United States Patent [19]

Martin et al.

[11] **3,924,216**

[45] **Dec. 2, 1975**

[54] **SHIELDED INDICATING LAMP FUSEHOLDER**

[75] Inventors: **Burton L. Martin; Peter E. Tilly,** both of Cedar Rapids, Iowa

[73] Assignee: **Rockwell International Corporation,** El Segundo, Calif.

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[21] Appl. No.: **543,839**

[52] **U.S. Cl.** **337/206;** 337/242

[51] **Int. Cl.²** **H01H 85/30**

[58] **Field of Search** 337/201, 206, 241, 242

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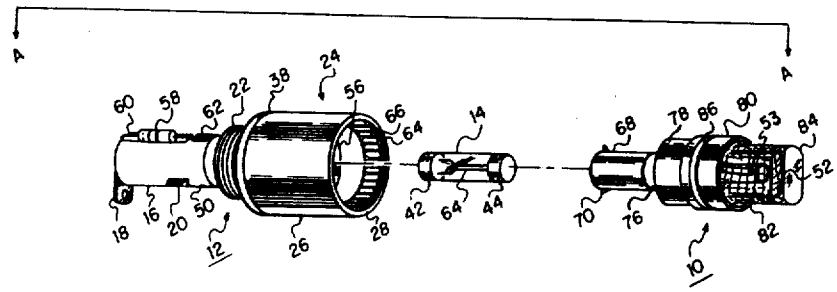
Primary Examiner—G. Harris

Attorney, Agent, or Firm—Howard R. Greenberg; Robert J. Crawford

[57] **ABSTRACT**

A fuseholder for housing a tubular fuse comprises a female member for receiving the fuse while mounted in a metal panel and a male member having a housing on one end for insertably engaging the female member and a blown fuse indicating lamp on the other end which is visible from the front of the panel when the fuseholder is completely assembled. A metal ring encircling the walls of the lamp, which is connected to a wire mesh jacket enshrouding the surfaces of the lamp above the ring, contacts an annular terminal at the front end of the female member which is in contact with the panel to provide a shielding effect once the fuseholder is assembled.

