

Sept. 27, 1966

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3,276,014

HOUSING FOR INDICATING LAMP OR OTHER ELECTRICAL COMPONENTS

Filed Nov. 29, 1963

3 Sheets-Sheet 1

Fig. 1

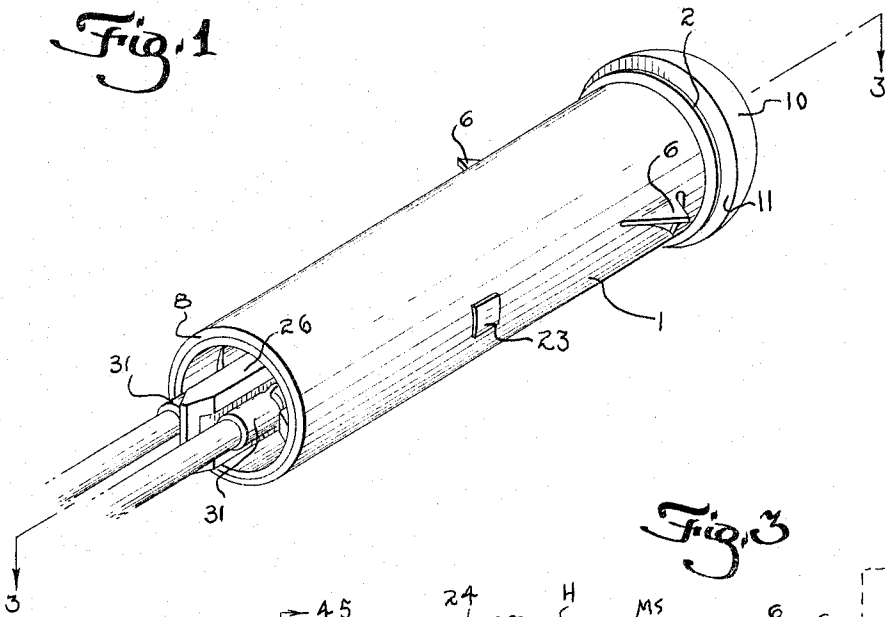


Fig. 3

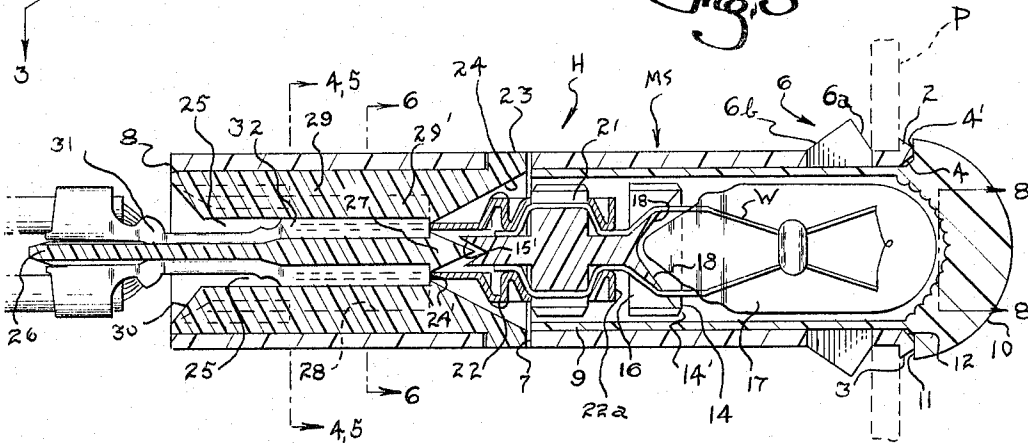
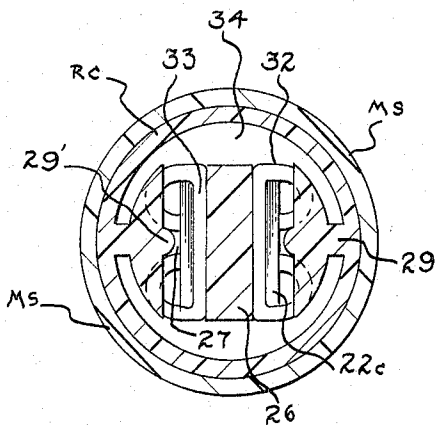


