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List et al.

[11] **3,894,205**

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[54] **LAMP SOCKET AND PANEL ASSEMBLY WITH GROUNDING SWITCH**

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[73] Assignee: **General Motors Corporation,** Detroit, Mich.

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[21] Appl. No.: **434,892**

[52] **U.S. Cl.** ..... **200/51.07;** 200/51.1; 200/51.13; 248/27; 339/127 R

[51] **Int. Cl.** **H01r 19/50**

[58] **Field of Search** ..... 200/51.07, 51.08, 51.09, 200/51.13, 51.1; 248/27; 339/127 R

[56] **References Cited**

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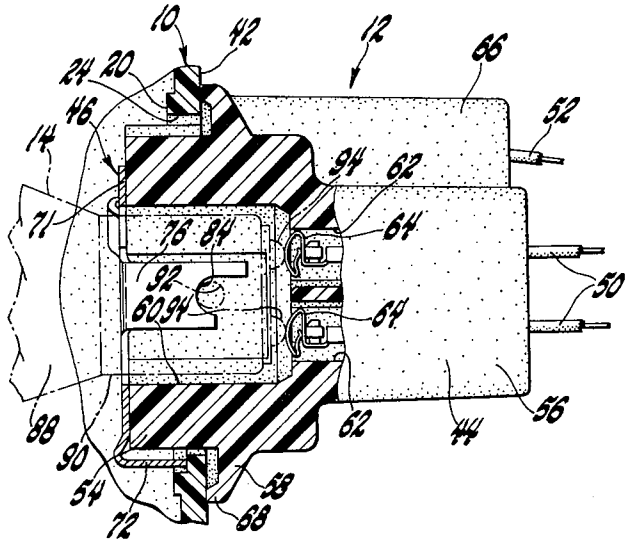
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Primary Examiner—David Smith, Jr.
Attorney, Agent, or Firm—Peter D. Sachtjen

[57] **ABSTRACT**

A lamp socket for detachable mounting on a panel includes an integral grounding switch which is closed by coaction with the panel to complete an electrical circuit to the lamp bulb only when the socket is in a properly mounted position.

