

[54] ELECTRICAL COUPLING MECHANISM

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[58] Field of Search .....200/51.09, 51.08, 51.07; 339/135, 127, 21, 189, 122; 240/85, 78 R, 78 CF, 78 DA; 174/61-64

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[57] ABSTRACT

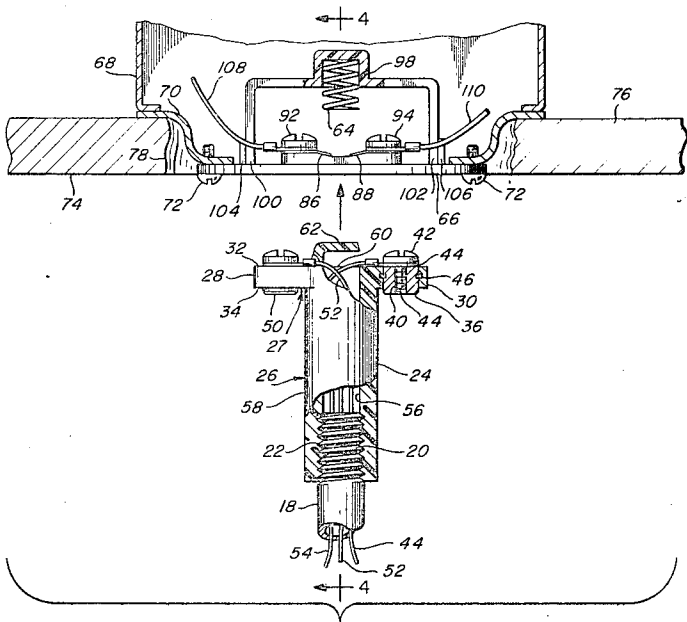
An electrical coupling mechanism adapted removably to suspend a lighting fixture from a ceiling structure of a building room; wherein a mounting plate is supported by a utility box; and a lighting fixture hanger is manually rotatably insertable through an opening in said mounting plate thereby concurrently making electrical and mechanical supporting connection for said lighting fixture whereby said lighting fixture and said hanger may be readily removed mechanically and electrically disconnected relative to structure and electrical contacts on said mounting plate.

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10 Claims, 4 Drawing Figures

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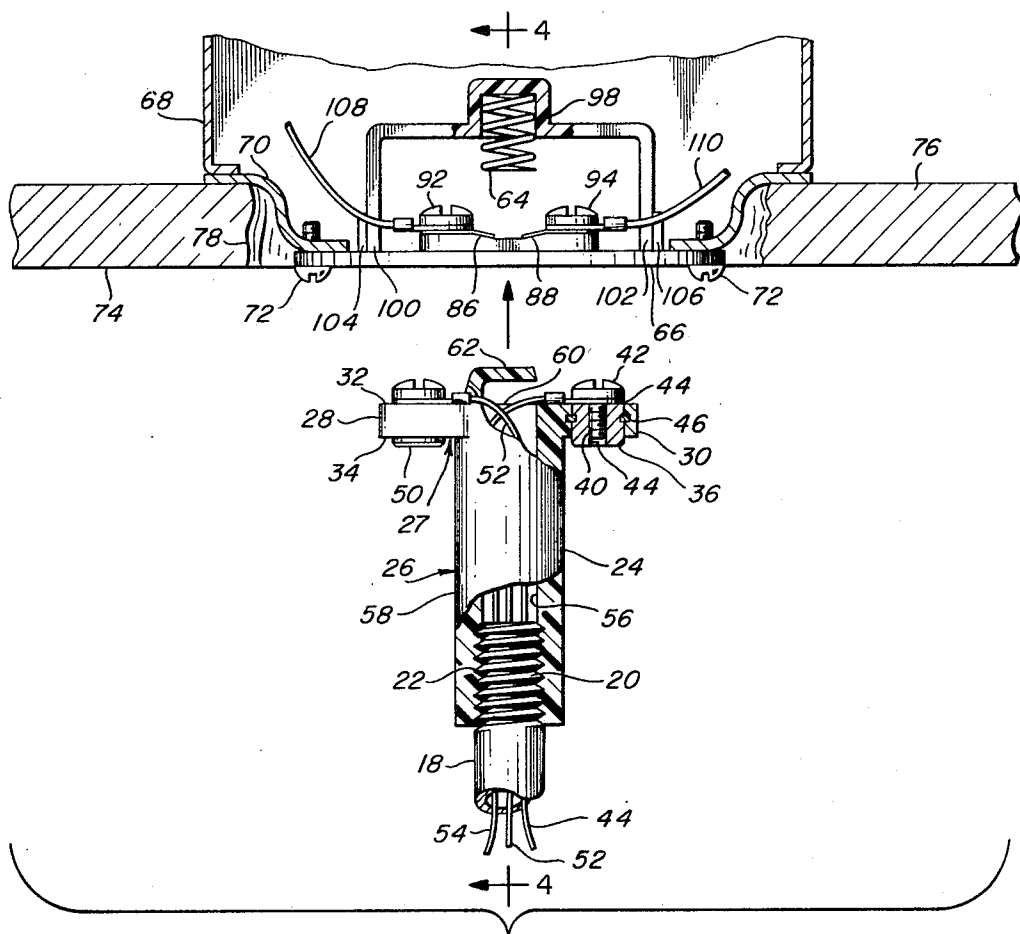