Fig. 4



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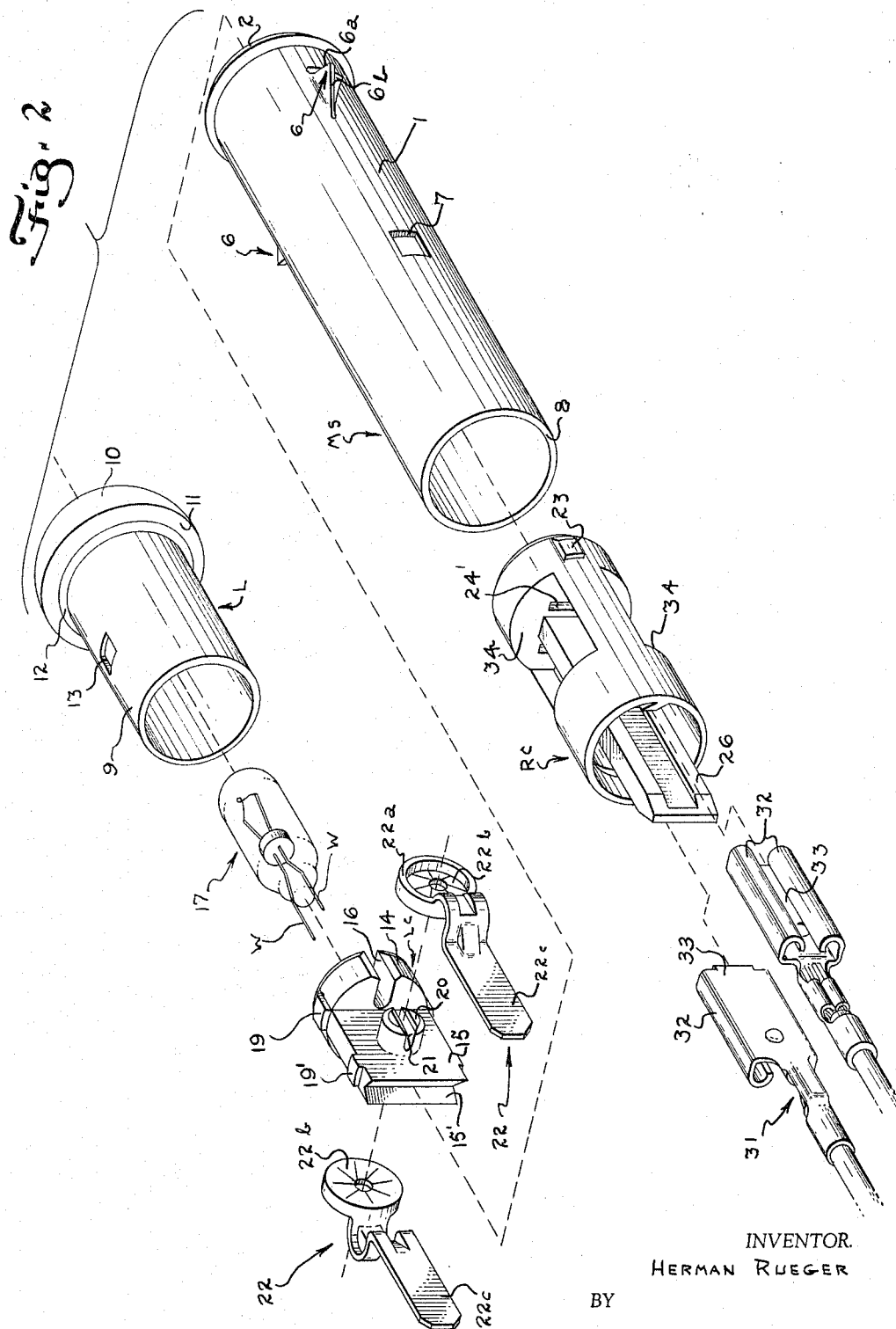
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HOUSING FOR INDICATING LAMP OR OTHER ELECTRICAL COMPONENTS