1 Claim, 9 Drawing Figures



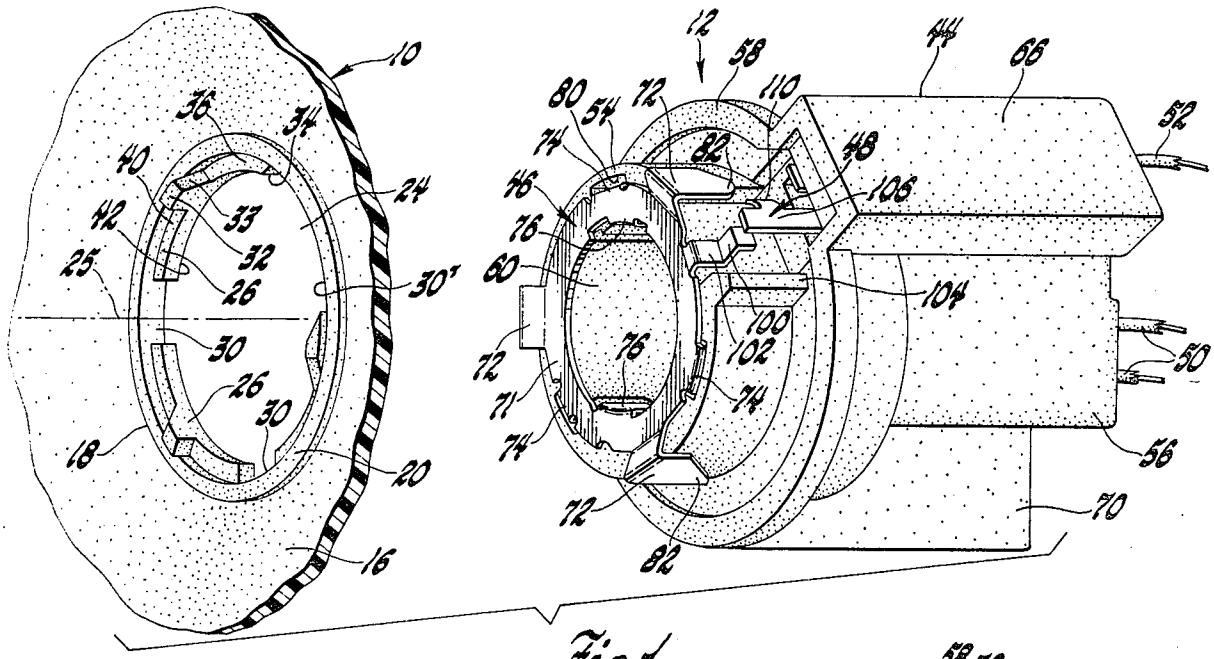


Fig. 1

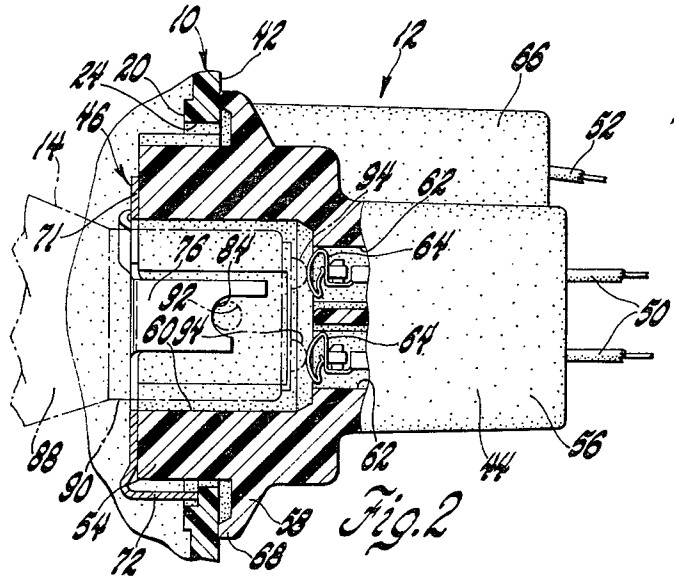


Fig. 2

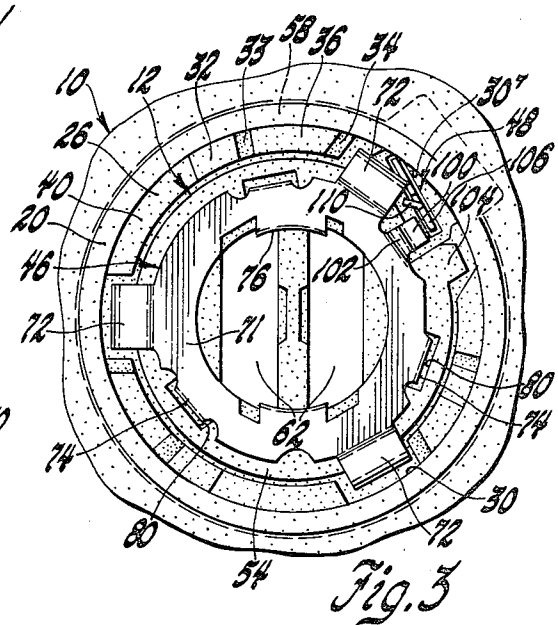


Fig. 3

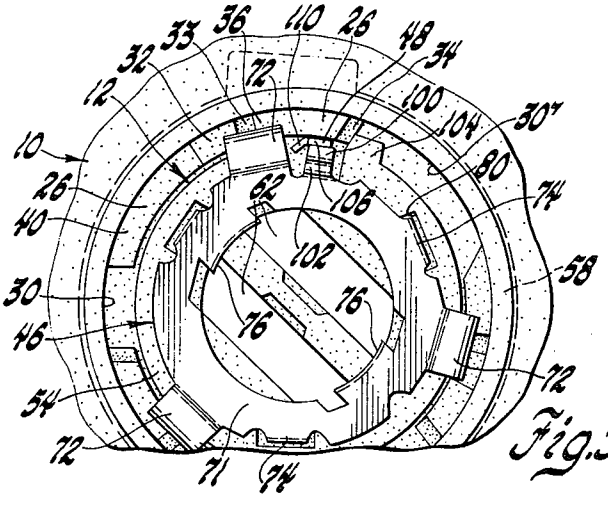


Fig. 5

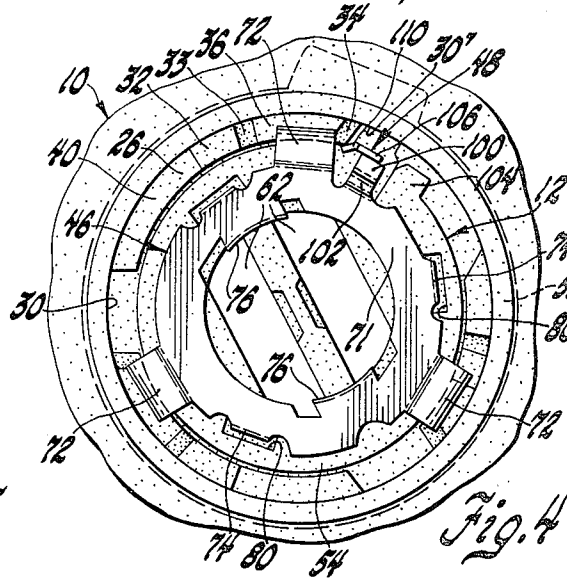


Fig. 4

