March 18, 1969 H. RUEGER 3,434,137

HOUSING FOR INDICATING LAMP OR OTHER ELECTRICAL COMPONENTS

Original Filed Oct. 14, 1964 Sheet 1 of 2

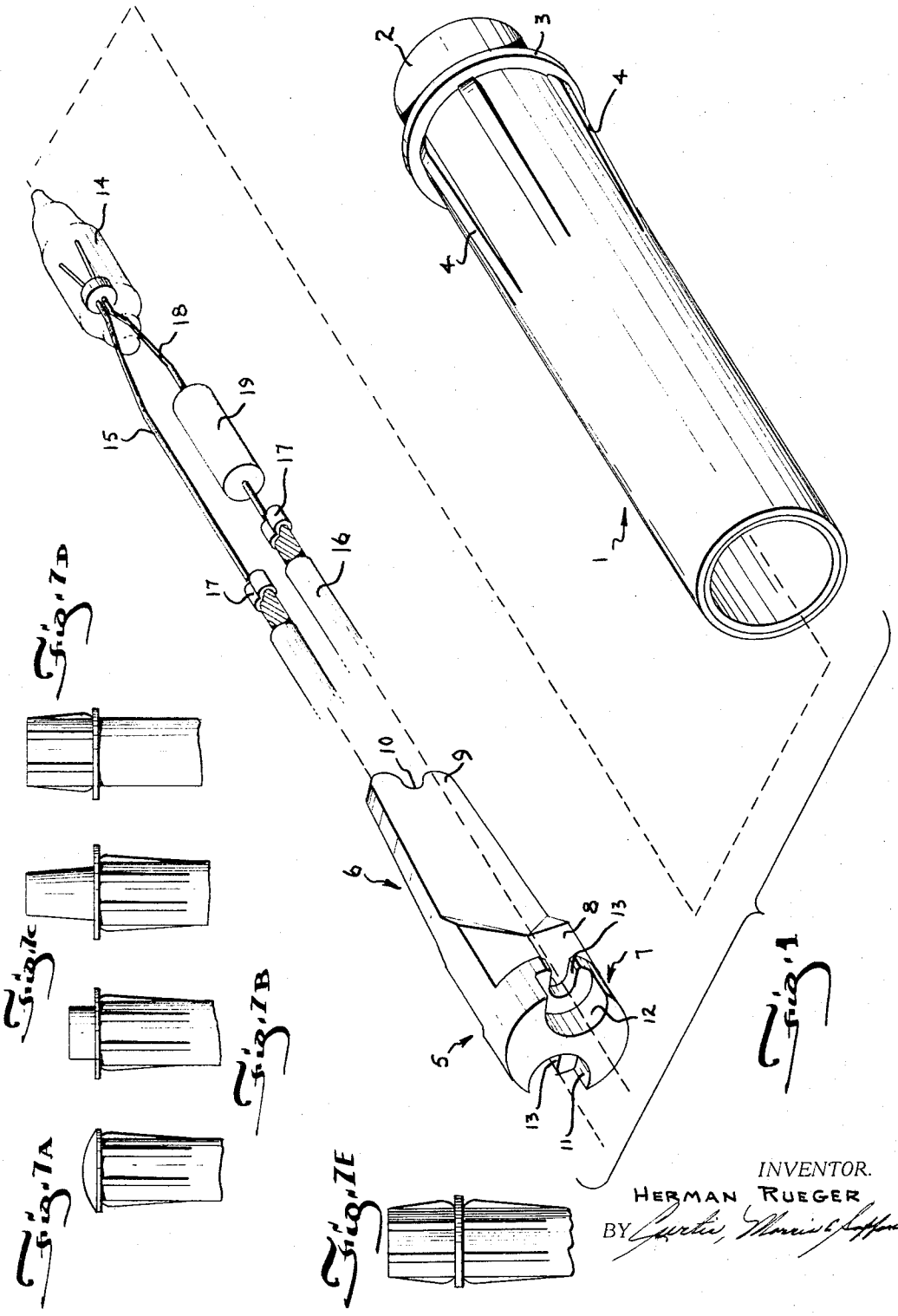


Fig. 1



Fig. 7D



Fig. 7C



Fig. 7B



Fig. 7A



Fig. 7E

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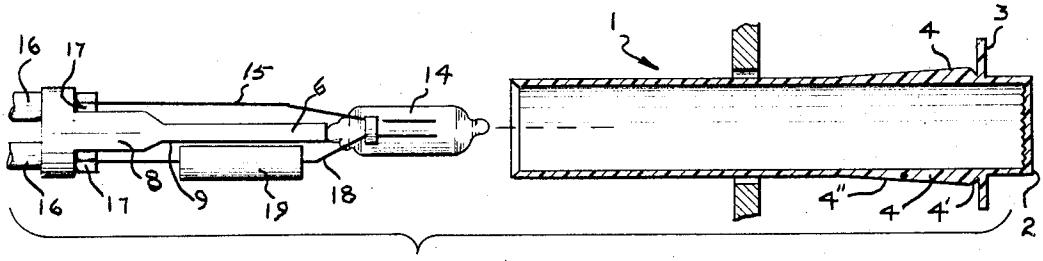



Fig. 2

Fig. 5A

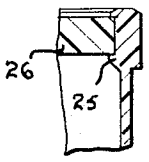



Fig. 3

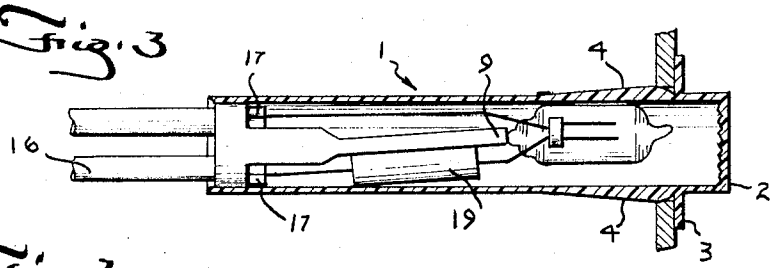



Fig. 3A

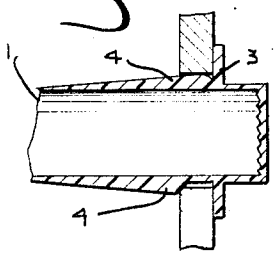
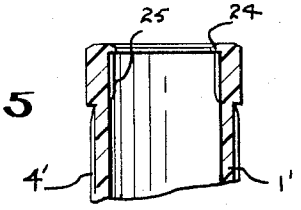



Fig. 5



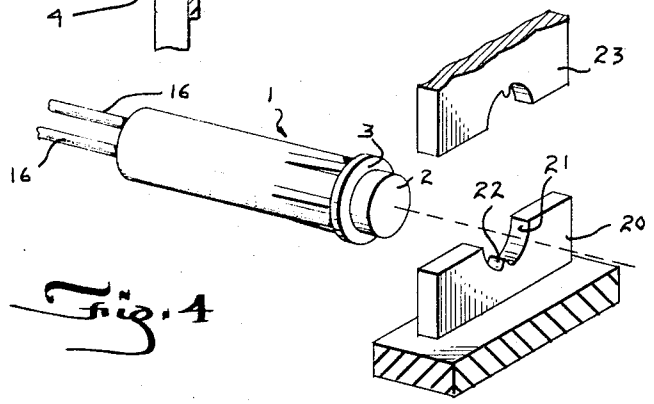




Fig. 4

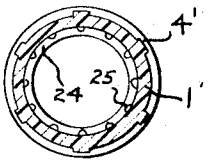



Fig. 6

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United States Patent Office 3,434,137
Patented Mar. 18, 1969



3,434,137

# HOUSING FOR INDICATING LAMP OR OTHER ELECTRICAL COMPONENTS

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Continuation of application Ser. No. 403,789, Oct. 14, 1964. This application Sept. 14, 1967, Ser. No. 667,860
U.S. Cl. 340—381 10 Claims
Int. Cl. G09f 9/14

## ABSTRACT OF THE DISCLOSURE

A unitary panel light and housing therefor, the housing being adapted to be readily inserted and removed from various size mounting apertures through the provision of axially tapered ribs around the periphery. The lamp leads are provided with separator and strain relief means.

This application is a continuation of application Ser. No. 403,789, filed October 14, 1964, and now abanboned.

This invention relates to lamp housings adapted preferably to be mounted on a mounting means, such as a panel in which indicating lamps or other suitable electrical components are mounted.

The use of indicating lamps, especially in small form, due to miniaturization and other features, has become increasingly important in many fields, such as, testing, appliance, communication, automotive, computer, control, etc., in order to provide an indication for various conditions or functions.