9 Claims, 3 Drawing Figures



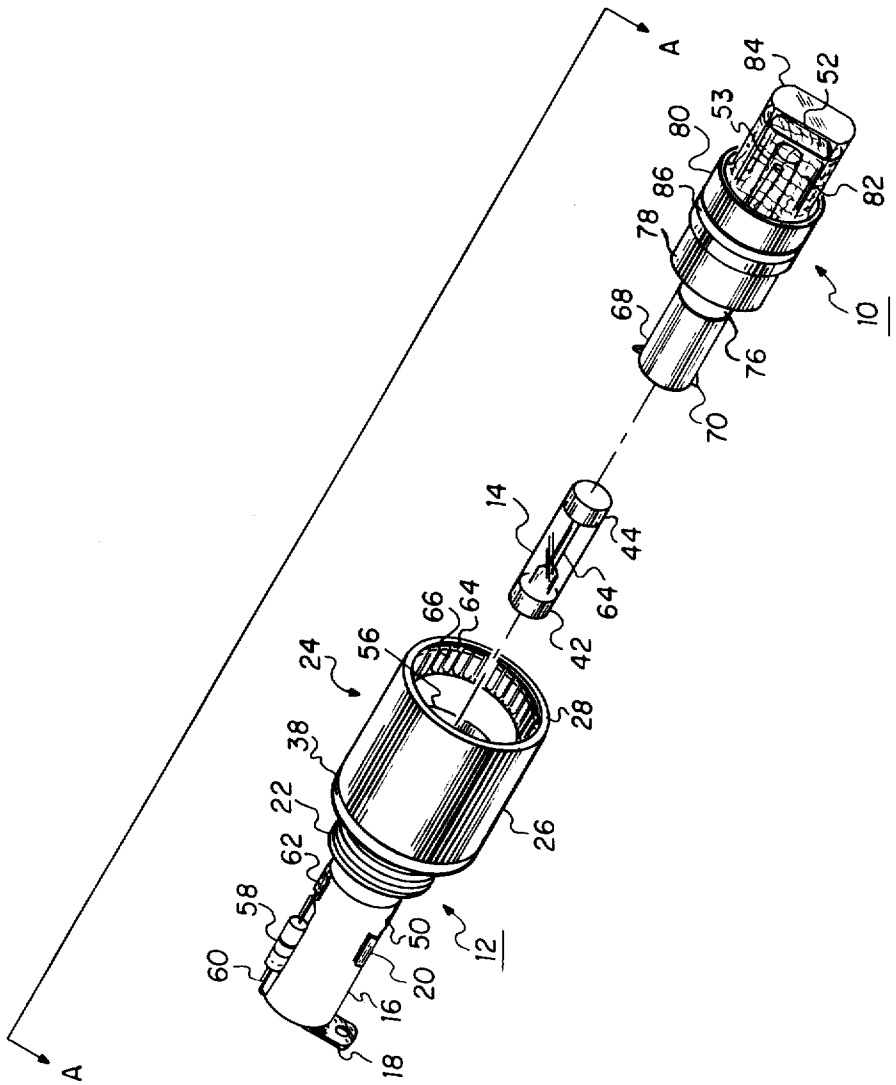

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FIG. 1

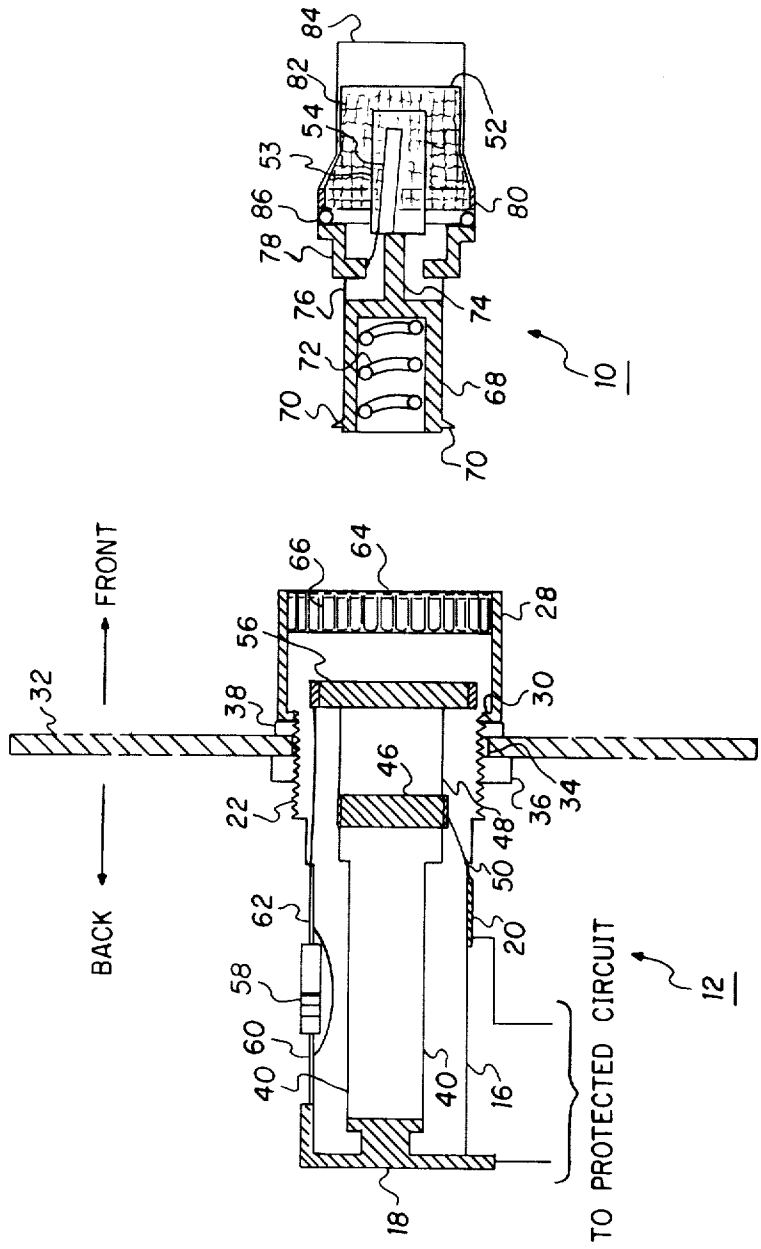

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TO PROTECTED CIRCUIT
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FIG. 2