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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

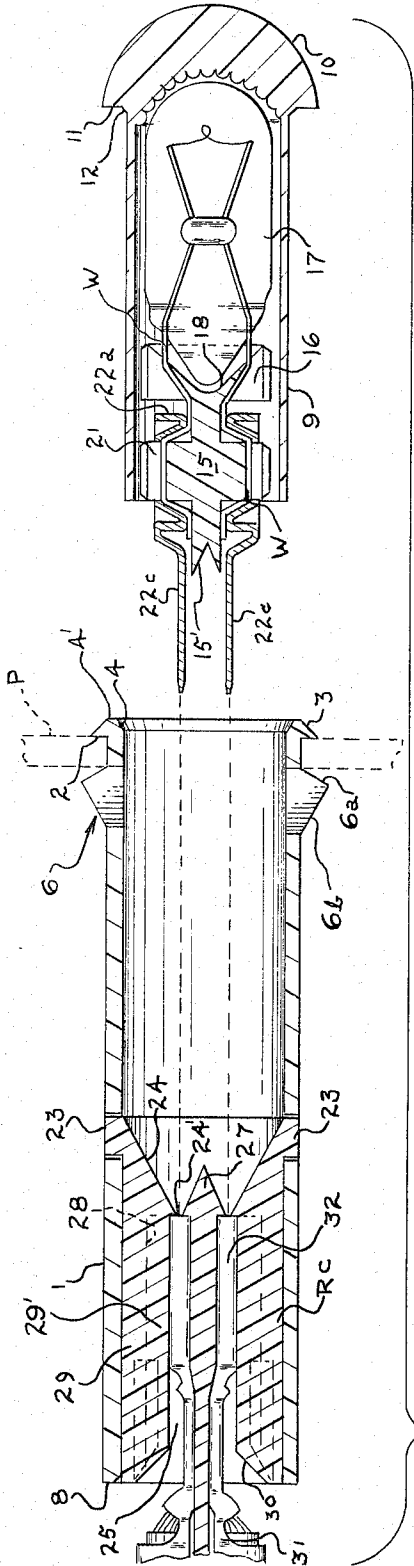


Fig. 7

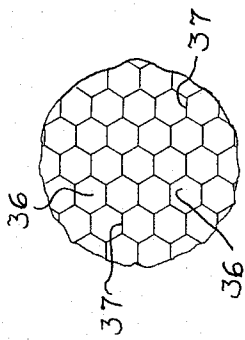


Fig. 8

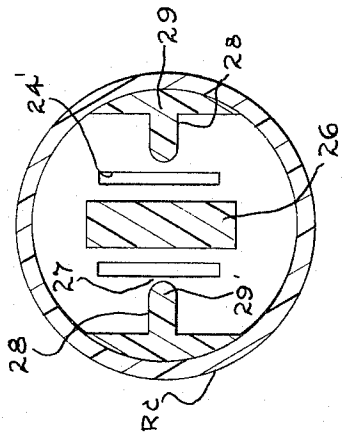


Fig. 6

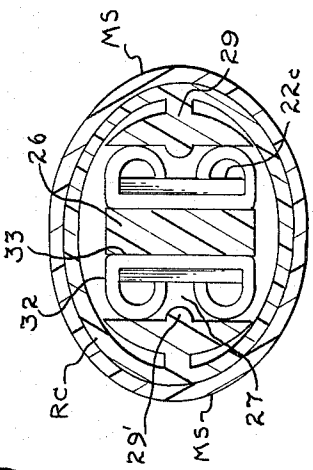


Fig. 5

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3,276,014

## HOUSING FOR INDICATING LAMP OR OTHER ELECTRICAL COMPONENTS

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9 Claims. (Cl. 340-381)