In view of the low cost for the production of panel lights, it is desirable that the indicating lamp and, if necessary, a resistor therefor be confined within the housing therefor to define a unitary structure so that a faulty panel light can readily be replaced by a new panel light. It is also desirable when replacing a faulty panel light that the panel light be readily removable from a panel and easily be replaced by a new panel light which is readily inserted into the aperture of a mounting panel without the aid of any tools.

It is an object of the present invention to provide a housing for an indicating lamp which is small in size and not bulky and which is adapted to be utilized in a small space.

It is another object of the present invention to provide a unitary panel light which can be easily mounted on various size mounting means without the use of any tools.

A further object of the present invention is to provide a panel light as a unitary structure which is cheap to manufacture, rugged in construction, long lasting and readily replaceable.

An additional object of the present invention is to provide a combined insulator for insulating the leads of the indicating lamp from each other and strain relief means for the external leads connected to the leads of the indicating lamp.

Other objects and attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there are shown and described illustrative embodiments of the invention; it is to be understood, however, that these embodiments are not intended to be exhaustive nor limiting of the invention but are given for purposes of illustration and principles thereof and the manner of applying them in practical use so that they may modify them in various forms, each as may be best suited to the conditions of a particular use.



In the drawings:

FIGURE 1 is an exploded perspective view of the housing and components thereof;

FIGURE 2 is a cross-sectional view of the housing with parts exploded therefrom;

FIGURE 3 is a view similar to FIGURE 2 but with the parts of the housing in place therein;

FIGURE 3*a* is a view similar to FIGURE 3 but showing a modification thereof;

FIGURE 4 is a perspective view of the assembled panel light and a means to secure the separator and strain relief means within the housing member;

FIGURE 5 is a partial cross-sectional view of an alternative embodiment of the present invention;

FIGURE 5*a* is a partial cross-sectional view of a lens member in place within the housing member;

FIGURE 6 is a bottom view of FIGURE 5; and

FIGURES 7A–E are partial side elevational views of different configurations of the lens members of the housing.

The present invention will be described in connection with an indicating lamp; however, it is to be understood that other electrical components can be housed therein, such as, switches, thermistors, photocells, etc.

Turning now to the drawings and more particularly FIGURES 1–3, there is illustrated a hollow tubular housing member **1** which is preferably molded from a suitable plastic material, such as, nylon, polypropylene, etc. Housing member **1** is a unitary structure and is closed at one end by a lens member **2** which has a substantially flat outer surface and a cylindrical sidewall. An annular flange **3** extends outwardly from housing member **1** at the inner end of lens member **2**. A plurality of ribs **4** extend outwardly from the exterior surface of housing member **1** from flange **3** to a point along housing member **1** where they merge therewith and have the same diameter thereof. Ribs **4** are preferably 3 in number, i.e., 3, 6, 9, etc., in equally-spaced relationship around the exterior of housing member **1**.

As can be discerned from FIGURES 2 and 3, each rib **4** has an upwardly-inclined portion **4'** having an upwardly-directed curvature away from flange **3** to its highest point and a downwardly tapered portion **4"** which tapers away therefrom toward the axis of housing member **1** until it merges with the exterior surface of the housing member. The configuration of each rib **4** is important in that upwardly-inclined portion **4'** has a radius of curvature extending from the tangent of the rib to its junction with flange **3** which, at this point, is the same diameter as that of housing member **1**. Downwardly-tapered portion **4"** is linear extending from the tangent of rib **4** until it merges with housing member **1**.

The configuration of the ribs is important because downwardly-tapered portions **4"** allow the housing member to be easily inserted within an aperture of a mounting panel and the smooth curvature at the apex of the ribs between upwardly-directed portions **4'** and downwardly-tapered portions **4"** allow the edges of the aperture in the mounting panel to tightly engage the ribs until flange **3** engages one surface of the mounting panel, thereby effecting a forced fit between the housing member and the aperture in the mounting panel.

Another important feature of ribs **4** is that various thicknesses of mounting panels can be utilized because of the smooth curvature between upwardly-inclined portions **4'** and downwardly-tapered portions **4"** of the ribs. Thus, ribs **4** provide an excellent holding means for housing member **1** in an aperture of a mounting member of various thicknesses.

If desired, some of ribs **4** may be set back from flange **3** a slight distance, as illustrated in FIGURE 3*a*, and this

arrangement would accommodate mounting panels of greater thickness.