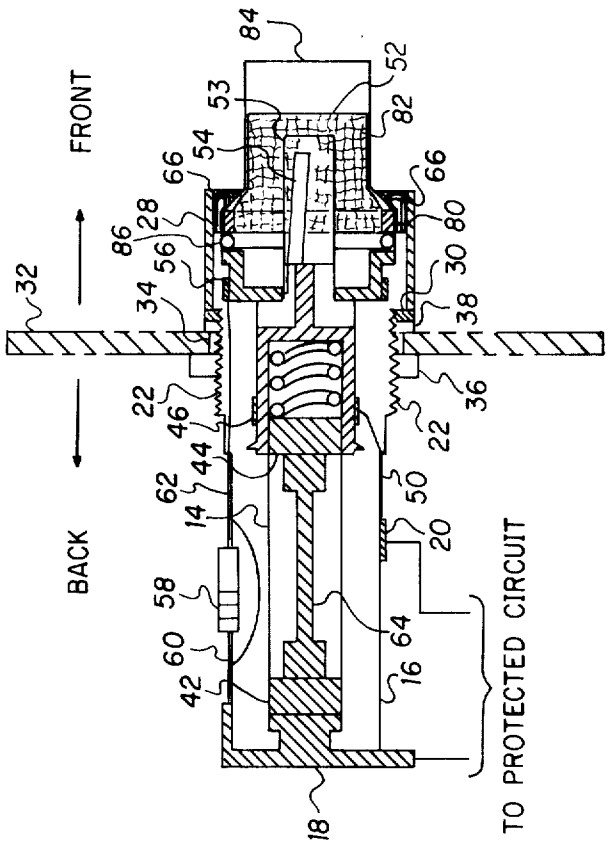

FRONT
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FIG. 3

SHIELDED INDICATING LAMP FUSEHOLDER

BACKGROUND OF THE INVENTION

The invention disclosed herein pertains in general to fuseholders and in particular to fuseholders for housing tubular fuses while mounted in a metal panel.

There are many well known, relatively inexpensive commercial fuseholders available for housing tubular fuses (such as the glass-tube type manufactured by Bussman) while mounted in an equipment metal panel. Although these fuseholders may include electromagnetic interference (EMI) shielding when required (such as the Bussman Type HMR) or a lamp indicator easily visible from the front of the panel to provide an immediate visual indication of a blown fuse (such as the Bussman Type HK), there are none that combine both these features. This is because of the difficulty in shielding the lamp whose incandescent filament (or electrodes in the case of neon lamps) acts as an antenna for undesired signals, while still retaining the ease of access to the housed fuse normally provided for replacing a blown fuse. Accordingly, it would be highly desirable to combine these two features in a single fuseholder, particularly for some applications such as in the field of UHF transmissions where EMI is critical. In attempting to do so, however, competitive commercial considerations dictate that any new fuseholder be changed as little as possible from current fuseholder designs so as to minimize the additional cost of fabrication as well as retain the appearance to which users have become accustomed. Furthermore, it is most important that the ease of access to the housed fuse be retained so as to facilitate blown fuse replacements.

With the foregoing in mind, it is a primary object of the present invention to provide a new and improved fuseholder for housing a tubular fuse while mounted in a metal panel.

It is a further object of the present invention to provide such a new and improved fuseholder which affords EMI shielding as well as an immediate visual indication of a blown fuse.

It is still a further object of the present invention to provide such a new and improved fuseholder whose appearance and fabrication are similar to currently available commercial fuseholders and whose fuse accessibility is the same.

These, as well as other objects, and the means by which they are achieved through the present invention may be fully appreciated by referring to the Detailed Description of the Invention which follows hereinafter together with the appended drawings.

BRIEF DESCRIPTION OF THE INVENTION

The shielded indicating lamp fuseholder of the invention comprises a female member for receiving a tubular fuse while mounted in a metal panel and which contains the necessary terminals for connection to the circuit to be protected by the fuse. The female member is fabricated with an annular terminal at its front end which is in contact with the panel through which the fuse is inserted from the front of the panel. The fuseholder also comprises a male member having a housing at one end for receiving one end of the fuse and for insertably engaging the female member (also through the opening of the annular terminal) to complete the assembly of the fuseholder whereupon parallel electrical paths via the protected circuit are established through the fuse as well as a blown fuse indicating lamp located on the other end of the male member. Upon assembly, the lamp remains completely visible from the front of the panel so as to provide an immediate indication of a blown fuse through illumination. Shielding of the lamp is provided through a metal ring which encircles its walls and a wire mesh jacket which completely enshrouds the surfaces of the lamp above the ring to which it is connected, arranged so that the ring comes into contact with the annular terminal when the male member engages the female member.