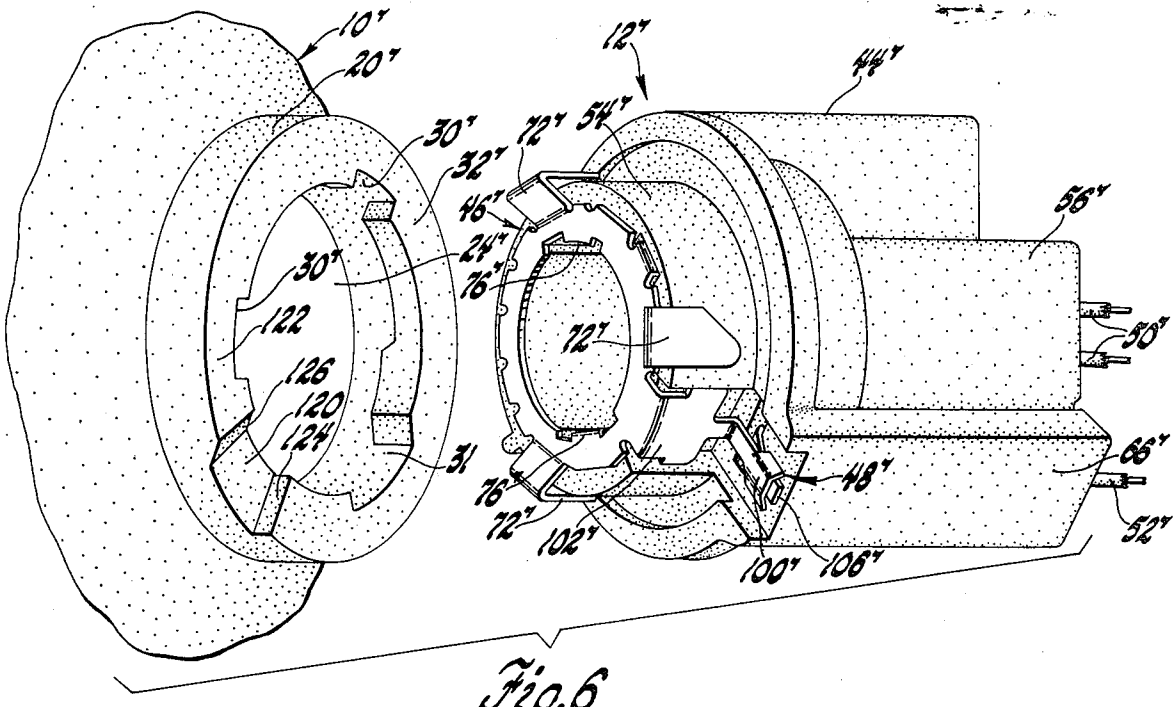


Fig. 6

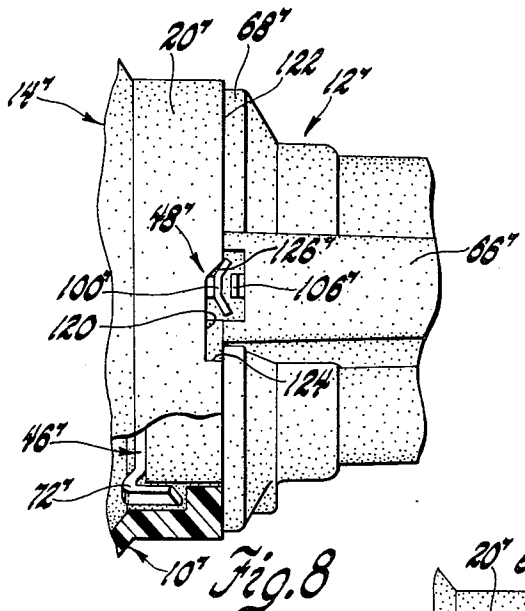


Fig. 8

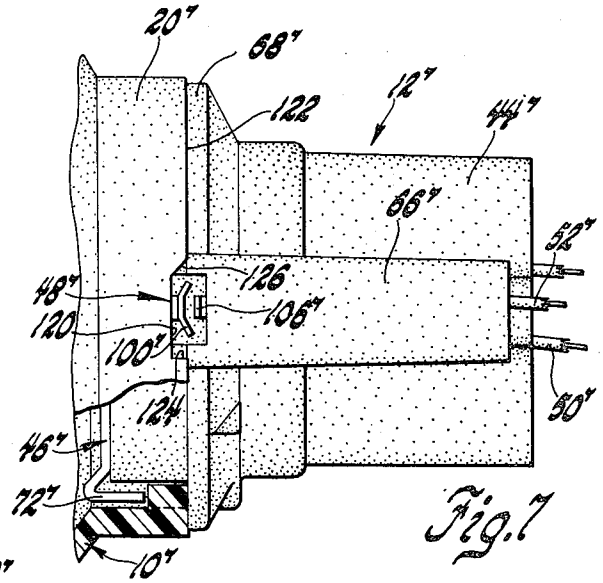


Fig. 7

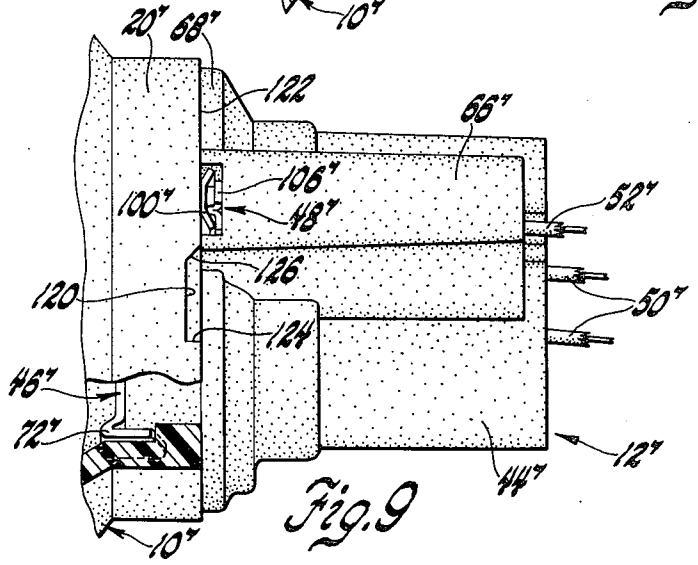


Fig. 9

LAMP SOCKET AND PANEL ASSEMBLY WITH GROUNDING SWITCH

The present invention relates to a lamp socket, and in particular, to a lamp socket and panel assembly for motor vehicles wherein the lamp socket is provided with an integral grounding switch which is closed to complete an electrical circuit through a lamp bulb carried by the socket only when the socket is in a properly indexed position on the panel.