A separator and strain relief means **5** is preferably molded from the same material of housing member **1** and is adapted to fit within housing member **1** and be secured thereto. Separator and strain relief means **5** includes a separator part **6** and a strain relief part **7**. Separator part **6** has a first section **8** and a second section **9**; section **8** being thicker than section **9**. The sides of section **8** incline inwardly to the mid-point thereof while the sides of section **9** are flat. Recess **10** is located in the outer part of section **9**. Strain relief part **7** in circular in configuration and includes diametrical semicircular recesses **11** and **12**, which terminate at about two-thirds of the thickness of part **7**. A U-shaped opening **13** is disposed in part **7** in alignment with recesses **11** and **12**, respectively, and is in communication with these recesses and separator part **6**.

A light bulb assembly comprises light bulb **14** having one lead **15** crimped onto the core of an insulated lead **16** by means of a ferrule member **17**. Lead **18** of light bulb **14** is soldered or welded onto a lead of a conventional resistor **19** while the other lead thereof is crimped onto the conductive core of another insulated lead **16** via a ferrule member **17**.

The light bulb assembly is mounted onto means **5** with the base of light bulb **14** being disposed within recess **10** while lead **15** extends along the side of section **9** and ferrule member **17** is disposed adjacent the inclined surfaces of one side of section **8**. The core of lead **16** is disposed within U-shaped opening **13** while the insulation of lead **16** is disposed within recess **11**. Lead **18** and resistor **19** extend along the other side of section **9** while ferrule member **17** is disposed adjacent the other inclined surfaces of section **8** and the conductive core of lead **16** is disposed within U-shaped opening **13** while the insulation of lead **16** is disposed within recess **12**, as illustrated in FIGURE 2.

Now that the light assembly has been mounted onto means **5**, it is ready to be disposed within housing member **1** and this is accomplished by merely pushing this assembly within housing member **1**, as illustrated in FIGURE 3. The interior surface of the end of housing member **1** opposite lens **2** is beveled to facilitate the insertion of the light assembly and means **5** within housing member **1**. As can be seen from FIGURE 3, section **9** of separator part **6** is disposed at an angle with respect to the longitudinal axis of housing member **1** because of the fact that resistor **19** takes up a considerable amount of space within housing member **1**. Thus, the flexibility of section **9** of separator part **6** enables resistor element **19** to be readily accommodated within housing member **1** without having to increase the diameter of housing member **1**.

Since the light assembly and means **5** are now disposed within housing member **1**, means **5** is now ready to be secured to housing member **1**. This is preferably accomplished as illustrated in FIGURE 4. The end of housing member **1** containing means **5** is disposed within a substantially stationary anvil **20** having a semicircular recess **21** disposed therein which is provided with an outwardly-directed projection **22** at the bottom thereof. Leads **16** are disposed on each side of projection **22** so that projection **22** is in alignment with the continuous circular surface of part **7** of the separator and strain relief means. A movable horn **23** having a similar shaped recess and projection is brought into engagement with the other half of housing member **1** in alignment with anvil **20** and an ultrasonic generating means (not shown) is connected to horn **23**. Upon energization of the ultrasonic generating means, horn **23** is vibrated at a frequency of about twenty-thousand cycles per second and this causes means **5** to be bonded or welded to the interior surface of housing member **1**, thereby providing a confined panel light assembly. If desired, anvil **20** may be elastically mounted so that it can vibrate in sympathy with horn **23**. Thus, means **5** is welded to the interior of housing member **1** along the edges of section **8** in engagement with housing member **1** and along the semicircular surfaces of part **7** in engagement with housing member **1**. The welding together of plastic parts by ultrasonic techniques is conventional and equipment therefor can be obtained through Branson Instruments Incorporated, Stamford, Conn., or others in the field. While the use of ultrasonic waves to weld the plastic parts together is the preferred technique, other techniques for securing plastic parts together may, of course, be utilized, such as, for example, heat-sealing techniques, deformations of plastics, etc.

Now that the light assembly is secured within housing member **1** via means **5**, ferrule members **17** cannot be pulled out through U-shaped openings **13** because they are larger than these openings, and leads **16** cannot be pushed through U-shaped openings **13** because the insulation thereof is larger than these openings so that part **7** acts as a strain relief means to prevent light bulb **14** from being pushed closer towards lens **2** which could cause breakage of the light bulb or a short circuit to occur between leads **15** and **18** and to prevent leads **16** from being pulled out of connection with leads **15** and **18** of the light bulb. A slight play is desirable between means **5** and the insulation of leads **16** and ferrule members **17** within openings **13**. Since the insulation of leads **16** is disposed within recesses **11** and **12**, no bare wire of these leads at the housing member appears exteriorly thereof.