This invention relates to lamp housings adapted to be mounted on a mounting means such as a panel and 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. An important problem with regard to indicating lamps is to provide a suitable housing therefor so as to easily mount them on a panel or mounting means and for easy removal therefrom. Another problem is to provide a housing wherein an indicating light or electrical component can be easily replaced. A further problem is to provide a housing from which the light from the lamp thereof is transmitted in a substantial viewing angle. An additional problem is to provide a housing which has simple parts and is cheap to manufacture.

It is, therefore, a primary object of the present invention to provide a housing which is easily mounted on and removed from a panel without the use of any tools.

Another object of the present invention is to provide a housing in which an electrical component can be readily mounted or removed therefrom without disturbing the electrical connection thereto.

A further object of the present invention is to provide a housing in which an indicating light can be mounted which transmits light therefrom in a substantial viewing angle.

An additional object of the present invention is to provide a light means encased within a lens means as a unit.

A still further object of the present invention is to provide a light carrier means which carries the light as well as providing a novel terminal means to connect the electrical leads of the light thereto.

Another object of the present invention is the provision of a receptacle carrier in which receptacle means are mounted and locked therein.

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 in the invention and principles thereof and the manner of applying it in practical use so that they may modify it in various forms, each as may be best suited to the conditions of a particular use.

In the drawings:

FIGURE 1 is a perspective view of an assembled housing, object of the present invention;

FIGURE 2 is an exploded perspective view of the housing and components thereof;

FIGURE 3 is a longitudinal cross-sectional view of FIGURE 1;

FIGURE 4 is a cross-sectional view taken along lines 4-4 of FIGURE 3 with receptacle in position;

FIGURE 5 is the same as FIGURE 4 except that the mounting sleeve and receptacle holder are in position for removal of the receptacle therefrom;

FIGURE 6 is a cross-sectional view taken along lines 6-6 of FIGURE 3 but without any tab section of the connector therein;

FIGURE 7 is a view similar to FIGURE 3 but with parts exploded; and

FIGURE 8 is a fragmentary sectional view taken along lines 8-8 of FIGURE 3 illustrating details of lens structure.

The present invention will be described in connection with a signal 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, there is shown a housing H comprising a mounting sleeve MS, a lens L, a lamp carrier LC, and a receptacle carrier RC.

Mounting sleeve MS includes a tubular sleeve 1 having at one end an outwardly extending flange 2 which has an outer inclined surface 3, an inner inclined surface 4 and a flat surface 4' therebetween. Rearwardly of flange 2, there are disposed on sleeve 1 flexible or resilient fin-like or rib-like members 6 each having oppositely inclined edges 6a, 6b. Fin-like members 6 can be integral with sleeve 1 or they can be cut out therefrom to provide the desired configuration.

Fin-like members 6 are normally disposed outwardly from sleeve 1 and these members and flange 2 define a holding means to hold mounting sleeve MS in an aperture of a mounting means P such as a panel. About midway of sleeve 1, there are openings 7, and the other end of sleeve 1 has an inner inclined surface 8.

Lens L comprises a hollow tubular element 9 having one end closed which includes lens structure 10 having a concavo-convex shape. The outer surface of lens structure 10 is smooth and round in a hemispheric manner while the inner surface is undulated to form lenticles and this will be described in greater detail hereafter. The outer surface of tubular element 9 has a diameter slightly less than the inner diameter of tubular sleeve 1 so that tubular element 9 is readily disposed in and removed from mounting sleeve MS.

The diameter of lens structure 10 at its outer periphery is larger than the outside diameter of tubular element 9 so that therebetween there is provided a surface 11 substantially normal to the axis of lens L which abuts against flat surface 4' of flange 2 to limit the movement of lens L within mounting sleeve MS and an inclined surface 12 mating with inner inclined surface 4.

