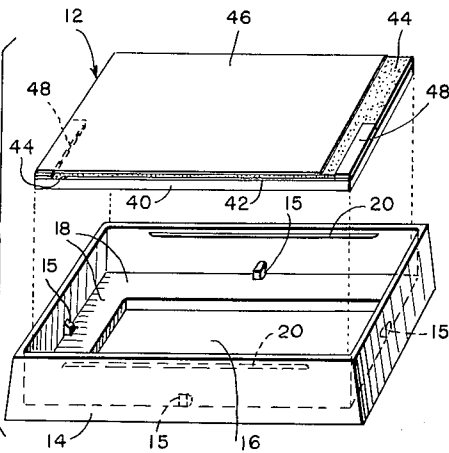


FIG. 5.



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FIG. 9.

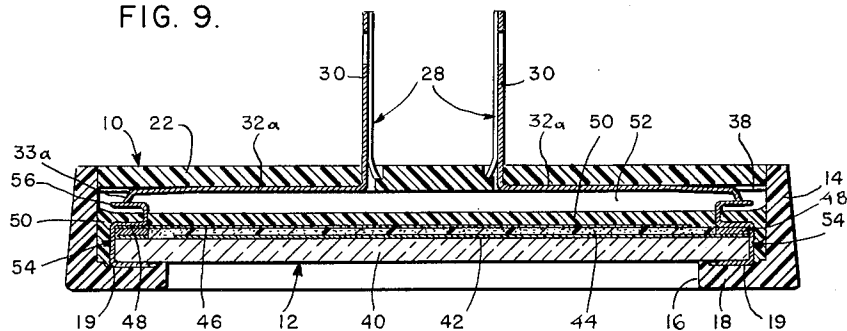


FIG. 10.

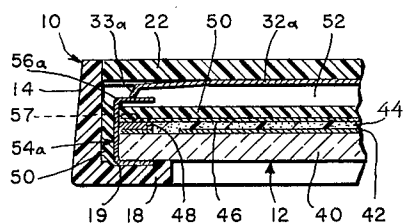


FIG. 11.

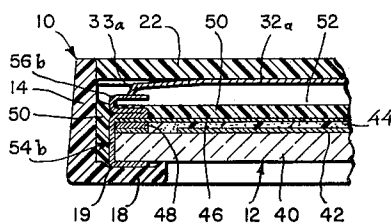


FIG. 12.

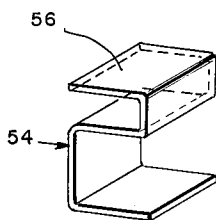


FIG. 13.

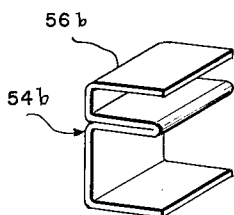
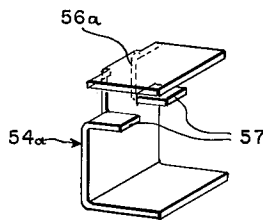


FIG. 14.

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3,056,898 LIGHTING UNIT AND METHOD OF MANUFACTURE

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Filed July 9, 1959, Ser. No. 825,961
10 Claims. (Cl. 313-108)

This invention relates to a lighting unit for display or convenience lighting applications and, more particularly, to an improved construction for and method of manufacturing such lighting units.

In the copending application of W. J. Knochel et al., Serial No. 824,249, filed July 1, 1959, and owned by the present assignee, there is disclosed and claimed a novel lighting unit wherein an area-type light source such as an electroluminescent lamp is mounted in a frame and retained therein by means of a panel that is attached to the back of the frame. The lamp is thus removably encapsulated in a casing and is energized by means of input terminals mounted on the back of the panel which terminals automatically connect with the lamp contacts through depressible lead-in conductors carried by the panel and disposed to engage such contacts when the panel is assembled with the frame. According to an alternative embodiment disclosed in the aforesaid copending application the terminals and lead-in conductors comprise elements that are clipped onto the lamp to form an assembly that is placed into the frame which is then filled with a suitable cement such as a thermosetting plastic or the like to provide a sealed-in type construction. The reliability and extremely low operating cost of such units coupled with the pleasant subdued lighting effect characteristic of electroluminescent type light sources makes them especially suited for convenience lighting applications, such as night and safety lights for example, and for displaying transparencies or the like.