FIG. 3

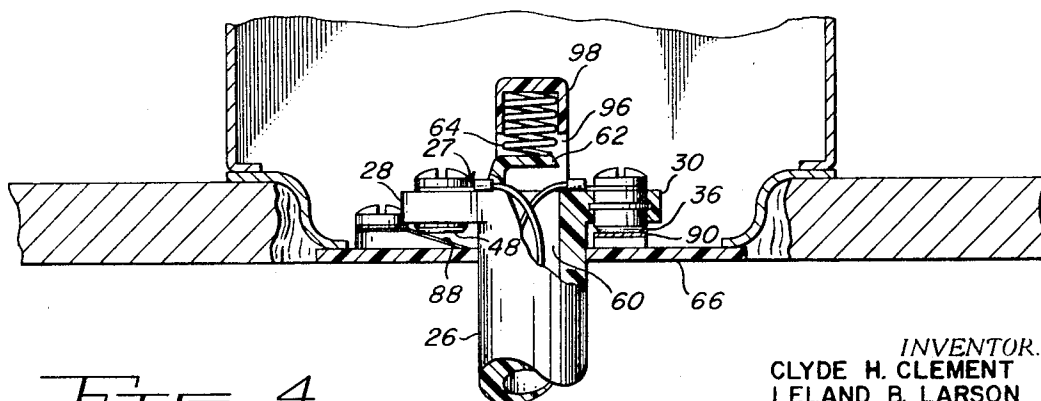


FIG. 4

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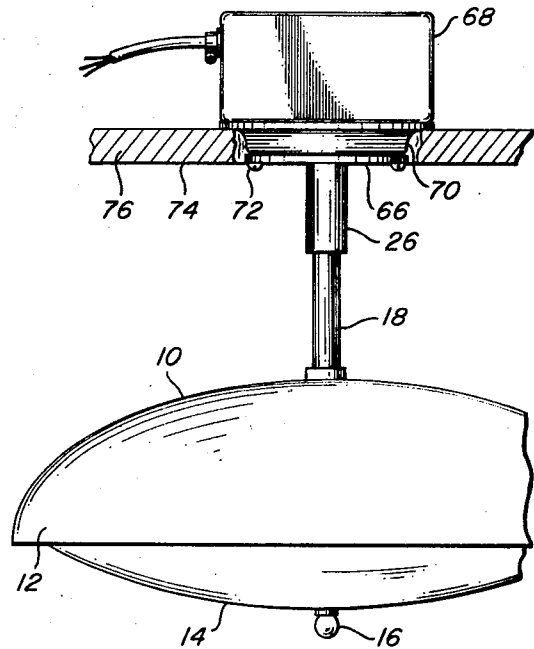
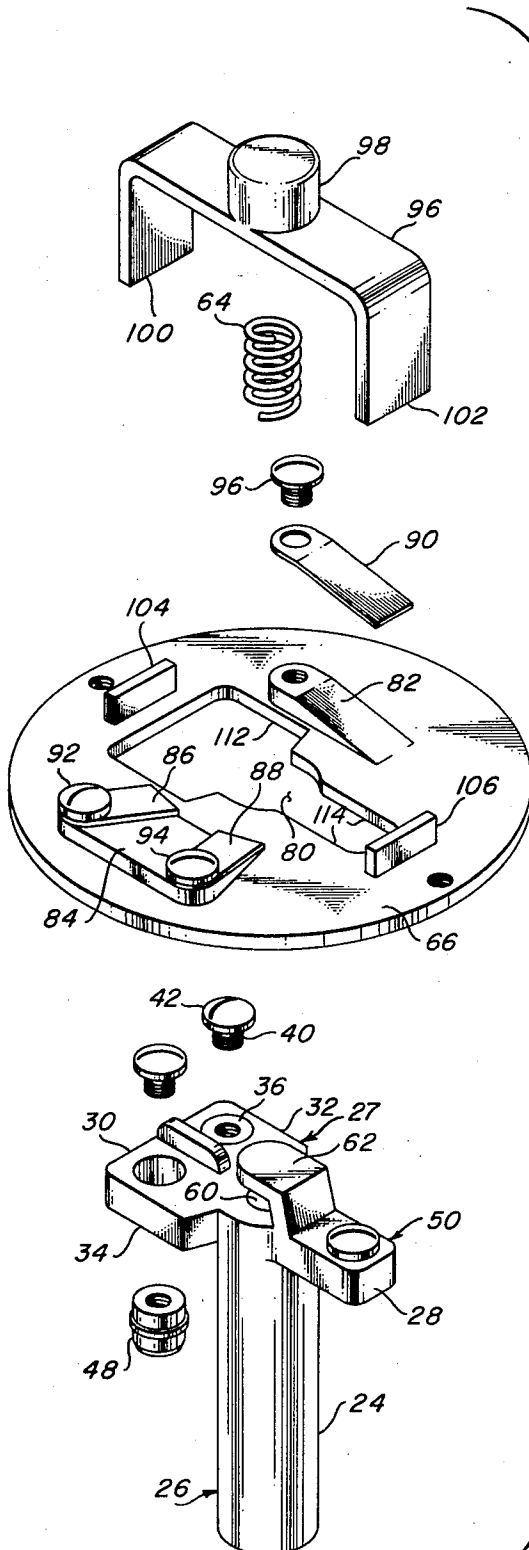


FIG. 1

FIG. 2

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**ELECTRICAL COUPLING MECHANISM**

Lighting fixtures have been suspended from ceiling structures in building rooms and have generally required maintenance attention from time to time. In many instances, these fixtures require cleaning due to the fact that insects and other foreign matter collect therein and additionally, such suspended lighting fixtures oftentimes require repairs and/or replacement of bulbs.

Suspended lighting fixtures are oftentimes difficult to handle or work with when in suspended position below a ceiling structure. In many instances, suspended lighting fixtures are somewhat flexibly mounted and handling of such fixtures in such positions becomes awkward and difficult. Lighting fixtures which are suspended by small thin-walled conduit are difficult to clean and maintain due to the fact that such conduit may be deflected if such lighting fixtures are worked on when in suspended position.

In accordance with the present invention, a mounting plate is carried by a utility box in the ceiling of a building room and is provided with an elongated opening through which a lighting fixture hanger may be inserted and rotatably locked for making mechanical and electrical connection for properly suspending and energizing a lighting fixture from the ceiling of a building room whereby the fixture and the hanger of the invention may readily be removed from the mounting plate for various purposes including the cleaning and/or maintenance of the lighting fixture. The invention comprises novel fixtures of the interlocking hanger and mounting plate whereby a lighting fixture may readily be removed from mechanical and electrical connection with structures in a utility box so that a person cleaning a lighting fixture or performing maintenance operations thereon does not risk the hazard of handling a lighting fixture which is electrically energized.

Another object of the invention is to provide a novel lighting fixture hanger and mounting plate wherein the hanger is substantially T-shaped and is adapted to be inserted upwardly through an elongated opening in the mounting plate whereby subsequent rotation of the hanger relative to the mounting plate, causes engagement of contacts carried by the mounting plate with contacts carried by the hanger while concurrently providing a mechanical interlocking support for suspending the lighting fixture. A novel resilient means is provided for maintaining pressure of the hanger contacts against the mounting plate contacts to insure efficient electrical connection and mechanical retention of the hanger relative to the mounting plate of the invention.