In the preferred embodiment described, the annular terminal is in the form of a metallic cup which extends out from the panel and has an annular base in contact with the panel and a plurality of resilient contacts around the peripheral interior wall of the cup against which the ring is pressed when the male member is inserted into the female member. Also, the wire mesh jacket is protected by a transparent protective cap which encloses it and which affords insulation to eliminate any potential shock hazard.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an isometric view of the fuseholder of the invention with the male and female members disengaged from one another in normal juxtaposition just prior to insertion of the male member in the female member (with the metal panel for mounting the fuseholder being omitted for the sake of pictorial clarity).

FIG. **2** is a cutaway view of the fuseholder of FIG. **1** along section lines A—A with the female member shown already mounted in a metal panel awaiting insertion of the male member, with the fuse not shown.

FIG. **3** is another cutaway view of the fuseholder of FIG. **1** along section lines A—A, except here the female and male members are shown fully engaged to complete the assembly of the fuseholder in the metal panel with a fuse in place.

DETAILED DESCRIPTION OF THE INVENTION

Referring to all three figures, the fuseholder of the invention is seen to comprise a male member **10** which engages a female member **12** by insertion therein. The female member **12** which is elongated and customarily cylindrical for receiving a tubular fuse such as the standard glass-tube fuse **14** shown is formed from any suitable insulating material such as phenolic plastic, with its insulating portions being represented by the clear areas in the drawings. A portion of the female member **12** consists of an insulated neck **16** to which is affixed two electrical terminals **18** and **20** (all electrical conductors are shown with either shaded or lined areas in the drawings for clarity of pictorial representation) which are for connection to the circuit to be protected by fuse **14.** At the front end of the female member **12,** above a threaded portion **22** of the neck **16** is an annular terminal **24** formed by a metallic cup **26** having a cylindrical wall **28** whose outer diameter is greater than that of the neck **16** and an annular base **30** whose inner diameter permits it to fit around the threaded neck portion **22.** The female member **12** is mounted in a metal panel **32** (which acts as a ground plane) as shown in FIGS. **2** and **3,** which depict a side view of the panel **32** with its front facing to the right of the drawing. After passing the neck **16** of the fuseholder through a hole **34** in the panel **32** from the front until movement of the female member **12** is restricted by the base **30** of cup **26** (whose outer diameter is greater than the diameter

of the hole 34), the female member 12 is held rigidly in place by tightening a nut 36 around the threaded portion 22 from the back of the panel 32. A soft flexible annular conductive gasket 38 formed with a wire mesh is preferably placed around the threaded neck portion 22 between the metal cup 26 and metal panel 32 to ensure a good electrical connection therebetween.

With specific reference to the cutaway views of FIGS. 2 and 3, the female member 12 is seen to have a cylindrical passageway 40 along its center axis for receiving the fuse 14 which is inserted therein from the front of the panel 32 through the annular terminal 24. Although terminal 18 can take any desired shape on the exterior end of neck 16, its portion which internally extends into the neck body itself and terminates at passageway 40 preferably is cylindrical and aligns with the passageway 40. Consequently, when fuse 14 is in place, one of its terminals 42 is in complete contact with terminal 18 thereby providing an electrical path between the fuse 14 and the protected circuit lead connected to terminal 18. The other terminal 44 of fuse 14 is connected to the other lead of the protected circuit via a ring contact 46 which is located around the peripheral wall of another passageway 48 in neck 16 which joins passageway 40 and has a greater diameter. As will be seen shortly, this greater diameter is necessary to accommodate the male member 10. Actual contact between fuse terminal 44 and ring contact 46 is effectuated only through male member 10 so that until it engages the female member 12 there is no continuity for the protected circuit via fuse 14. The ring contact 46 which is internal to the female member 12 is connected to external terminal 20 by a lead 50 which passes through the body of neck 16.