The space left between surface 11 of lens L and outer inclined surface 3 of flange 2, when lens L is disposed in mounting sleeve MS, serves as a gripping area which can be gripped by the fingernails of a person or a tool (not shown) in order to easily remove lens L from mounting sleeve MS. If a tool is used, flange 2 serves to prevent the tool from engaging panel P in order to keep the tool from marring or scratching the panel. Tubular element 9 has openings 13 therein.

Lamp carrier LC includes a round section 14 and a post-carrying section 15. Round section 14 has a diameter slightly less than the inside diameter of sleeve element 9. Radial slots 16 are disposed in round section 14 to accommodate the wires W of an electrical component such as lamp 17. A conical recess 18 is disposed in the front end of round section 14 and the base of lamp 17 is seated therein. Lugs 19 project outwardly from round section 14 and these engage openings 13 in tubular element 9 thereby locking the lamp carrier therein. The front part of round section 14 and lugs 19 have an inclined surface 14' which facilitates the insertion of the lamp carrier and lugs within tubular element 9 and openings 13, respectively. Lugs 19 are preferably disposed 90° with respect to radial slots 16. Additional lugs 19' project outwardly from the edges of section 15

adjacent the free end thereof which serve to limit the inner movement of lamp carrier LC within tubular element 9 in order to obviate any breakage of lamp 17.

Post-carrying section 15 extends outwardly from round section 14 in a central and normal direction therefrom. Extending outwardly from each side of section 15 is a post 20 having a slot 21 therein in alignment with a corresponding radial slot 16. The outer end of each post 20 may be rounded. Wires W are disposed within slots 16 and 21; and electrical connectors 22 such as disclosed in U.S. patent application Serial No. 318,977 filed October 25, 1963 in the name of the present inventor, have cup-shaped sections 22a which are pushed onto posts 20 to provide excellent electrical and mechanical connection as well as retention of the connector on posts 20 via spring engaging members 22b. Tab sections 22c extend out from cup-shaped sections 22a. The outer end of section 15 has a V-shaped slot 15'; and as can be discerned, section 15 maintains the wires and connectors separated from each other.

Receptacle carrier RC has an outside diameter slightly less than the inside diameter of mounting sleeve MS in which it is to be disposed. Lugs 23 are on the outer surface of receptacle carrier RC adjacent the inner end and these engage openings 7 in tubular sleeve 1 in order to lock the receptacle carrier therein.

A frusto-conical recess 24 is disposed within the inner end of the receptacle carrier. Parallel slots 25 extend longitudinally through receptacle carrier RC and are in communication with recess 24 through openings 24' which have a width less than that of slots 25. A separation element 26 extends along the longitudinal axis of the receptacle carrier. Separation element 26 has a V-shaped section 27 disposed across recess 24 which is disposed within V-shaped slot 15' when in position within tubular sleeve 1. Recess 24 and V-shaped section 27 define a guide means to guide tab sections 22c into their respective slots 25 through openings 24' so that the tab sections lie therewithin.

The outer side of each slot 25 has recesses 28 disposed above and below a rail member 29 extending between openings 24' to about the length of tab section 22c as shown in FIGURE 3. Of course, recesses 28 can be any desired length. Each rail member 29 has a rounded part 29' extending toward separation member 26. Rail member 29 and rounded part 29' merge into an inclined surface 30 at the entrance to the receptacle carrier to facilitate entry of the electrical receptacles 31 within slots 27.

Electrical receptacles 31 are preferably of the type disclosed in U.S. Patent No. 2,774,951 which has arcuately shaped spring arms 32 bent over a base portion 33 and defining a channel therebetween in which the rounded part 29' of rail members 29 are disposed. When these electrical receptacles are disposed within the receptacle carrier, they are guided in slots 27 by rounded parts 29'.

Once receptacles 31 are within slots 27, bases 33 thereof lie against separation member 26 and spring arms 32 are disposed within recesses 28 to thereby maintain the receptacles locked within the receptacle carrier.