As noted in the aforesaid copending application, when an electroluminescent lamp of glass-plastic construction is employed as the light-generating component for such lighting units it is necessary to apply a protective coating to the back of the lamp in order to prevent the influx of water vapor and other gaseous impurities that would deteriorate the electroluminescent phosphor and decrease its light output. With the casing type construction, it has heretofore been the practice to protectively coat the back of the lamp with a suitable material such as a thermosetting plastic before assembling the lamp and closure panel with the frame, which construction and mode of manufacture are disclosed in the above-mentioned copending application of Knochel et al. Precoating the lamps in accordance with this technique required a separate time-consuming operation since the lamps could not be readily assembled with the frame until the plastic coating was cured.

While it was recognized that the "sealed-in" mode of construction by virtue of the plastic filling employed therein automatically provided the necessary protection and was more rugged and thus more practical from a functional standpoint, it did not present as neat an appearance as and required considerably more plastic material than the "casing" type design which employed a closure panel. A combination of both types of construction would, accordingly, be very desirable from both a functional and an appearance standpoint. It was found, however, that when the panel was fastened to the back of the frame the plastic filling would in some cases tend to migrate to the inner face of the panel and along the lead-in conductors by capillary action resulting in voids and "thinned-out" areas on the back of the

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lamp through which water vapor or other gaseous impurities could enter.

It is accordingly the general object of the present invention to avoid and overcome the foregoing disadvantages and problems by providing an improved lighting unit of the aforesaid character that can be quickly and economically fabricated and will have a long useful life.

It is another object of this invention to provide a lighting unit of simple rugged construction the light-generating component whereof constitutes an electroluminescent lamp that is sealed within a casing comprising a frame and a closure panel.

Still another object of this invention is the provision of an improved construction for and method of manufacturing a lighting unit of the type wherein an electroluminescent lamp requiring a protective coating is mounted in a casing having a closure panel, whereby such lamp is not only provided with such protective coating but is permanently locked in positive electrical engagement with the portions of the lead-in conductor means of the casing during and without in the least interfering with or interrupting the normal sequence of operations required to assemble the lamp with such casing.

The aforesaid objects, and others which will become apparent to those skilled in the art as the description proceeds, are achieved according to this invention by placing the electroluminescent lamp into a frame that is of sufficient depth to permit a predetermined quantity of plastic or other protective material to be dispensed directly into the frame over the back of the lamp, and the panel to be assembled with the frame without contacting such material. Specially shaped lead-in conductors are provided on the panel to penetrate the plastic material while it is in its uncured state and engage the lamp contacts. The plastic is then cured thereby automatically sealing the lamp within the frame and locking the embedded portions of the lead-in conductors in positive electrical engagement with the lamp contacts. In accordance with an alternative embodiment of this invention the embedded portions of the lead-in conductors constitute extensions that clamp onto the lamp and engage the contacts thereof and protrude through and beyond the filling of plastic material to provide exposed contact surfaces that connect with depressible contactor members carried by the closure panel. The plastic material is thus dispensed directly into the frame and the protective coating subsequently formed in situ over the lamp during the normal sequence of operations heretofore required to mount the lamp within the casing formed by the frame and panel. The present invention accordingly provides what may be termed a "cast embedment" type of assembly that is an improvement from both a structural and production standpoint over the "casing" and "sealed-in" type designs disclosed in the aforesaid copending application Serial No. 824,249 of Knochel et al. in that the new construction incorporates all of the desirable features but obviates the deficiencies of and problems associated with both of the aforesaid designs.

For a better understanding of this invention reference should be made to the accompanying drawings wherein:

FIG. 1 is a front perspective view of an improved lighting unit constructed in accordance with this invention;

FIG. 2 is a side elevational view, partly in section, of the improved lighting unit shown in FIG. 1;

FIG. 3 is an enlarged cross-sectional view along the line III-III of FIG. 2, in the direction of the arrows;

FIG. 4 is a perspective view of the panel and terminal-contact members illustrating the manner in which they are preassembled according to this invention;

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FIG. 5 is an exploded perspective view of the frame and lamp components illustrating the manner in which they interfit one with another according to the present invention;

FIGS. 6 to 8 are enlarged cross-sectional views of one end of the improved lighting unit shown in FIGS. 1 to 3 at various stages of fabrication;

FIG. 9 is a view corresponding to FIG. 3 but illustrates an alternative embodiment of this invention;

FIGS. 10 and 11 are fragmentary cross-sectional views of lighting units illustrating additional embodiments of this invention; and

FIGS. 12 to 14 are perspective views on an enlarged scale of the lamp contact extensions employed in the alternate embodiments illustrated in FIGS. 9 to 11 respectively.

As shown in FIGS. 1 and 2 and more particularly in FIG. 3, the improved lighting unit of the present invention comprises in general a suitable area-type light source such as an electroluminescent lamp 12 that is sealed within a casing 10 consisting of a frame 14 and a panel 22. The electroluminescent lamp 12 is of the well-known glass-plastic type wherein an electroluminescent phosphor-dielectric layer 44 (FIG. 3) is sandwiched between a metal electrode 46 and a light-transmitting electrode 42 carried by a glass base plate 40. The metal electrode 46 may comprise evaporated aluminum or the like and as is customary in lamps of this type connects with one of the bus bar contacts 48 provided at opposite side edges of the lamp 12 but terminates short of and is thus electrically insulated from the other of said bus bar contacts. In similar fashion, the light-transmitting electrode 42 is electrically isolated from the bus bar 48 and that is connected to the metal electrode 46. The frame 14 and panel 22 are preferably molded from a suitable non-flammable plastic such as polystyrene for example.

In accordance with the present invention the frame 14 is purposely made larger than the electroluminescent lamp 12 so that the latter, when centrally located within the frame by means of suitable spacer elements 15 (FIGS. 5 and 6) provided at the bottom thereof, will have its light-emitting face disposed in the window 16 defined by the rim 18, as shown most particularly in FIG. 3 and FIGS. 6 to 8. The lamp 12 is accordingly spaced from the sides of the frame 14 and recessed a predetermined distance inwardly from the back edges thereof to provide a cavity 52 (see FIG. 6). Ribs 24 (FIGS. 2 and 4) on the sides of the panel 22 interlock with grooves 20 in the mating portions of the frame 14 thereby permitting the panel to be snapped into the back of the frame flush with the back edges thereof, as shown in FIGS. 2 and 3. A pair of generally L-shaped spring metal strips 28 are anchored in slots 26 in the panel 22 and arranged to provide a pair of plug-in prong terminals 30 that extend outwardly from said panel, and a pair of lead-in conductors such as contactor arms 32 that extend laterally in opposite directions along the inner face of said panel within recesses 38 thereat as shown in FIGS. 3 and 4. Tongues 34 at the base of each of the prong terminals 30 engage ledges 36 that project into the slots 26 at the inner ends thereof thereby permitting the metal strips 28 to be preassembled with the panel 22 and pivot within the aforesaid slots, as illustrated in FIG. 4. While the prong terminals 30 may constitute a plug-in assembly for a convenience outlet as shown, various kinds of terminals may be employed. The contactor members 32 are specifically shaped according to this invention to lie flat against the inner face of the panel 22 within the recesses 38 (when the panel 22 is assembled with the frame 14) and have their free ends sharply bent away from the panel 22 to provide protruding blade-like end sections 33 that are resiliently depressible and disposed to engage the contact surfaces at the back of the lamp 12 as hereinafter described.

In assembling the improved lighting unit according to the present invention the electroluminescent lamp 12 in