In addition to providing the terminals 18 and 20 for passing current from the protected circuit through the fuse 14, the female member 12 also provides terminals for a parallel path through an indicating lamp 52 which is part of the male member 10 and consequently which is connected in the circuit only when the fuseholder is completely assembled. The lamp 52 preferably would have a transparent outer covering with a normal incandescent bulb 53 (or any equivalent such as a dual electrode neon bulb) inside containing a filament 54 having two leads which are connected in the circuit upon assembly of the fuseholder via ring contact 46 and another ring contact 56 which is part of the female member 12 and is located around the peripheral wall of passageway 48. Ring contact 56 is connected to terminal 18 through a resistor 58 which resides in an external ridge cut out of neck 16. A completely exposed lead 60 on the exterior of neck 16 connects resistor 58 to terminal 18 while a lead 62 passes from the exterior of neck 16 through its body to connect resistor 58 to internal ring contact 56. Since upon complete assembly of the fuseholder, filament 54 is connected between ring contacts 46 and 56 (which will be apparent shortly) which connect with terminals 20 and 18, respectively, two parallel current paths are possible from the protected circuit through terminals 18 and 20; namely, one through the fuse 14 itself and the other through the series combination of resistor 58 and lamp 52. Since the lamp 52 path is effectively shorted by the fuse 14 path, all current flow through the fuseholder is through the metallic lead 64 of fuse 14, when intact, thereby preventing the lamp 52 from illuminating. However, when fuse 14 blows because of a current oversurge through the protected circuit, the redirected current through filament 54 is sufficient to illuminate lamp 52, without causing any damage in the protected circuit because of its low magnitude restricted by the resistance of resistor 58. Thus, an immediate visual indication that a fuse has blown is provided by illumination of lamp 52.

Returning to the female member 12, it is seen that around the interior peripheral wall 28 of cup 26 at its entrance from the front of the panel is provided a strip of fingerstock 64 consisting of a plurality of resilient metallic contacts 66 having a U shape which are minimally joined together so as to provide flexibility and which are affixed to the interior wall 28 via one leg of the "U" such as by soldering. The other leg of the U which is free to move provides a spring action, viz. when a force is exerted thereon so as to compress it toward the cylinder wall 28, it springs against the force producing member. It will be observed that an insulating portion of female member 12 may extend into the annular terminal 24 as far as the strip of fingerstock 14, which is the result of forming the cup 26 around the front portion of presently available commercial fuseholders.

The male member 10 comprises a cylindrical metallic housing 68 at one end for receiving one end of the fuse 14 whose outer diameter is no greater than that of passageway 48 so that it may easily be inserted therein. Key ways (not shown) in the body of the female member 12 along passageway 48 are provided for receiving keys 70 of housing 68 to guide the travel of male member 10 as it is inserted in the female member 10. At the end of its travel, the male member 10 is twisted causing keys 70 to engage detents (not shown) provided in passageway 48 so that the male member 10 cannot thereafter be removed. A spring 72 in housing 68 which presses against terminal 44 of fuse 14 upon assembly assures a tight fit between the engaged male and female members as well as a good contact between terminal 42 of fuse 14 and terminal 18.

Once insertion is accomplished, the outer diameter of housing 68 makes contact with the ring contact 46 (which preferably has a break along its cylindrical wall so that a tight connection can be formed through expansion of its diameter by spring action), while its inner diameter contacts terminal 44 of fuse 14 thereby completing a current flow path therebetween. The cylindrical housing 68 joins lamp 52 through a metallic cylinder 74 along its center axis and an annular insulator 76 concentric therewith. Cylinder 74 is connected to one of the leads of filament 54 thereby connecting it to ring contact 46 via housing 68 upon assembly of the fuseholder. The other lead of filament 54 is connected to a metallic cup 78 which is concentric with insulator 76 by passing the lead through the insulating material. The outer diameter of metallic cup 78 is essentially the same as that of ring contact 56, which preferably has a break like that of ring contact 46, so that it comes into contact with it by spring action upon assembly, thereby connecting the second lead of filament 54 to resistor 58.