Current lamp socket and panel assemblies for motor vehicles comprise a socket which is detachably mounted on a nonconductive panel. The socket includes a metallic bulb holder carrying a lamp bulb. The holder is electrically connected to a grounding lead wire. The base contact of the bulb is conventionally connected to a lead wire connected to a circuit on the positive side of the battery. Accordingly, when a bulb is in the holder, the bulb filament is energized regardless of the mounting position.

While such an arrangement adequately provides the desired illumination of the bulb filament in accordance with electrical circuit actuation, for certain applications such as automobile taillighting, the arrangement may not be entirely satisfactory. Therein, it is photometrically desirable that the bulb filament bear a predetermined, general horizontal, relationship with respect to the lamp lens. Otherwise, the optical characteristics of the lighting unit are undesirably altered. Furthermore, it is desirable that a ready check be available to determine that the lamp sockets are in securely locked and indexed positions. Inasmuch as the aforementioned lamps can be energized independently of the socket mounting orientation, an insecurely mounted light will erroneously give an illumination appearance of being properly aligned. Subsequent vibration and use thus might dislodge the socket from its operative position.

A lamp socket assembly made in accordance with the present invention is detachably mountable on a panel member by means of cooperating lands and grooves on the panel in the socket. Only by inserting the forward end of the socket through an opening in the panel and then fully rotating the socket to an indexed position wherein the lands on the socket are engaging the lands of the panel is a grounding circuit completed for energizing the bulb filament. The forward end of the socket includes a conductive bulb holder having prongs extending into a longitudinal cavity in the socket. The prongs fixedly and electrically engage the cylindrical sidewall of a bayonet type lamp base on a negative or ground side of the filaments. The base of the bulb includes a conventional insulated contact which engages a terminal to complete an electrical connection to the positive or hot side of the filament. The bulb holder additionally includes three circumferentially spaced, reversely bent outwardly extending locking ears which are inserted through mating grooves in the socket. When rotated, the ears compressively engage one side of the panel while an intermediate flange on the socket engages the other side of the panel. The bulb holder further includes a contact which is normally spaced from the contact leading to the socket grounding lead. In both embodiments disclosed herein, one of the contacts is a resilient cantilevered spring. This spring engages a camming surface on the panel as the socket is rotated toward its indexed position. This biases the spring contact against the stationary contact to complete the grounding circuit with the lamp holder and through the bulb filament only when the socket is in the properly indexed position. By having the socket assembly connected to ground only when the lamp socket is properly secured to the panel, an inspector at final assembly for the motor vehicle can readily determine whether all of the lamp sockets have been properly mounted, inasmuch as non-illumination would be indicative of the improper mounting.

The above and other features of the present invention will be apparent to one skilled in the art upon reading the following detailed description, reference being made to the accompanying drawings illustrating embodiments of the present invention in which:

FIG. **1** is an exploded perspective view of one embodiment of the present invention showing the lamp socket in spaced relationship to the panel;

FIG. **2** is a fragmentary cross-sectional view showing details of construction of the lamp socket of FIG. **1**;

FIG. **3** is a front plan view of the lamp socket at the insertion position showing the normally spaced relationship between the grounding contact and the spring contact;

FIG. **4** is a view similar to FIG. **3** showing the lamp socket with the spring contact at the camming position;

FIG. **5** is a view similar to FIG. **3** showing the lamp socket at the indexed position wherein the spring contact engages the grounding contact;

FIG. **6** is a view similar to FIG. **1** showing an alternate embodiment of the present invention with the lamp socket in spaced relationship to the panel;

FIG. **7** is a fragmentary cross-sectional view of the lamp socket with the grounding contact and spring contact at the insertion position;

FIG. **8** is a view similar to FIG. **7** showing the lamp socket with grounding contact and the spring contact at the camming position; and,

FIG. **9** is a view similar to FIG. **7** showing the lamp socket with the grounding contact and the spring contact at the indexed closed position wherein the spring contact engages the grounding contact.