In the embodiment described hereinabove, housing member **1** may be molded in any desirable color because lens **2** is integral with housing member **1**. The inside surface of lens **2** may be serrated, have concentric circular recesses or have any desirable configuration in order to provide the desired dispersion of light emanating from light bulb **14**. The present invention has been described in conjunction with a neon light bulb; however, the present invention is equally applicable to the use of an incandescent light bulb or the like.

While lens **2** has been disclosed as being integral with housing member **1**, it is within the purview of the present invention that housing member **1** can be a straight tubular member and that lens structure **2** can be a separate structure having a depending tubular structure slidable over or within housing member **1** and secured thereto as by ultrasonic welding as described hereinabove. The depending tubular structure of the lens structure or the housing member may be provided with the holding ribs, as desired.

FIGURES 7A–D illustrate various configurations of the lens structure with the housing member of FIGURES 7A–C having the holding ribs disposed on the housing member while the side surface of the lens structure of FIGURE 7D has the holding ribs disposed thereon instead of on the housing member; however, holding ribs may also be disposed on the lens structure as well as the housing member as illustrated by FIGURE 7E. Thus, the housing member of FIGURES 7A–C and E hold the lens structure in place within an aperture of a mounting member, whereas the lens structure of FIGURE 7D holds the housing member in place within an aperture of a mounting member. If desired, the lens end of the housing member may be open instead of having a surface thereover, and, in this case, holding ribs may be disposed on either side or both sides of the flange.

FIGURES 5, 5*a* and 6 illustrate an alternative embodiment of the present invention. The end of housing member **1'** adjacent ribs **4'** has an inwardly-directed flange **24** on the interior surface thereof. A plurality of rib elements or projections **25** are disposed on the inner surface of housing member **1'** and these rib elements extend from flange **24** along the inner surface of housing member **1'** to a point where they merge with the inner surface of housing member **1'**. Each rib element **25** extends outwardly from the inner surface of housing member **1** the same height along the inner surface to a point

at which the rib tapers inwardly toward the inner surface and merges therewith, as illustrated in FIGURE 5. The height of each rib element **25** is less than the dimension of flange **24**. A lens disc **26** having a diameter slightly less than the inner diameter of housing member **1** but slightly larger than the height of rib elements **25** and having a thickness slightly less than the length of the rib elements from flange **24** to the point at which they begin to taper is inserted through the bottom of housing member **1'** and pressed along rib elements **25** until the top surface of the lens disc seats against flange **24**. Rib elements **25** will be squashed almost to flatness by the lens disc and the part of each rib element **25** adjacent the bottom surface of the lens disc will form a slight lip, as illustrated in FIGURE *5a*, which extends inwardly towards the longitudinal axis of the housing member and in engagement with the bottom surface of the lens disc. Thus, the lens disc is securely held in position by rib elements **25** and flange **24**. In this arrangement, housing member **1'** may be one color and lens disc **26** may be another color.

As can be discerned, there has been disclosed a unique housing member for a panel light wherein the light means is encapsulated therein to define a unitary structure for being removably mounted within an aperture of a mounting panel.

I claim:

**1.** A housing member for securing an electrical element having lead means therein comprising a hollow tubular member, a separator and strain-relief means including a separator part and strain-relief part, said electrical element being adapted to be disposed on said separator part with lead means extending along each side thereof to separate the lead means from one another, means for connecting each of said lead means to conductive means of an insulated lead means with said connecting means being spaced from the end of insulation of said insulated lead means to allow some of said conductive means to be bare, said strain-relief part having recesses each for receiving the end of the insulation of one of the insulated lead means therein and openings each in communication with one of said recesses and said separator part for receiving the bared part of one of said insulated lead means, said openings being too small for the connecting means and the insulation of said insulated lead means to pass through, said connecting means adapted to be disposed adjacent one side of said openings and the end of the insulation of said insulated lead means adapted to be disposed on the other side of said openings, said separator and strain-relief means along with said electrical element connected to said insulated lead means adapted to be inserted in and secured to said tubular member to form a unitary structure.