A metal ring 80 which encircles the outer wall of lamp 52, preferably around its base close to where it joins housing 68, has a diameter and is located so that when the male and female members are engaged, it presses against resilient metallic contacts 66 to establish a good contact therewith. A wire mesh jacket 82 which completely enshrouds the surfaces of lamp 52 above the ring 52 is connected to the ring 52 through

any desired bonding process such as soldering. Consequently, when the fuseholder is completely assembled, the lamp **52** is completely shielded from EMI signals by the connection of the wire mesh jacket **82** with the metal panel **32** through contact of the metal ring **80** with resilient contacts **66** of annular terminal **24** which is in contact with panel **32**. Yet the lamp **52** is completely visible from any position in front of the panel **32**, thereby affording an immediate visual indication of a blown fuse without the need for first disengaging the male member **10**. Furthermore, simple access to a blown fuse for replacement purposes is provided the same as with prior art fuseholders merely by twisting and then removing the male member **10**. Finally, when compared with prior art fuseholders such as those made by Bussman previously alluded to, the differences in appearance will be seen to be minimal thereby incurring only a modest increase in fabrication cost which will appeal to current users both economically as well as aesthetically. It will be readily apparent to those familiar with the art that the foregoing structural changes can be made on presently available commercial fuseholders without any difficulty. A transparent cap **84** of any suitable material such as plastic or glass can be used to completely enclose the wire mesh jacket **82** so as to protect it from breaks and to afford insulation from potential shock hazards. If desired, the jacket **82** can be formed inside the cap **84** itself when it is molded. An insulating ring **86** separates the metallic ring **80** from the metal cup **78**.

Thus, the invention herein is seen to provide a shielded fuseholder of simple fabrication quite similar to currently available commercial fuseholders without sacrificing simple access to the fuse for replacement while still permitting an immediate visual indication of a blown fuse. Since the preferred embodiment described herein may undoubtedly be modified by those skilled in the art without departing from the scope and spirit of the invention, the foregoing detailed description is intended to be merely exemplary and not restrictive of the invention as will now be claimed hereinbelow.

What is claimed is:

1. A shielded indicating lamp fuseholder for housing a tubular fuse while mounted in a metal panel comprising:

a female member for mounting in the panel having terminals for connection to the circuit to be protected by the fuse and an annular terminal at its front end in contact with the panel through which the fuse is received from the front of the panel;

a male member having a housing at one end for receiving one end of the fuse and a lamp at the other end which illuminates when the fuse is blown, said housing being engageably insertable in said female member through said annular terminal to complete the assembly of the fuseholder, whereupon parallel electrical paths via the protected circuit are established through the fuse and said lamp;

a metal ring encircling the outer wall of said lamp located so that when said male member engages said female member, said ring comes into contact with said annular terminal, and

a wire mesh jacket which completely enshrouds the surfaces of said lamp above said ring and is connected thereto.

2. The fuseholder of claim **1** wherein said annular terminal comprises a metallic cup which extends out from the panel and has an annular base in contact with the panel and resilient metallic contacts around the peripheral interior wall of said cup against which said ring is pressed when said male member engages said female member.

3. The fuseholder of claim **2** including a conductive gasket intermediate said annular base and the panel.

4. The fuseholder of claim **1** including a transparent protective cap enclosing said wire mesh jacket.

5. The fuseholder of claim **1** wherein said ring is located around the base of said lamp where it joins said housing.

6. In combination with an indicating lamp fuseholder for housing a tubular fuse having a female member for receiving the fuse via its front end while mounted in a metal panel and a male member having a housing at one end for receiving one end of the fuse and for insertably engaging the female member via its front end to complete the fuseholder assembly whereupon parallel electrical paths are established via the fuse and a blown fuse indicating lamp on the other end of the male member which is visible from the front of the panel during engagement, a shielding arrangement comprising;

an annular terminal located at the front end of the female member through which the male member housing and fuse are received in contact with the panel;

a metal ring encircling the outer wall of the lamp located so that when the male and female members are engaged, said ring comes into contact with said annular terminal, and

a wire mesh jacket which completely enshrouds the surfaces of the lamp above said ring and is connected thereto.

7. The shielding arrangement of claim **6** wherein said annular terminal comprises a metallic cup which extends out from the panel and has an annular base in contact with the panel and resilient metallic contacts around the peripheral interior wall of said cup against which said ring is pressed when said male member engages said female member.

8. The shielding arrangement of claim **6** including a transparent protective cap enclosing said wire mesh jacket.

9. The shielding arrangement of claim **6** wherein said ring is located around the base of said lamp where it joins said housing.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 3,924,216
DATED : December 2, 1975
INVENTOR(S) : Burton L. Martin and Peter E. Tilly

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 68, delete "52" both instances and substitute therefor --80--.

Signed and Sealed this

second Day of *March 1976*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks