

Aug. 20, 1946.

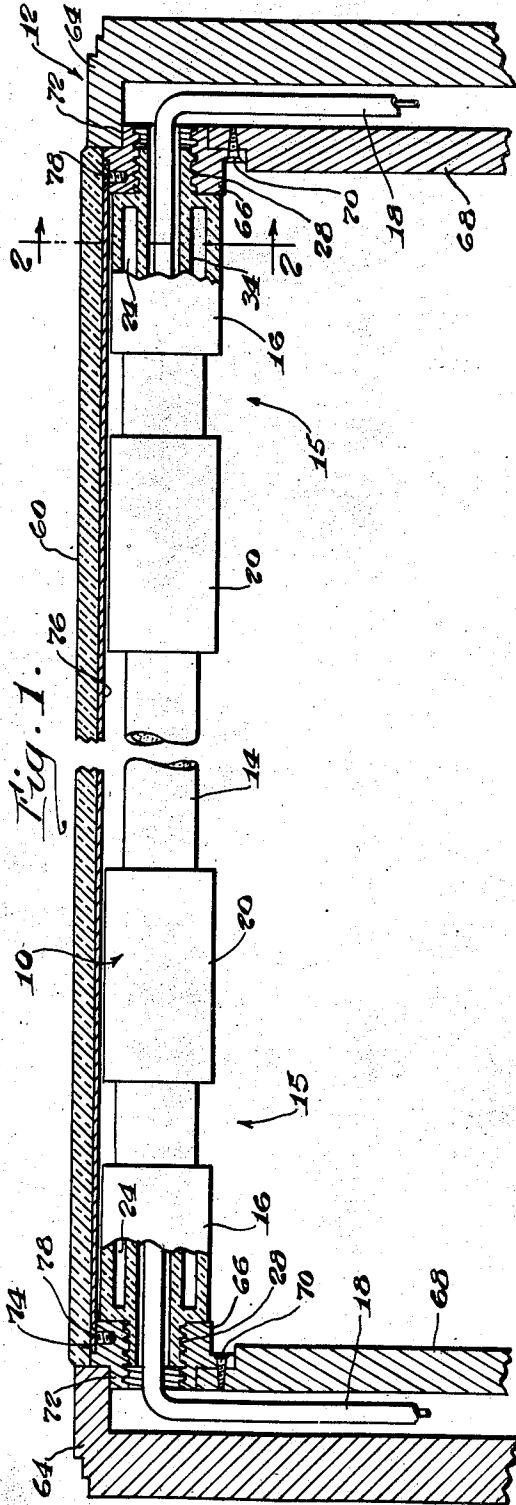
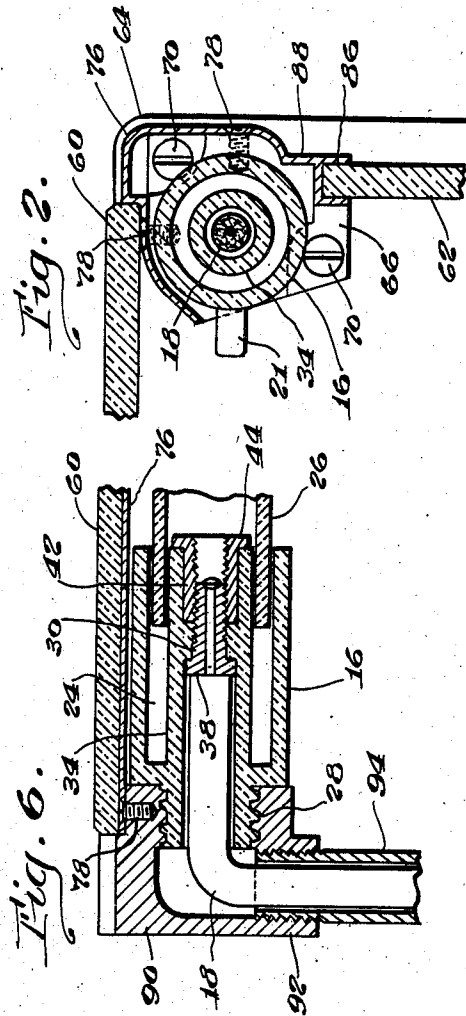
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2,406,145

FLUORESCENT LIGHTING UNIT

Filed March 8, 1944

3 Sheets-Sheet 1



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Fig. 3.

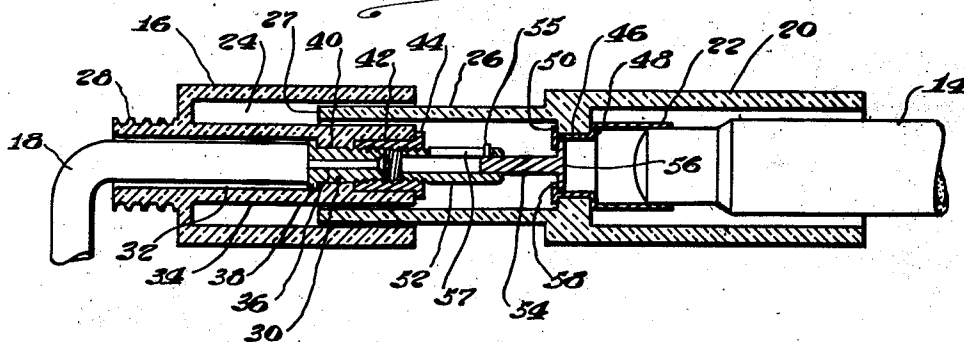
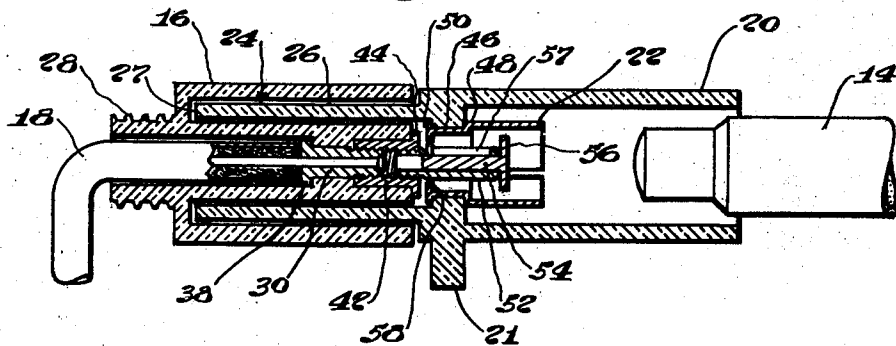


Fig. 4.



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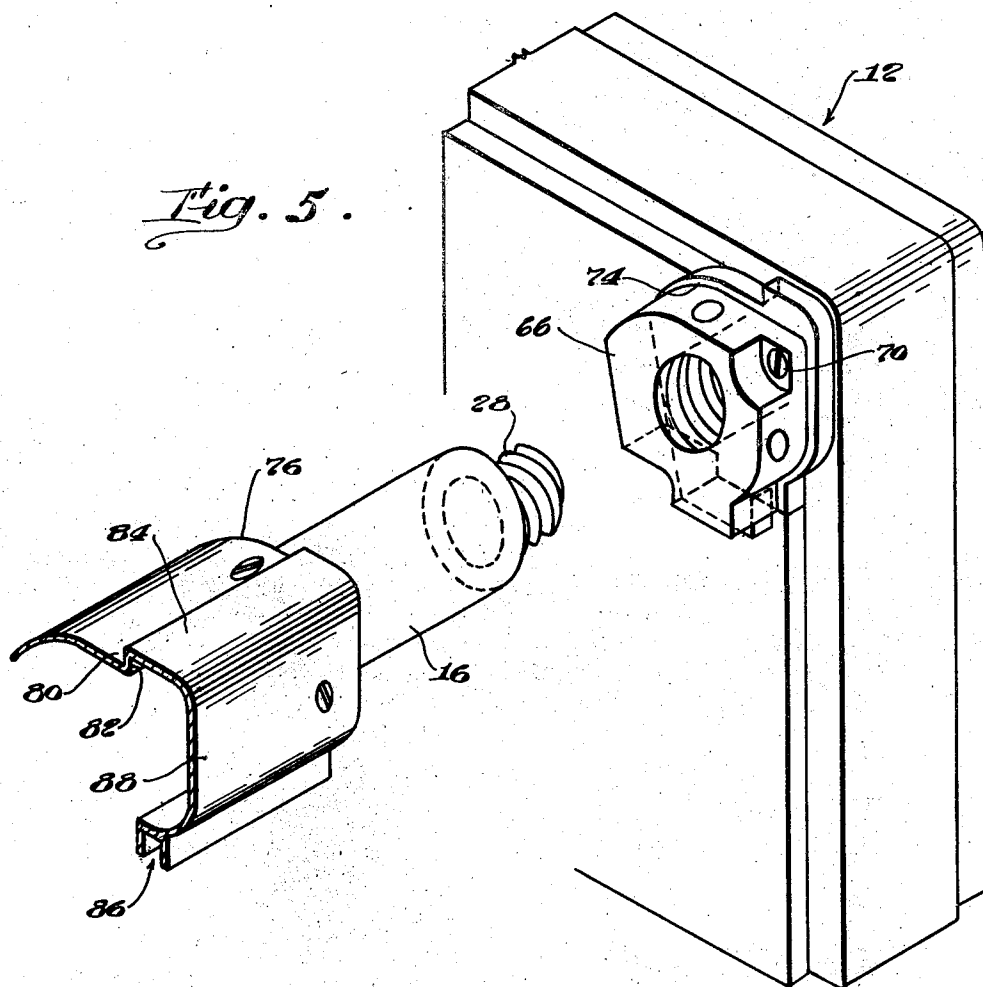
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Fig. 5.



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UNITED STATES PATENT OFFICE

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FLUORESCENT LIGHTING UNIT

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6 Claims. (Cl. 240—6)

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This invention relates to a fluorescent lighting unit particularly adapted for illuminating the interior of a show case or the like.

The invention has for an object to provide a novel and improved fluorescent lighting unit of the character specified in which provision is made for mounting the fluorescent lamp in a novel and improved manner to provide minimum liability of arcing or grounding from the terminals and whose structure enables it to conform in all respects to the regulations adopted by the National Board of Fire Underwriters.

With this general object in view, and such others as may hereinafter appear, the invention consists in the lighting unit and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention, Fig. 1 is a front elevation of a show case embodying the present fluorescent lighting unit, some of the parts being broken away and shown in cross section; Fig. 2 is an enlarged cross sectional view in side elevation taken on the line 2—2 of Fig. 1; Fig. 3 is an enlarged detail view in longitudinal cross section of a terminal housing embodied in the present lighting unit, the housing being shown in its extended position and with one end of the lamp inserted; Fig. 4 is a similar view with the housing shown in its retracted position and with the lamp disconnected; Fig. 5 is a perspective view of one end of the lighting unit as embodied in a show case, some of the parts being shown separated for clearness of illustration; and Fig. 6 is a cross sectional view of a modified form of mounting for use with the present lighting unit, to be referred to.

In general, the present invention contemplates an improved fluorescent lighting unit particularly adapted for use in illuminating the interior of a show case or the like and in which provision is made for mounting the lighting unit in a novel and improved manner whereby to provide a simple and efficient structure for detachably supporting the contact ends of the fluorescent lamp in engagement with the terminals provided therefor, and whose structure is such that the liability of inadvertent arcing from the terminals is reduced to a minimum.

In accordance with the present invention, the illustrated lighting unit includes a pair of extensible socket members comprising safety housings which may be supported at each end of the

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show case or other similar unit to be illuminated and which are capable of retraction and extension to permit insertion and removal of the elongated fluorescent lamp, and whose construction is such as to maintain a safe arcing distance from the terminal connections to the exterior of the safety housing at all times.

In the preferred form of the invention, as embodied in a show case, the lighting unit includes a reflector or shield which may and preferably will comprise the front rail thereof, forming a part of the frame of the show case, and supporting the adjacent edges of the top and front glass panels. The ends of the show case may and preferably will be constructed to provide a hollow interior to receive and conceal the wires leading from the supporting sockets.

Referring now to the drawings, the present fluorescent lighting unit, indicated generally at 10, is preferably illustrated as embodied in a show case 12 and includes an electric discharge tube or fluorescent lamp 14, preferably of the cold cathode type which is arranged to be operatively supported at either end in a pair of safety housings, indicated generally at 15, and preferably mounted at each end of the show case. The safety housings 15 may and preferably will be made of porcelain, glass, plastics or other dielectric material, and, as herein shown, each housing includes a stationary tubular member 16 in which provision is made for connecting a terminal wire 18, and a longitudinally movable tubular member 20 provided with a socket 22 for receiving one end of the fluorescent lamp. The stationary member 16 as herein illustrated is provided with an annular recess 24 arranged to slidably or telescopically receive a reduced portion 26 of the tubular movable member 20 whereby to permit extension and retraction of the socket housing member 20 with respect to the terminal housing member 16 for insertion or removal of the elongated fluorescent lamp 14. The stationary member is also provided with an exteriorly threaded end portion 28 for cooperation with a suitable receptor support for the lighting unit to be hereinafter described.

As best shown in Figs. 3 and 4, the insulated terminal wire 18 is connected to an adapter 30 which is supported within a central opening 32 formed in a centrally disposed and longitudinally extended cylindrical portion 34 of the stationary member 16. The bared end portion of the terminal wire 18 is preferably extended through a central bore 36 of the adapter and soldered at the extended end in a countersunk portion provided

therefor. The adapter 30 is provided with a flanged head 38 which is seated against a portion 40 of reduced diameter formed within the opening 32, the other end of the adapter extending through said portion, and is provided with external threads for cooperation with a second adapter 42 which is internally threaded. The second adapter 42 is also provided with a flanged head 44 which engages with the top of the cylindrical portion 34 of the stationary housing member 16 when the two adapters are screwed up tight as illustrated in Figs. 3 and 4.

As herein illustrated, the socket member 22, which may be of the split fuse holder type for yieldingly engaging the end of the fluorescent lamp, may and preferably will be permanently fixed within the tubular housing member 20. The attached end of the socket is formed of a reduced diameter and extended through a collared portion 46 formed in the tubular member, the shouldered portion 48 of the socket resting against one edge of the collared portion and the extended end of the socket being bushed over or spun against the opposite edge of the collar as indicated at 50 to permanently secure the socket in place.

In order to provide a connection between the terminal connections or adapters 30, 42 carried by the stationary housing member 16 and the socket 22 carried by the movable housing member 20 and to maintain contact therebetween during extension and contraction thereof, a sliding or extensible connection is provided, herein shown as comprising a female member or bushing 52 screwed into the internally threaded adapter 42 and a cooperating male member or sliding contact pin 54 slidably fitted within the bushing 52. As herein shown, the outer end of the contact pin 54 is disposed within the socket 22 and is provided with an enlarged head 56 for engagement with an inwardly flanged portion 58 at the bottom of the socket member, as clearly shown in Figs. 3 and 4. Thus, in operation, when the socket housing member 20 is extended to operatively engage the end of the fluorescent lamp, as shown in Fig. 3, the contact pin 54 is moved forward in the bushing 52 while maintaining contact therewith. When the socket housing member 20 is retracted to the full depth of the annular recess 24, as shown in Fig. 4, the female member 52 is arranged to pass through the opening in the bottom of the socket 22 formed by the inwardly flanged portion 58, the male member being moved back by the engagement of the end of the lamp during the shifting thereof in the removing operation, or, the male member may remain in its extended position to be again engaged by the bottom of the socket when the latter is moved forward into operative engagement with the lamp.

The present fluorescent lamp housing is designed to conform with the standards adopted by the National Board of Fire Underwriters for terminals and receptacles for gas tubing operating at high voltages which require that the live terminals and conductors shall be so supported as to maintain a separation of at least 1½ inches between the conductor and any grounded metal. The present lighting unit preferably employs a cold cathode type of fluorescent lamp operative at around 15,000 volts and is usually provided with a shield or reflector which may be made of metal. Thus, in the above described embodiment of the invention, the socket member 22 is disposed at a sufficient depth in the housing member 20 so that the distance from the top of the live socket to