Referring to the drawings, and in particular FIGS. **1** through **5**, there is shown a lamp socket and panel assembly wherein the lamp socket is readily connectable to and disconnectable from the panel, and when in position thereon, a light bulb carried by the socket is accurately indexed therewith to provide a lighting function requiring accurate positioning of the bulb filament. Although the present invention is readily usable in various types of lighting applications, it is particularly useful for motor vehicle lighting applications such as taillights, stop lights, turn signal lights, and side marker lights. For purposes of subsequent illustration, the application described will be a motor vehicle rear lighting application wherein the bulb contains plural filaments for providing distinct lighting modes.

Referring to FIG. **1**, the lamp socket and panel assembly comprises a panel **10** and a lamp socket **12**. The lamp socket **12** holds a conventional bayonet type light bulb **14** as shown in dashed lines in FIG. **2**.

The panel **10** may be the reflector for a taillight assembly and comprises at its rear central portion a thin wall reflector section **16** and a circular lamp mounting central section **18**. The panel **10** forms a component of the lighting unit which is conventionally attached to the rear of the motor vehicle. The panel **10** is formed of a non-conductive plastic material such as vinyl. The front

surface of the panel may be provided with reflective coating.

The central section **18** of the panel **10** includes a circular hub **20** having a central longitudinal opening **24** with an axis **25**. The opening **24** is peripherally bounded by an alternating series of inwardly projecting lands **26** and grooves **30**. The grooves **30** are substantially uniformly circumferentially spaced. For purposes hereafter described, one of the grooves **30'** is slightly larger than the others.

Referring to FIG. **3**, a representative land **26** is provided with an intermediate projecting indexing stop **32** having an indexing ramp **33**, an entry ramp **34**, an an arcuate engagement surface **36**. A trailing portion **40** spaced on the other side of the indexing stop **32** has a substantially arcuate planar rear surface **42**.

The lamp socket **12** comprises a body **44**, a lamp holder **46**, a grounding switch **48**, a pair of input leads **50**, and a grounding lead **52**.

The body **44** is a one piece molded member made from a suitable elastomeric plastic material such as vinyl. The body **44** broadly includes a frontal nose portion **54**, a rear base portion **56**, and an annular intermediate sealing flange **58**. As shown in FIG. **2**, the body **44** includes a frontally opening cylindrical lamp cavity **60** communicating with the pair of laterally spaced, axially extending terminal receptacles **62** opening rearwardly at the base portion **56**. A pair of conventional spring terminals **64** are fixedly retained in the receptacles **62** and attached to the leads **50**.

The grounding lead **52** is contained within a longitudinally axially extending terminal housing **66**. The sealing flange **58** is slightly larger in diameter than the opening **24** and terminates within annular forwardly projecting frontal lip **68**. The lip **68** compressively sealingly engages the rear surface **42** of the hub **20** in assembly. To facilitate rotation of the body **44**, the rear base portion **56** is provided with a longitudinal tab **70**. In conjunction with the housing **66**, the tab **70** may be grasped to facilitate insertion and rotation of the socket **12**.

The bulb holder **46** comprises a generally annular electrically conductive metallic stamping. The bulb holder **46** comprises an annular frontal ring section **71**, three radially outwardly extending circumferentially spaced locking and indexing ears **72**, three reversely directed staking legs **74**, and a pair of inner reversely directed contact terminals or prongs **76**.

The staking legs **74** are fixedly received within forwardly opening slots **80** in the nose portion **54**. The locking ears **72** each include a reversely bent section terminating with rounded triangular tips **82**. The hypotenuse of each tip **82** engages the ramp surfaces **33** on the stops **32** to interlock and index the socket **12** on the panel **10** in final assembly. The tips **82** are axially spaced from the lip **68** slightly less than the thickness of the corresponding land **26**. The ears **72** yield slightly to provide for compressive retention of the lands therebetween.