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its "as finished" condition (that is, without any protective coating) is first placed into the frame 14 within the spacing elements 15 so that the front peripheral edge of the lamp seats against and effects a seal with the rim 18, as illustrated in FIG. 6. If necessary, a suitable caulking compound may be applied to the face of the lamp 12 or inner surface of the rim 18 to insure such seal. A predetermined quantity of suitable thermosetting casting resin or plastic material 50 such as epoxy resin or the like is then dispensed into the frame 14 while the latter is held in substantially horizontal position, the viscosity of said plastic material being adjusted by suitable diluent to permit the material to flow into and fill the spaces between the ends of the lamp 12 and sides of the frame 14 and completely cover the back of said lamp and contact surfaces thereat but only partially fill the cavity 52 at the back of the frame, as shown in FIG. 7. As a specific example of a suitable resinous casting material 50 an epoxy resin of the type disclosed in application Serial No. 822,231, filed June 23, 1959, and owned by the present assignee may be employed. The preassembled panel 22 and metal strips 28 (FIG. 4) are then snapped into the frame 14 while the plastic material 50 is still in its uncured condition and the frame is maintained in horizontal position. The resultant compression of the protruding end sections 33 by the panel 22 cause the former to penetrate the plastic material and frictionally engage the lamp contacts, as shown in FIG. 8. When in its assembled position the panel 22 is spaced from the meniscus of the plastic material 50 and the laterally-extending portions of the contactor arms 32 are disposed in the unfilled section of the cavity 52, as shown in FIG. 3. The plastic material 50 is then cured while the frame 14 is maintained in substantially horizontal position thereby not only hermetically sealing the lamp 12 within the casing 10 but permanently locking the end sections 33 of the contactor members 32 in positive electrical engagement with said lamp and permanently securing the panel 22 to the back of said frame.

The maintenance of a spacing between the meniscus of the plastic filling 50 and the inner face of both the panel 22 and the exposed laterally-extending portions of the contactor members 32 afforded by the unfilled segment of the cavity 52 (see FIGS. 3 and 8) constitute an essential feature of this invention. Experience has shown that unless such a spacing is provided and maintained, and the ends of the contactor members 32 are sharply bent to provide blade-like sections 33 of sufficient length to penetrate the plastic filling 50 but prevent the main portions of the contactor members 32 from contacting the plastic, the latter when in its uncured state wets the frame 14 and contactor members 32 and tends to migrate by means of capillary action from the back of the lamp 12 to the panel 22. Such migration causes voids or pockets in the cured plastic coating and resultant "thinned out" areas therein through which water vapor or other gaseous impurities may eventually penetrate and contaminate the electroluminescent phosphor. It has been found that a layer of epoxy resin at least .030 of an inch thick is required on the back of the glass-plastic electroluminescent lamp 12 to insure adequate protection and that this requirement can be met, while maintaining the necessary spacing, by employing a frame that is about .395 of an inch in depth with a lamp approximately .135 of an inch thick and a panel 22 about .120 of an inch thick. The provision of the specially shaped contactor members 32 and a lamp 12 and frame 14 suitably dimensioned to provide a cavity 52 of sufficient depth at the back of the frame in accordance with this invention thus permits all but the light-emitting face of the lamp to be permanently encapsulated by means of what may be termed a "cast embedment" technique during the normal sequence of operations heretofore required merely to assemble the aforesaid components. The present invention thus comprises a combination of the "casing" and "sealed-in" types

of construction disclosed in the abovementioned copending application Serial No. 824,249, of Knochel et al. and as such constitutes an improvement thereover.

The same advantageous results can be achieved by extending the lamp contacts so that they protrude above the plastic material 50, as for example by providing a pair of spring metal extensions 54 of the type shown in FIG. 12 and clamping them onto the sides of the lamp 12 in engagement with the lamp contacts before inserting the former into the frame 14. As indicated more particularly in FIG. 9, each of the extensions 54 are so dimensioned that when they are clamped onto the lamp 12 the upper bar segments 56 will be above the meniscus of the plastic filling 50 and thus remain exposed in the cavity 52 where they can be engaged by the suitably shortened end sections 33a of the compressed contactor members 32a. The extensions 54 thus, in effect, merely replace the sealed-in tips of the contactor end sections employed in the preferred embodiment described above and in this sense can be thought of as constituting extensions of the lead-in conductor means rather than of the lamp contacts. In order to preserve the seal between the abutting front peripheral portion of the lamp 12 and the rim 18 suitable recesses 19 (see FIG. 9) are provided in the latter to accommodate the lowermost segment of the extensions 54 and thus enable the lamp to seat squarely against the inner lip of the rim.