the outer end of the housing member 20 is equal to or in excess of the minimum arcing distance required by the National Board of Fire Underwriters. Also, the stationary housing member 16 is constructed to dispose the end of the flanged head 38 of the adapter 30 a sufficient depth from the threaded end 28 of the housing 16 to assure a minimum arcing distance equal to or in excess of the National Board of Fire Underwriters standards. The remaining point of exposure or possible path of leakage of the current comprises the air space defined by the distance from the head 44 of the adapter 42 downwardly between the cylindrical portion 34 and the inner surface of the telescopically engaged portion 26 of the member 20, then across the bottom edge 27 of such portion and upwardly between the outer surface of the portion 26 and the inner surface of the tubular outer wall of the member 16 to the outer edge of said member 16. In order to assure the maintenance of a safe arcing distance through the above defined path at all times during the extension or retraction of the sliding member 20, the annular recess 24 is made of sufficient depth and the telescopically engaged portion 26 is made of sufficient length so that when the movable member 20 is moved to its position of maximum extension into operative engagement with the lamp, the air space through the above defined path will equal or exceed the minimum distance required.

Provision is also made for breaking the contact between the male and female connecting members 52, 54 in the event that the movable member 20 is inadvertently extended beyond the required safety distance and to this end the members 52, 54 are so proportioned as to separate upon such abnormal projection of the housing. However, as illustrated in Fig. 3, a suitable stop pin 55 may and preferably will be provided in the end of the male member 54 for engagement with the closed end of a slotted portion 57 in the female member 52 to prevent extension of the movable member 20 beyond the required safe distance to thus positively assure the maintenance of a safe arcing distance from any live conductor to a possible grounding point adjacent the outside of the housing.

From the description thus far it will be observed that the present safety housing provides a simple and efficient unit to permit extension and contraction into and out of operative engagement with the contact ends of the fluorescent lamp and whose construction is such as to maintain the maximum required separation between any portions of the high voltage conductors to a possible grounding point outside the shielding housing and that any type of metal reflector or metal supporting structure for the housings may be used without danger of arcing from the live conductors.

Referring now to Fig. 1, the present fluorescent lighting unit is preferably illustrated as embodied in the show case 12 having top and front glass panels 60, 62 and hollow end panels 64. As herein shown the safety housings 15 are mounted in internally threaded receptors 66 in which the threaded end 28 of the housings may be received. The receptors may be secured to the inner wall 68 of each end panel 64 by screws 70. In order to provide a more rigid attachment to the panels and to assure proper alignment, the receptors may be provided with shouldered portions 72 extended into a bore in the inner wall 68. The receptors 66 may be made of a plastic

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or other suitable dielectric material, or, they may be made of metal since the construction of the housing is such as to reduce to a minimum any danger of arcing from the live conductors.

As herein shown, each receptor 66 is preferably disposed in the upper front corner of the end panels 64 of the show case, and, as best shown in Fig. 5, each receptor is rabbeted as indicated at 74, around its inner edge to receive the ends of the front rail 76 of the show case frame, the rabbeted portion conforming to the contour of the rail to form a flush exterior surface. The rail 76 may be secured to the receptors by screws 78 and as thus constructed the front rail serves as a reflector or shield for the elongated lamp. The reflector rail may be made of a suitable plastic material or may be made of metal. When made of metal, the receptors 66 and the reflector rail 76 may and preferably will be suitably grounded.

The front rail 76 is also preferably designed to support the front edge of the top glass panel 60 in a recess 80 formed by an offset 82 in the upper wall 84 of the rail, and, a grooved portion 86 formed integrally with the front wall 88 of the rail is provided to receive the upper edge of the front glass panel 62 as illustrated. The reflector rail is preferably designed to effect illumination of the interior of the show case and to serve as a shield to prevent any glare from the lamp from being directed toward the observer standing in front of or in the rear of the show case.

From the above description it will be observed that when thus embodied in a show case the insulated wire leads 18 may be drawn through the hollow end panels 64 to thus conceal the lead wires from view and to leave the interior of the show case free from wiring or wiring conduits. It will also be observed that the reflector rail conceals the safety housings from the view of the observer thus providing a compact and efficient unit for embodiment in a show case.