The prongs **76**, as shown in FIG. **2**, include a J-shaped notch **84**. The light bulb **14** comprises a spherical globe **88**, a conductive cylindrical base **90**, a pair of diametrically opposed locking lugs **92**, and a pair of radially spaced contacts **94**. The base **90** and the contacts **94** are connected to the filament lead wires. Thus, the lamp bulb **14** is a conventional bayonet type construction. The bulb **14** is axially inserted into the cavity **60** against the spring biasing of the spring terminals **64** and rotated to the indexed condition in the notch **84** by passage over the leading edge thereof.

The leads **50** are connected in separate parallel circuit on the positive side of the battery. The operation of the circuits is controlled by various switches such as the brake light switch, the light switch, and the directional signal switch to selectively illuminate the filaments of the bulb **14**. To complete the circuit through the filaments, however, it is necessary to close a grounding circuit established, as hereinafter described, through the prongs **76**, the grounding switch **48** and the grounding lead **52**.

The grounding switch **48** comprises a stationary contact on the bulb holder **46** and spring contact partially disposed within the housing **66**.

The stationary contact has a generally L-shaped grounding terminal **100** projecting radially outwardly and rearwardly from a downwardly extending arm **102** adjacent one of the ears **72**. The grounding terminal **100** is positioned, as shown in FIG. **3**, substantially midway between a locating rib **104** on the nose portion **54** and the adjacent ear **72**. The rib **104**, the grounding terminal **100** and the ear **72** span an arcuate sector slightly less than that spanned by the large groove **30'**. The spring contact further includes a fixed portion (not shown) housed within the housing **66** and a forwardly projecting cantilevered spring finger contact **106**. The spring finger contact **106** is normally spaced from the grounding terminal **100** and closes thereagainst as the socket **12** is rotated into the indexed position. The spring finger contact **106** includes a camming lip **110** which cooperates with the leading surface of the land **36** to close the grounding circuit under the aforementioned conditions.

More particularly, to mount the lamp socket **12** on the panel **10**, the nose portion **54** is forwardly inserted through the opening **24** with the locking ears **72** registering with the associated groove **30** and the rib **104** and the adjacent locking ear **72** being positioned at the enlarged groove **30'**, (FIG. **3**). The socket **12** is then forwardly inserted until the lip **68** engages the rear surface **42**. The operator, by gripping the housing **66** and the tab **70**, rotates the socket until the tips **82** of the ears **72** engage the ramps **34** at the camming position (FIG. **4**). Upon further rotation the ears **72** slide up the ramps **34** onto the engagement surface **36**, this being accommodated by limited yielding and flexing of the ear **72**. Referring to FIG. **4**, as the ear **72** is rotated over the surface **36**, the camming lip **110** of the spring contact **106** engages the forward corner of the ramp **34**, a position which starts the inward camming action thereof. Referring to FIG. **5**, further rotation of the socket **12** with respect to the panel **10** continues until the tip **82** of the ear **72** abuts the ramp **33** of the locating stop **32**. In this position, the contact terminal **106** bears against the interior surface of the land **26** and is firmly closed against the terminal **100**. Accordingly, this completes the electrical circuit to the bulb filament only when the socket is in the properly indexed position with respect to the panel. In the event the socket has not been rotated sufficiently to close the grounding circuit at the properly indexed condition, the circuit will not be closed, and the failure to illuminate will be indicative of a mounting problem. Moreover, should the socket inadvertently dislodge from its mounting posi-

tion, the bulb **14** would be automatically distinguished, indicative of the dismounted condition.

In FIGS. **6** through **9,** there is shown an alternate embodiment of the present invention incorporating a grounding circuit which is closed as the socket attains its fully indexed position on the panel. Therein, parts corresponding to the embodiment of FIGS. **1** through **5** are referenced by corresponding numbers carrying a prime designation.

More particularly the embodiment comprises a panel assembly **10'** which detachably receives a socket **12'**. The panel includes a circular hub **20'** defining a central opening **24'**. The opening **24'** is bounded by alternating grooves **30'** and lands **32'**. One of the grooves **31** is enlarged with respect to the others. Additionally, the hub **20'** includes a radial notch **120** formed in the rear surface **122** thereof. The notch **120** includes a vertical wall **124** and an inclined ramp wall **126.**

The body **44'** of the socket **12'** is substantially the same as the former embodiment and includes the ground terminal housing **66'** and a rear base **56'**. The base **56'** houses the leads **50'** and **52'**.

The bulb holder **46'** is attached to the nose section **54'** of the holder **46'** and includes inner prongs **76'** for gripping the cylindrical sidewall of the bulb. The holder **46'** includes three radially outwardly disposed locking ears **72'**.

In this embodiment the grounding switch **48'** includes a stationary contact at the housing **66'** and a spring contact at the holder. The grounding terminal on the housing **66'** has an outwardly projecting fixed contact arm **100'**. The spring finger **106'** cooperates with the notch **120** to complete a grounding circuit as the socket **12'** is rotated to its fully indexed position.

More particularly, in FIG. **7** the socket **12'** is shown at its insertion position with respect to the panel **10'**. Therein the ears **72'** are aligned with associated grooves **30'** and the flange **68'** engages the rear surface of the hub **20'**. In this position, the spring contact **106'** is midway disposed in the notch **120** and is axially spaced from the stationary contact. The grounding circuit is thus open and the bulb filaments are extinguished. As the socket **12'** is rotated with respect to the panel **10,** the contact **106'** traverses the notch **120** until the camming position is reached wherein the leading edge engages the ramp surface **126,** (FIG. **8**). As rotation of the socket **12'** continues, tips of the locking ears **72'** ride upwardly on the ramp surfaces of the lands and thereacross. The lands are compressively gripped between the ears **72'** and the lip of the flange. Concurrently, the camming action between the ramp surface **126** and the contact **106'** axially rearwardly biases the contact into electrical contact with the stationary contact, (FIG. **9**). This completes the electrical circuit to the lamp bulb in a manner previously described. It insures a complete electrical circuit only when the socket has attained an indexed position with respect to the panel, the socket being restrained from movement by interengagement between the locking ears, the stop surfaces on the terminal parts of the land **32'**. Thus the lamp socket is not connected to ground until properly secured to the panel.

Although this invention has been shown and described with reference to the above embodiments, other forms will be readily apparent to those skilled in the art. Therefore, it is not intended to limit the scope of this invention by the embodiments selected for the purpose of this disclosure but only by the claims which follow.

What is claimed is:

1. A lamp socket and panel assembly comprising: a non-conductive panel, a central hub on said panel having an opening therein bounded by an outer peripheral surface defined by alternating lands and grooves; axially projecting stop surfaces on said hub adjacent said grooves; a radial notch in said hub having a camming surface thereon; a lamp socket formed of a nonconductive elastomeric material, said socket having a body with front and rear portions; an annular flange on said body intermediate said front and rear portions; a center longitudinal cavity in said front portion of the body adapted to receive the base of a lamp bulb having lead wires connected to the filaments thereof, said intermediate flange adapted to engage the peripheral surface of said panel; first and second terminal members carried by said socket adapted to be connected in an electrical circuit, one of said terminals being disposed in said cavity and adapted to engage one lead of said lamp bulb; an annular conductive bulb holder carried on the front portion; said holder having a plurality of integral flexible locking ears spaced circumferentially thereabout adapted to register with said grooves at an insertion position, said ears having rounded triangular tips spaced from said flange by the thickness of said panel member and including a hypotenuse index surface thereon; a contact prong formed integrally on said holder extending into the cavity and adapted to electrically connect with the other lead of said lamp bulb, said holder having a radially extending cantilevered spring finger integrally formed thereon adapted to contact said other terminal to complete an electrical circuit through the light bulb, said finger registering with said notch at said insertion position, said lamp socket being attachable to said panel by inserting said ears through said grooves and rotating the body with the locking ears passing across the surface of said lands until engagement of said hypotenuse index surface at an indexed position with said stop surface, said spring finger engaging said camming surface at said notch as said socket is rotated to said indexed position to bias said spring finger against said other terminal to complete the electrical circuit through said bulb only when said socket is in an indexed condition on said panel member.

* * * * *