The invention comprises an electrical coupling mechanism which may have various uses for removably supporting a conduit mechanism and for concurrently and removably making electrical contact with a source of electrical energy wired into a conventional utility box.

Accordingly, it is an object of the present invention to provide an electrical coupling mechanism which is readily adapted to removably mount an electrical conduit structure, relative to a mounting plate, in a utility box so as to provide combined mechanical and electrical connections between the mounting plate and the conduit structure which is readily removable and replaceable concurrently to provide mechanical connection as well as electrical connection for the conduit structure relative to the utility box and the mounting plate.

Another object of the invention is to provide an electrical coupling mechanism particularly adapted for use in removably supporting and electrically connecting a suspended lighting fixture relative to utility box and a source of electrical energy wired thereinto.

Another object of the invention is to provide an electrical coupling mechanism particularly adapted for use in suspending lighting fixtures from a ceiling of a building room; the coupling mechanism being adapted readily to mechanically and electrically disconnect the lighting fixture from a utility box in said ceiling so that the lighting fixture may be cleaned or worked upon without damage to the lighting fixture and its suspension features and also without hazard to anyone handling the lighting fixture due to the fact that the invention pro-

vides for electrical disconnection of the lighting fixture when it is removed from its suspended position relative to a utility box.

Further objects and advantages of the invention may be apparent from the following specification, appended claims and accompanying drawings.

FIG. 1 is a side elevational view of a lighting fixture suspended in connection with the electrical coupling mechanism of the invention shown connected to a conventional utility box mounted relative to a ceiling of a building room;

FIG. 2 is a perspective exploded view of mechanical features of the invention;

FIG. 3 is an enlarged vertical sectional view of the mechanism of the invention shown relative to a utility box and a building room ceiling and showing the hanger of the invention directed toward the mounting plate thereof for inserting the hanger through a slot or opening in the mounting plate and for connecting it in suspended relation thereto; and

FIG. 4 is a vertical sectional view similar to FIG. 3 with the hanger of the invention completely inserted and connected relative to the mounting plate of the invention and showing the mounting plate rotated substantially 90° from that as shown in FIG. 3 of the drawings.

As shown in FIG. 1 of the drawings, a conventional lighting fixture 10 is provided with a reflector 12 and a translucent or transparent diffuser bowl 14 held by a conventional rotating nut 16 to the fixture 10.

The fixture 10 is provided with an upwardly extending hollow tubular conduit 18 adapted to contain electrical conductors as will be hereinafter described.

As shown in FIG. 3 of the drawings, the conduit 18 is provided with an externally screw-threaded portion 20 screw-threadably connected to internal screw threads 22 of a hollow tubular portion 24 of a hanger 26 of the invention.

The hanger 26 is a generally T-shaped structure having a crossbar portion 27 at its normally upper end and this crossbar portion is provided with opposite ends 28 and 30. The crossbar portion 27 is provided with upper and lower sides 32 and 34 as shown in FIG. 2 of the drawings. Cast in the end 30 of the crossbar portion 27 is a hollow cylindrical contact member 36.

The contact member 36 is provided with an internally screw-threaded bore 38 in which an externally screw-threaded screw 40 is secured. This screw 40 is provided with a head 42 adapted to hold a conductor 44 at the upper side 32 of the crossbar portion 27 of the hanger 24.

The contact member 36 is provided with an annular ring 46 protruding from its periphery and this ring 46 is cast into the crossbar end 30 as shown best in FIG. 3 of the drawings. The hanger 26 may be cast of any suitable dielectric material such that the contact 36 as well as another contact 48 may be held rigidly and securely in connection with the end 30 of the crossbar portion 27 of the hanger 26. Likewise, another contact 50 is cast into the end 28 of the crossbar portion 27 of the hanger 26 and all of the contacts 36, 48 and 50 are similar in construction to that as described in connection with FIG. 3 of the drawings.

The three contacts 36, 48 and 50 provide for conduction of conventional 110 volt electrical energy and also may provide for the connection of the usual ground wire used in conventional household electrical circuits. Thus, three electrical conductors designated 44, 52 and 54 extend from the contacts 36, 48 and 50 downwardly through a hollow bore 56 of the hanger 26. The bore 56 is surrounded by a generally tubular conduit portion 58 which as hereinbefore described, screw threadably supports a suspension conduit 18 coupled to the lighting fixture 10.