Alternatively, generally C-shaped extensions 54a of the type shown in FIG. 13 may be employed and portions cut from its upstanding segment and bent inwardly to provide a pair of fingers 57 adapted to grip the back of the lamp 12 and connect with the contact thereat, as illustrated in FIG. 10. Similarly, an E-shaped extension 54b may be used wherein the medial bar segment is formed by bending the material back upon itself (FIG. 14) which medial segment engages the back of the lamp 12 at a contact area thereat and thus permits the upper segment 56b to protrude beyond the filling of plastic material 50 in the manner illustrated in FIG. 11 and set forth above.

It will be apparent from the foregoing that the objects of the invention have been achieved in that an improved construction and mode of assembly for a lighting unit has been provided whereby such units can be economically and conveniently fabricated despite the fact that the light-generating component comprises an electroluminescent lamp of the type that requires a protective backing. In addition, a lighting unit has been provided which not only advantageously combines the "casing" and "sealed-in" types of construction employed heretofore but does so in such a manner that the lamp is automatically sealed within the frame during the normal sequence of operations normally required to assemble the various components thereby enabling the units to be very conveniently and efficiently fabricated on a mass production basis.

While several best known embodiments of this invention have been illustrated and described in detail in accordance with the patent statutes, it is to be particularly understood that the invention is not limited thereto or thereby.

We claim:

1. A lighting unit comprising, a frame, a planar light source mounted in said frame having a light-emitting face at least a portion of which is disposed in the front opening of said frame, contact means carried by said light source on a side other than the light-emitting face thereof, a panel fastened to and extending across the back of said frame, said panel being spaced from the back of said light source and defining a cavity therewith at the back of said frame, a plastic coating of predetermined thickness on the back of said light source covering said contact means and partly filling said cavity, lead-in conductors engaging said light source contact means and extending through said plastic coating and cavity and through said panel, the parts of said lead-in conductors protruding beyond said panel comprising exposed terminals for said

light source, and the parts of said lead-in conductors in engagement with said light source contact means being embedded in said plastic coating and permanently locked thereby in positive electrical engagement with said light source.

2. A lighting unit comprising, a frame, a planar light source mounted in said frame having a light-emitting face at least a portion of which is disposed in the front opening of said frame, contact means carried by said light source on a side other than the light-emitting face thereof, a panel fastened to and extending across the back of said frame, said panel being spaced from the back of said light source and defining a cavity therewith at the back of said frame, a plastic coating of predetermined thickness on the back of said light source covering said contact means and partly filling said cavity, lead-in conductors in pressure engagement with said light source contact means and extending therefrom through said plastic coating and cavity and through said panel, the exposed portions of said lead-in conductors comprising terminals for said light source, said panel being snap interlocked with said frame and pressing said lead-in conductor means inwardly toward said light source, the parts of said lead-in conductor means in engagement with said light source contact means being embedded in said plastic coating and permanently locked thereby in positive electrical engagement with said light source.

3. A lighting unit comprising, a frame having a rim that defines a front opening, a planar light source mounted in said frame and having a light-emitting face at least a portion of which is disposed in said front opening, the front peripheral edge of said light source being firmly seated against the rim of said frame and forming a seal therewith, the depth of said frame being greater than the thickness of said light source by an amount such that the back of said light source is recessed a predetermined distance inwardly from the back of said frame, contact means carried by said light source on a side other than the light-emitting face thereof, a panel fastened to and extending across the back of said frame, the inner face of said panel being spaced from the back of said light source and defining a cavity therewith at the back of said frame, a coating of plastic material of predetermined thickness on the back of said light source covering said contact means and partly filling said cavity, spring metal contactor members fastened to and protruding inwardly from said panel through said cavity and plastic coating and engaging said light source contact means, the outer ends of said contactor members extending through and beyond said panel and constituting exposed terminals for said lighting unit, the portions of said contactor members in engagement with said light source contact means being embedded in said plastic coating thereby permanently locking said contactor members in positive electrical engagement with said light source and, in conjunction with said panel, permanently locking said light source within said frame.