Separation element 26 has a height less than the inside diameter of the receptacle carrier as represented by the outer end thereof, and it is only connected to the inner end thereby being free to move against either rounded part 29'. Between the inner and outer ends of receptacle carrier RC, arcuately shaped openings 34 about the length of recesses 28, may be provided therein.

When it is desired to remove the receptacles from the receptacle carrier, the outer end thereof is pressed towards the edges of separation element 26, as shown in FIGURE 5, which causes the rail member 29 and rounded parts 29' to move outwardly from receptacles 31, and by pushing one of the receptacles against the separation element to completely free the spring arms 32 from recesses 28, then the receptacle is withdrawn from its respective slot.

This same procedure can be followed when the receptacle carrier is locked in position in the mounting sleeve.

Each of the mounting sleeve MS, lens L, lamp carrier LC, and receptacle carrier RC is preferably molded from any suitable plastic material such as nylon, polypropylene, etc., to attain the desired result.

While lugs 19 and 23 lock lamp carrier LC and receptacle carrier RC, respectively in lens L and mounting sleeve MS, tubular element 9 may be provided with inwardly directed flaps (not shown) which would be disposed between posts 20 and round section 14 of the lamp carrier to maintain same within lens L. Tubular sleeve 1 may also be provided with inwardly directed flaps which engage recesses (not shown) in the inner end of the receptacle carrier or openings 34. Instead of flaps, heat may be applied to tubular element 9 and tubular sleeve 1 in the area where the flaps would be formed in order to form inwardly directed depressions to secure the lamp carrier and receptacle carrier therewithin.

As was stated above, lens L is a molded item and the inner surface is lenticular. Actually, each lenticule 36 overlaps adjacent lenticules so that the edges 37 therebetween, when viewing the lenticular surface normal thereto, defines a straight line; however, when the lenticular surface is viewed at an angle with respect to the normal, these edges are arcuate. Thus, each lenticule 36, when viewed normal to the axis of the lens is substantially a hexagon, so that the lens surface defines substantially a honeycomb configuration. This reduces the nonmagnifying area between lenticules to a minimum and also provides a total lens viewing angle of 180°.

The end of the corepin to form the interior of the lenticular surface has formed thereon the depressions that are to be formed on the inner surface of lens L. An example of the formation of the depressions in the corepin comprises forming a single depression coaxial with the axis of the corepin and having a predetermined radius, forming six depressions around the single depression in a predetermined overlapping relationship therewith and with each other. The subsequent concentric circles of depressions are formed in the same manner and are increased by increments of six to a total of thirty-six depressions. Thus, when lens L is molded, in a conventional mold structure, the corepin to form tubular element 9 and the interior surface of lens structure 10, the latter will be formed by the end of the corepin having the configuration as pointed out above thereby providing the lens structure with a unique concept of transmitting a small amount of light from the bulb which may be a low amperage-type lamp in a 180° viewing plane and with brilliance.

Each of the lenticules gathers light emanating from the filament of the light bulb and focuses it at a point exterior of the outer lens surface thereby creating the 180° viewing plane which is desirable since the present invention can be readily discernable in a bright ambient environment.

While the above discussion has been directed only to providing the interior surface of the lens structure with lenticules, the outer surface thereof can be lenticular in like manner, if desired, or conversely, neither surface need be lenticular but can take any desirable configuration. This can be accomplished by providing the part of the mold in which the outer surface of the lens structure is to be molded with depressions in the same manner as that of the end of the corepin.

Since lens L is a separate piece, it can have any desirable color such as blue, green, orange, red, yellow, amber or natural (clear) thereby providing interchangeable color combinations.