The electrical conductors 44, 52 and 54 extend from the bore 56 laterally to the contacts 36, 48 and 50 through a terminus 60 of the bore portion 56.

Overlying the terminus 60 of the bore portion 56 and in spaced relation thereto, is a cantilevered spring engaging por-

tion 62 of the hanger 26. This spring engaging portion 62 is integral with the crossbar portion 27 of the hanger between the opposite ends 28 and 30 thereof and the portion 62 is engageable by a compression spring 64 when the hanger 26 is properly connected to the mounting plate 66 of the invention as will be hereinafter described in detail.

The mounting plate 66 as shown in FIGS. 2 and 3 of the drawings, is connected to a conventional utility box 68 by means of a dielectric adapter 70.

The mounting plate 66 is coupled to the adapter 70 by means of screws 72 and the adapter plate 70 is generally ring-shaped and offset so as to extend from the utility box 68 to a plane near a lower surface 74 of a building room ceiling in order to suspend support the mounting plate 66 is close proximity to the lower plane 74 of the ceiling structure 76. The adapter 70 extends through an opening 78 in the ceiling structure 76 all as shown best in FIGS. 1, 3 and 4 of the drawings.

The adapter plate 66 as shown in FIG. 2 of the drawings, is provided with an opening 80 through which the crossbar portion 27 of the hanger 26 may be inserted. The opening 80 is elongated and of a breadth substantially less than the distance between opposite ends 28 and 30 of the crossbar portion 27 of the hanger 26.

At opposite sides of the opening 80 the mounting plate 66 is provided with contact mounts 82 and 84 on which contact plates 86, 88 and 90 are held by screws 92, 94 and 96 respectively. The screws 92, 94 and 96 are screw-threaded into the contact mounts 82 and 84 of the mounting plate 66.

The contact plates 86, 88 and 90 are adapted to be engaged respectively by the contacts 36, 48 and 50, carried by the hanger 26, when the crossbar portion 27 of the hanger 26 is inserted through the opening 80 in the mounting plate and rotated substantially 90° relative thereto.

A generally U-shaped spring holder 96 is provided with an intermediate portion 98. This intermediate portion 98 is substantially cup-shaped and holds the spring 64. Integral with the intermediate portion 98 are downwardly extending spaced apart legs 100 and 102 which are secured to the mounting plate adjacent to upstanding taps 104 and 106 respectively.

The mounting plate and spring holder 96 may be made of suitable dielectric material so that the legs 100 and 102 may be cemented to the taps 104 and 106 in a position substantially as shown in FIG. 3 of the drawings.

The screws 92 and 94 hold electrical conductors 108 and 110 in connection with the contacts 86 and 88 and a conductor similar to the conductors 108 and 110 is held by the screw 96 relative to the contact 90 so that these conductors may be coupled to sources of electrical energy and a ground wire in the utility box 68.

As shown in FIG. 4 of the drawings, the hanger 26 of the invention is in the same position as that shown in FIG. 3 of the drawings; however, the mounting plate 66 is shown rotated 90° relative thereto as shown in FIG. 3, so as to illustrate engagement of the contacts carried by the hanger 26 with the contacts carried by the mounting plate 66.

The spring holder 96 as shown in FIG. 4, retains the spring 64 in the cup-shaped portion 98 and this spring bears upon the spring engaging portion 62 of the hanger 26. Thus, the compression spring 64 forces the opposite ends 28 and 30 of the crossbar portion 27 of the hanger 26 downwardly so that the contacts carried by the crossbar engage the contacts carried by the mounting plate 66. The bearing of the contacts carried by the hanger 26 or the contacts carried by the mounting plate 66 provides for mechanical suspension support of the lighting fixture 10 as well as the suspension conduit 18 shown in FIG. 1 of the drawings.