4. A lighting unit comprising, a frame having a rim that defines a front opening, an electroluminescent lamp mounted in said frame having a light-emitting face at least a portion of which is disposed in said front opening, the front peripheral edge of said electroluminescent lamp being firmly seated against the rim of said frame, contact means at and comprising a part of the back of said electroluminescent lamp, a panel fastened to and extending across the back of said frame, said panel being spaced from the back of said lamp and defining in conjunction therewith a cavity at the back of said frame, a layer of plastic material on the back of said lamp overlying said contact means and partly filling said cavity, contactor members secured to said panel and extending inwardly therefrom through said cavity and said plastic layer and engaging said contact means, the outer ends of said contactor members extending beyond said panel and constituting exposed terminals for said lighting unit, the por-

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tions of said contactor members in engagement with said lamp contact means being embedded in said plastic layer thereby permanently locking said contactor members in positive electrical engagement with said lamp and, in conjunction with said panel, permanently locking said lamp within said frame.

5. A lighting unit comprising, a frame having a rim that defines a front opening, an electroluminescent lamp of substantially uniform thickness mounted in said frame and having a light-emitting face at least a portion of which appears in said front opening, the front peripheral edge of said electroluminescent lamp being firmly seated against the rim of said frame and forming a seal therewith, the thickness of said lamp being such that the back thereof is recessed a predetermined distance inwardly from the back of said frame, planar contacts at and comprising portions of the back of said lamp, a panel of insulating material fastened to and closing the back of said frame, the inner face of said panel being spaced from the back of said lamp and defining a cavity therewith at the back of said frame, a layer of plastic material completely covering the back of said lamp and contacts thereat and partly filling said cavity, resilient contactor members fastened to said panel extending into said cavity and having ends disposed toward the back of said lamp and compressed by said panel into frictional engagement with said lamp contacts, the outer ends of said contactor members being of such length that they project through openings in said panel and serve as exposed terminals for said lighting unit, the ends of said contactor members engaging said lamp contacts being embedded in said plastic layer and thereby permanently locked in positive electrical engagement with said lamp, and said plastic layer extending beyond the edges of said lamp to the sides of said frame thereby permanently encapsulating all but the aforesaid light-emitting portion of said lamp and sealing the latter within said frame.

6. A lighting unit comprising, a frame having a rim that defines a front opening, an electroluminescent lamp of substantially uniform thickness mounted in said frame and having a light-emitting face greater in area than said front opening, said electroluminescent lamp having substantially the same configuration as but being smaller than said frame, the front peripheral edge of said electroluminescent lamp being firmly seated against the rim of said frame and forming a seal therewith, spacer elements at the bottom of said frame centering said lamp within said frame and aligning the light-emitting face of said lamp with the front opening of said frame, bus bar contacts on the back of said lamp, a panel of insulating material snap interlocked with and closing the back of said frame, the inner face of said panel being spaced a predetermined distance from the back of said lamp and defining a cavity therewith at the back of said frame, a filling of cured thermosetting plastic material between the ends of said lamp and sides of said frame, said plastic filling completely covering the back of said lamp and bus bar contacts thereat but only partly filling said cavity, resilient contactor arms carried by said panel extending into the unfilled portion of said cavity and having protruding inner end sections disposed toward said lamp and compressed by said panel into frictional engagement with said bus bar contacts, the outer end sections of said contactor arms being of such length that they project through openings in said panel and therebeyond to serve as terminals for said lighting unit, the protruding inner end sections of said contactor arms being embedded in said plastic filling and thereby permanently locked in positive electrical engagement with said bus bar contacts, said plastic filling being substantially impervious to gaseous impurities and permanently sealing said lamp within said frame.

7. A lighting unit comprising, a frame having a rim that defines a front opening, an electroluminescent lamp of substantially uniform thickness mounted in said frame

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and having a light-emitting face at least a portion of which is disposed in said front opening, said electroluminescent lamp having substantially the same configuration as but being smaller than said frame, the front peripheral edge of said electroluminescent lamp being firmly seated against the rim of said frame and forming a seal therewith, spacer elements at the bottom of said frame centering said lamp within said frame, contacts on the back and disposed near the side edges of said lamp, a panel of insulating material snap interlocked with and closing the back of said frame, the inner face of said panel being spaced a predetermined distance from the back of said lamp and defining a cavity therewith at the back of said frame, a filling of cured thermosetting plastic material between the ends of said lamp and sides of said frame, said plastic filling completely covering the back of said lamp and contacts thereat but only partly filling said cavity, extension means clamped to the sides of said electroluminescent lamp engaging said contacts and projecting through said plastic filling into the unfilled portion of said cavity, resilient contactor arms carried by said panel extending into the unfilled portion of said cavity and compressed by said panel into frictional engagement with the exposed portions of said extension means, terminals carried by said panel electrically connected to said contactor arms, said plastic filling being substantially impervious to water vapor and other gaseous impurities and hermetically sealing said lamp within said frame, the exposed parts of said extension means being of sufficient length to prevent the migration of said plastic material, prior to the curing thereof, to said contactor arms and said panel by capillary action.