In assembly, lamp 17 is placed within conical recess 18 of lamp carrier LC. Wires W of the lamp are placed in slots 16 and 21 and electrical connectors 22 are forced onto posts 20 such that spring-engaging members 22b frictionally engage the posts until the cup-shaped sections 22a push parts of the wires against section 15 and

against the posts thereby providing excellent electrical and mechanical interconnection. Thus, each of wires W is engaged by the corresponding connector 22 at two specific points.

The assembled lamp carrier is then inserted into sleeve element 9 of lens L until lugs 19 of the lamp carrier engage openings 13 of the lens thereby locking the lamp carrier therein.

Mounting sleeve MS is disposed in the aperture of panel P by pushing flexible fin-like members 6 against the outer surface of sleeve 1. Upon flange 2 engaging the outer surface of the panel, fin-like members 6 move outwardly from sleeve 1 and inclined edges 6a engage the inner surface of panel P to thereby lock mounting sleeve MS thereon.

Electrical receptacles 31 are placed in recesses 28 of slots 25 in receptacle carrier RC which, in turn, is placed in the inner end of mounting sleeve MS until lugs 23 engage openings 7 thereby locking the receptacle carrier in place.

Lens L and lamp carrier LC assembly is then disposed within the outer opening of mounting sleeve MS with tab sections 22c engaging conical recess 24 to guide them through openings 24' and into engagement with receptacles 31 thereby providing excellent electrical and mechanical interconnection in addition to sufficient frictional force therebetween to maintain this assembly in position in the mounting sleeve. In position, surface 11 of lens 10 engages surface 4' of flange 2, the inner end of tubular element 9 engages the inner end of receptacle carrier RC and V-shaped slot 15' engages V-shaped section 27.

Of course, it is possible to insert the lens in mounting sleeve MS first and then the receptacle carrier can be inserted into position. This can be accomplished by holding the lens in position while the receptacle carrier is moved into proper position.

Suitable conductor means are connected to the receptacle means as by crimping, soldering or by other conventional means, and the conductor means are connected to electrical circuitry of which an indication is to be established when so actuated.

While only one housing has been illustrated in the mounting means, it is obvious that the panel P can be a large member and numerous housings disposed thereon such as a computer indication ensemble.

While the receptacle carrier has been described as being separate from mounting sleeve MS, it is to be understood that both these elements can be formed as an integral unit; however, it is preferable that they be separate since the size of the lamp or electrical component within lens L could vary in size and the receptacle carrier can be disposed within the mounting sleeve at different locations. More than one set of openings 7 would also be necessary to accommodate the different size components and the same would be true of openings 13 in tubular sleeve 9, unless the other provisions for securing the lamp carrier in lens L and receptacle carrier RC in mounting sleeve MS as pointed out above are employed.

As can be discerned from the foregoing, there has been described a unique housing which houses electrical components therein in a protective and compact manner, as well as a housing which is easily mounted on a mounting means of various thicknesses and which does not require much space. The housing is, therefore, versatile, has high electrical and mechanical quality, is simple in assembly and inexpensive in construction. In addition, there has been described a novel lens structure, lamp carrier and receptacle carrier to be used in connection with the instant housing or other suitable environments.

It will, therefore, be appreciated that the aforementioned and other desirable objects have been achieved; however, it should be emphasized that the particular embodiments of the invention, which are shown and described herein, are intended as merely illustrative and not as restrictive of the invention.

I claim:

1. A signal structure to be mounted in an apertured panel, said structure containing a pilot lamp with electrical leads, a hollow tubular housing of insulating material, flange means on one end of said tubular housing, integral resilient fin-like means on said tubular housing spaced from said flange means, said fin-like means being flexible to pass through an aperture to clamp the flange means of said tubular housing against a panel, a lamp-protecting means adapted to be removably mounted in said tubular housing in which said pilot lamp is disposed, said lamp-protecting means having a light-transmitting portion extending outwardly from said flange means when said lamp-protecting means is disposed in said tubular housing, connector-carrier means in said lamp-protecting means carrying connector means, said electrical leads connected to said connector means, and terminal-carrier means including terminal means removably mounted thereon, said terminal-carrier means removably mounted in said tubular housing and being spaced from said flange means, said terminal means being engageable with said connector means when said lamp-protecting means is disposed within said tubular housing.

2. The structure of claim 1 wherein said resilient fin-like means have oppositely inclined surfaces, one to facilitate entry of the tubular housing within the aperture of a panel mounting means and the other to engage the inner surface of the mounting means regardless of thickness.

3. A housing for containing electrical components comprising a hollow tubular insulative housing member, a flange member at one end of said housing member, integral struck-out fin-like members extending outwardly from said housing member adjacent to but spaced from said flange member, said flange member and said fin-like members defining a holding means to hold said housing member within an opening of a supporting panel with said fin-like members being moved inward toward the axis of said housing member during insertion within said opening and said fin-like members moving back toward their normal position thereby engaging one side of the panel while said flange member engages the other side, a hollow dielectric tubular member having one end closed and being open at the other end and insertable in said housing member, an electrical component carrier means having electrical connector means thereon connectable to electrical leads of an electrical component mounted within the open end of said dielectric tubular member, latching means on said component-carrying means and said tubular member to latch them together as a unit with said electrical connector means extending outwardly therefrom, and receptacle-carrier means mountable in said housing member including receptacle means engaging said connector means and said receptacle means being removably carried by the receptacle-carrier means in spaced and insulated relationship.

4. A housing according to claim 3 wherein said fin-like members include leading edges facilitating insertion of said housing member within said opening of said supporting panel and trailing edges engaging said one side of said panel.

5. A housing according to claim 3 wherein said receptacle-carrier means includes guide means to guide said connector means into said receptacle means.

6. A housing having a panel lamp or like device comprising a hollow insulative tubular member, integral means adjacent one end of said tubular member to hold the housing in place in an aperture in a supporting panel, a translucent plastic tubular element including lens means at one end, a lamp-carrier means for receiving and holding an electrical lamp and electrical terminals and being insertable in said plastic tubular element, said lamp-carrier means and said plastic tubular element with said lamp and terminals in position on said lamp-carrier means defining a unit having said terminals extending outwardly therefrom, said unit being insertable within said one end

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of said tubular member, a receptacle-carrier means removably mountable within said tubular member for carrying electrical receptacles that are removable therefrom, said terminals electrically engaging said receptacles and said receptacles holding said unit in a position within said tubular member, said lamp-carrier means and said tubular member and said receptacle-carrier means and said tubular member include latching means to latch said lamp-carrier means and said tubular element together as said unit and said receptacle-carrier means and said tubular member together.

7. A housing according to claim 6 wherein said tubular element includes a surface projecting outwardly from an exterior surface of said tubular element which abuts against said one end of said tubular member to limit the movement of said unit within said tubular member.

8. A housing according to claim 6 wherein said receptacle-carrier means includes guiding means to guide said terminals into electrical engagement with said receptacles.

9. A signal structure containing a pilot lamp or the like having electrical leads, an insulative lamp-carrier means including a lamp-carrier member and a lens member, said pilot lamp being disposed on said lamp-carrier member and said lamp-carrier member having means to interconnect said leads with connector means to hold said pilot lamp snugly against said lamp-carrier member, said lens member being latched onto said lamp-carrier member over said pilot lamp and connector means at said interconnecting means and being provided with a lens spaced from the end of said pilot lamp, said connector means having sections extending outwardly from said lamp-carrier member, an insulative tubular housing member having a flange at one end and integral stiffly flexible fin-like members spaced from said flange and extending

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outwardly from an exterior surface of said housing member, said fin-like members being flexible to pass through an aperture to clamp the flange against a mounting panel, an insulative receptacle-carrier means for removably carrying receptacle means disposed in said housing member, said lamp-carrier means being insertable within said housing member with said sections of said connector means frictionally and electrically engaging said receptacle means to maintain said lamp-carrier means within said housing member and to provide electrical engagement between said connector and receptacle means.

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