It will be seen that the opening 80 is provided with a substantially wide portion 112 and a substantially narrower portion 114. The wider portion 112 of the opening 80 receives the end 30 of the crossbar portion 27 of the hanger 26 while the relative narrow end 114 receives the end 28 of the crossbar portion of the hanger 26. It will be appreciated, however, that the spacing apart of the end portions 28 and 30 is greater than

the width of the broad portion 112 of the opening 80 and therefore, when the opposite ends 28 and 30 of the crossbar are inserted through the opening and rotated substantially 90° they overlie the contacts 86, 88 and 90 to provide electrical connection as well as mechanical support for the hanger 26, suspension conduit 118 and the lighting fixture 10.

It will be appreciated by those skilled in the art that rotation of the hanger 26 may permit removal of the hanger relative to the mounting plate 66 which causes electrical disconnection of the contacts and therefore complete electrical deenergization of the lighting fixture 10 so that it may be removed and cleaned or handled for the purpose of various maintenance operations to be performed thereon.

Removal of the lighting fixture 10 from its position adjacent a building room ceiling permits the lighting fixture to be handled with facility and efficiency and alleviates the electrical hazards as well as the usual mechanical hazards attendant to the upward reaching or the standing on a ladder by the operator when cleaning or performing maintenance operations on lighting fixtures suspended from a building room ceiling.

We claim:

1. In an electrical coupling mechanism, the combination of: a mounting plate adapted to be secured to a utility box; said mounting plate having an elongated opening therein; first electrical contacts carried by said mounting plate in position laterally with respect to said elongated opening; a generally T-shaped hanger having a crossbar portion and a conduit portion; said crossbar portion having opposite ends extending in opposite directions away from said conduit portion; said opposite ends of said crossbar portion spaced apart a distance slightly greater than the breadth of said elongated opening; second electrical contacts located generally on said opposite ends of said crossbar portion, said crossbar portion and said second contacts disposed to be inserted through said elongated opening in said mounting plate, whereupon subsequent rotation of said T-shaped hanger about an axis, generally at right angles to said crossbar portion and relative to said mounting plate, may dispose said second contacts in engagement with said first contacts; and resilient means carried by said mounting plate tending to force said crossbar portion toward said mounting plate and to maintain said second contacts engaged with said first contacts.

2. The invention as defined in claim 1 wherein first and second electrical conductors are connected respectively to said first and second contacts; said second conductors extending through said conduit portion of said T-shaped hanger.

3. The invention as defined in claim 1 wherein one of said ends of said crossbar portion carries two of said second contacts and the other of said ends carries another of said second contacts.

4. The invention as defined in claim 1 wherein said mounting plate is provided with a generally U-shaped spring holder provided with an intermediate portion and a pair of leg portions extending therefrom; said leg portions secured to said mounting plate and straddling said opening in said mounting plate; said intermediate portion having a spring holding portion, said resilient means being a spring held by said spring holding portion.

5. The invention as defined in claim 4 wherein said conduit portion of said T-shaped hanger is provided with a hollow bore portion adapted to contain electrical conductors; said hollow bore portion having an open terminus at said crossbar portion; said crossbar portion having a spring engaging portion disposed in spaced relation to said open terminus of said bore portion to permit conductors to extend from said bore portion to said second contacts, said spring engaging portion engageable with said spring when said T-shaped hanger is extending through said opening in said mounting plate.

6. The invention as defined in claim 1 wherein said mounting plate and said hanger are made of dielectric material.

7. The invention as defined in claim 1 wherein said mounting plate is adapted to be secured in horizontal position in connection with said utility box in a building room ceiling structure; and a lighting fixture suspended from said hanger.

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8. The invention as defined in claim 7 wherein a dielectric adapter is coupled to said mounting plate and adapted to be secured to said utility for suspending said mounting plate.

9. The invention as defined in claim 7 wherein said conduit portion of said hanger is provided with an internally screw-threaded bore; and a suspension conduit having external screw threads screw threaded into said internally screw-threaded bore, said suspension conduit and said conduit portion of said hanger being hollow and adapted to contain electrical conductors extending from said second contacts to said

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lighting fixture.

10. The invention as defined in claim 7 wherein said mounting plate is provided with upper and lower sides; said first contacts on said upper side; said opposite ends of said crossbar portion of said T-shaped hanger being disposed apart a distance greater than lateral dimensions of said elongated opening in said mounting plate whereby said opposite ends of said crossbar overlie said upper side of said mounting plate when said hanger suspends said electrical fixture.

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