8. In the manufacture of a lighting unit of the type wherein a planar light source having a light-emitting face is mounted in a frame having a panel that is secured to the back of said frame, the depth of said frame being greater than the thickness of said light source, and said panel having contactor members mounted thereon conformed and arranged to engage contacts on said light source when said panel is assembled with said frame, the method of sealing said light source within said frame and permanently locking said panel to the back thereof and said contactor members in positive electrical engagement with the light source contacts during the normal sequence of operations required to assemble said lighting unit, which method comprises, placing said light source in said frame so that at least a portion of the light-emitting face thereof is disposed in the front opening of said frame, seating the front peripheral edge of said light source against the front of said frame and effecting a seal therewith, introducing a sufficient quantity of thermosetting resin material that wets said panel into said frame to cover the back of said light source and said light source contacts but only partly fill said frame, assembling said panel with the back of said frame while said resin material is in an uncured state thereby to force said contactor members through said resin material into electrical engagement with said light source contacts, and then curing said resin material while maintaining the assembled lighting unit in substantially horizontal position thereby to provide and maintain a spacing between said panel and the meniscus of said resin material and thus prevent said material, while in its uncured state, from migrating by means of capillary action to said panel from the back of said light source.

9. The method of making an hermetically sealed lighting unit of the type wherein a planar light source having a light-emitting face is partly enclosed by a casing comprising a frame and a panel, said panel being adapted to snap into and close the back of said frame and carrying resilient contactor members with protruding end sections disposed to engage contacts on said light source when said panel is snapped into said frame, which method comprises, locating said light source in said frame against the front but spaced from the sides and back thereof and

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with at least a portion of the light-emitting face of said light source disposed in the front opening of said frame, effecting a seal between the abutting front peripheral portions of said frame and light source, holding said frame in substantially horizontal position, dispensing a thermosetting resin material that wets said casing into said frame until the sides and back of said light source and contacts thereof are covered and said frame is only partly filled, snapping said panel into the back of said frame while said resin material is in an uncured state and thus forcing the ends of said contactor members through said uncured resin material into engagement with the contacts of said light source, and curing said resin material while maintaining the assembled lighting unit in substantially horizontal position thereby to provide and maintain a spacing between said panel and the meniscus of said resin material and prevent said material, while in said uncured state, from migrating by means of capillary action to the inner face of said panel from the back of said light source.

10. The method of making an hermetically sealed lighting unit of the type wherein a light source having a light-emitting face is partly enclosed by a casing comprising a frame and a panel, said panel being adapted to snap into and close the back of said frame and carrying resilient contactor members arranged and conformed to engage, when said panel is snapped into said frame, the uppermost parts of extensions carried by said light source and electrically connected to the contacts thereof, which method comprises, assembling said extensions in operative relation with said light source to form a unitary structure, locating said assembled light source and extensions in said frame against the front but spaced from the sides and back

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thereof so that at least a portion of the light-emitting face of said light source is disposed in the front opening of said frame, effecting a seal between the abutting front peripheral portions of said frame and light source, holding said frame in substantially horizontal position, dispensing into said frame and covering the back and sides of said light source and the contacts thereof but only partly filling said frame with a thermosetting casting resin material that wets said casing and contactor members, the height of said extensions being such that the meniscus of said resin material is below the uppermost portions of said extensions, snapping said panel into the back of said frame while said resin material is in an uncured state and thus compressing said contactor members into positive electrical engagement with the exposed uppermost portions of said extensions, and then curing said resin material while maintaining the assembled lighting unit in substantially horizontal position thereby to maintain the spacing between the exposed uppermost portions of said extensions and the meniscus of said resin material and prevent said material, while in its uncured state, from migrating by means of capillary action to said contactor members and said panel from the back of said light source.

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