**2.** A panel lamp for insertion in an aperture of a panel means comprising a hollow tubular housing member having one end through which light is to be transmitted, a flange extending outwardly from an exterior surface of said housing member, rib members on the exterior surface of said housing member, each rib member including an upwardly-inclined portion having a radius of curvature extending from a tangent of the rib member to a position adjacent said flange and a downwardly-tapered portion extending from said tangent to the housing member, said flange and upwardly-inclined portions of some or all of the rib members being adapted to hold said housing member in said aperture of said panel means with said flange engaging one surface of said panel means and the upwardly-inclined portions engaging sections of the aperture, and separator and strain-relief means including a separator part for carrrying a light means and for separating leads of said light means from each other and a strain-relief part through which external leads pass and are held captive therein for providing strain-relief between the external leads and connecting means connecting said leads of said light means thereto, said separator and strain-relief means with said light means connected to said external leads thereon adapted to be secured in said housing member.

**3.** A panel lamp according to claim **2** wherein some rib members are spaced further form said flange than other rib members to provide a holding arrangement to accommodate panel means of a greater range of thickness.

**4.** A panel lamp according to claim **2** wherein the end of said housing member through which light is to be transmitted includes a flange member directed toward the axis of said housing member, rib elements on an internal surface of said housing member, each rib element extending from a point adjacent said flange member to a point remote therefrom at which the rib element merges with the internal surface, a lens structure adapted to be pushed along said rib elements and into engagement with said flange member with said rib elements frictionally holding said lens structure in position.

**5.** A panel lamp according to claim **2** wherein said separator and strain-relief means is secured to said housing member via the application of ultrasonic means.

**6.** A panel lamp according to claim **2** wherein the strain-relief part of said separator and strain-relief means includes recesses in which insulation of said external leads is disposed.

**7.** A panel lamp for insertion within an aperture of a panel means comprising a hollow tubular housing member, lens means located at one end of said housing member, a flange extending outwardly from an exterior surface of said housing member adjacent said lens means, rib members on the exterior surface of said housing member, each rib member including an upwardly-inclined portion having a radius of curvature extending from a tangent of the rib member to a point adjacent said flange and a downwardly-tapered portion extending from said tangent to the housing member, said flange and upwardly-inclined portions of some or all of the rib members being adapted to hold said housing member in said aperture of said panel means with said flange engaging one surface of said panel means and some or all of the upwardly-inclined portions engaging sections of said aperture, and separator and strain-relief means including a separator part for carrying a light bulb and for separating leads of said light bulb and external leads connected thereto and a strain-relief part through which the external leads pass and are held captive therein, said separator and strain-relief means carrying said light bulb and leads connected thereto adapted to be inserted within and secured to said housing member with said light bulb facing said lens means.

**8.** A panel lamp according to claim **7** wherein additional rib members having the same configuration as the first-mentioned rib members are disposed along an exterior side surface of said lens means.

**9.** A panel lamp comprising a hollow tubular housing member having one end provided with lens means through which light is to be transmitted from an indicating light, mounting means on said housing member for mounting said panel lamp on a panel means, a separator and strain-relief member having a separator part and a strain-relief part, said separator part having an area for carrying an indicating light and a section for insulatingly separating electrical leads of said indicating light and external leads connected thereto, said strain-relief part having spaced openings through which the external leads pass and are held captive therein, said separator and strain-relief means carrying said indicating light and leads connected thereto being insertable within the other end of said housing member and securable to said housing member with said indicating light facing said lens means.

**10.** A housing member for carrying a light-conducting member and for insertion into an aperture of a panel means comprising a hollow tubular member having integral lens means at one end, a flange extending outwardly

from an exterior surface of said tubular member adjacent said lens means, rib members on the exterior surface of said housing member and extending therealong from a point adjacent said flange to a point where they merge therewith, each rib member including an upwardly-inclined portion having a radius of curvature from a tangent of the rib member to the tubular member and a linear downwardly-tapered portion from said tangent to the housing member, said flange being adapted to engage one surface of said panel means when said housing member is inserted within the aperture and some or all of the upwardly-inclined portions of the rib members along said radius of curvature thereof being adapted to engage sections of the aperture to hold said housing member therein, and means for engaging said light-conducting means and along with said light-conducting means being insertable within the other end of said tubular member and securable therein to maintain said light-conducting means within said tubular member with an end of said light-conducting means directed toward said lens means.



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THOMAS A. ROBINSON, *Primary Examiner.*

U.S. Cl. X.R.

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