In some instances, it may be desired to support the ends of the safety housings 15 independently of the ends of the show case, and, for this purpose, as illustrated in Fig. 6, a modified form of support may comprise a receptor 90 provided with an elbow 92 formed integrally therewith and arranged to receive a conduit 94 through which the wires are extended. The contour of the modified receptor may and preferably will be such as to fit snugly within the front reflector rail and may be attached thereto by screws 78, as above described.

Likewise, the present fluorescent lighting unit may be supported within the show case independently of the front rail. In such instances, the receptors 90 may be used and a separate reflector section attached thereto. Such units may be supported in any position within the show case remote from the front rail or frame of the show case.

As illustrated in Fig. 4, the movable housing member 20 may and preferably will be provided with an integral lug 21 extending radially therefrom for convenience in sliding the housing member into and out of operative engagement with the ends of the fluorescent lamp.

From the above description it will be seen that the extensible safety housing embodied in the present lighting unit comprises a shielding member for the live conducting elements supported therein and that the construction of the housing is such as to maintain at least a predetermined minimum unshielded distance or air space

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from the live conducting elements to a possible grounding point adjacent the outer surface of the housing, such as the supporting elements or the reflector rail whereby to reduce to a minimum liability of arcing from said elements to such possible grounding points.

While the preferred embodiment of the invention has been herein illustrated and described it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. In a fluorescent lighting unit for use in a show case or the like having top and front glass panels and hollow end panels, a pair of safety housings comprising extensible shielding members for operatively supporting the ends of a fluorescent lamp, means for supporting said safety housings comprising a pair of receptors attached to said hollow end panels, said hollow end panels being arranged to receive and conceal the wiring from the unit, a reflector rail comprising the front rail of the show case frame attached to said receptors and disposed in close proximity to said safety housings, said front rail having provision for supporting the adjacent edges of said top and front glass panels, live conducting elements of relatively high voltage supported within said housings, the arrangement being such that said safety housings may be longitudinally contracted to permit insertion of said lamp and thereafter extended into operative position, with all conductive material within said housings shielded at all times.

2. In a fluorescent lighting unit, a safety housing for operatively supporting the end of a fluorescent lamp, comprising: an insulating member having an opening therein adapted to receive an insulated cable having a bared end, so that the insulated portion of said cable will extend to a point substantially within said insulating member; a conducting member secured within said insulating member for connection with the bared end of said insulating cable; an elongated hollow insulating member telescopically associated with said first named insulating member; a lamp socket secured within said hollow insulating member spaced inwardly from both of the ends thereof; and means maintaining an electrical connection at all times between said conducting member and said lamp socket, the arrangement being such that said safety housing may be longitudinally contracted to permit insertion of said lamp and thereafter extended into operative position, with all conductive material within said housing shielded at all times.

3. In a fluorescent lighting unit, a safety housing for operatively supporting the end of a fluorescent lamp, comprising: an insulating member having an opening therein adapted to receive an insulated cable having a bared end, so that the insulated portion of said cable will extend to a point substantially within said insulating member; a conducting member secured within said insulating member for connection with the bared end of said insulating cable; an elongated hollow insulating member telescopically associated with said first named insulating member; a lamp socket within said hollow insulating member spaced inwardly from both of the ends thereof; an elongated bushing secured to said conducting member and an elongated pin slidably received by said bushing and engageable with said lamp socket, said bushing and said pin main-

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taining at all times an electrical connection between said conducting member and said lamp socket, the arrangement being such that said safety housing may be longitudinally contracted to permit insertion of said lamp and thereafter extended into operative position, with all conductive material within said housing shielded at all times.

4. In a fluorescent lighting unit, a safety housing for operatively supporting the end of a fluorescent lamp, comprising: an insulating member having an opening therein adapted to receive an insulated cable having a bared end, so that the insulated portion of said cable will extend to a point substantially within said insulating member; a conducting member secured within said insulating member for connection with the bared end of said insulated cable; an elongated hollow insulating member telescopically associated with said first-named insulating member; a lamp socket within said hollow insulating member spaced inwardly from both of the ends thereof; an elongated bushing secured to said conducting member; an elongated pin slidably received by said bushing and engageable with said lamp socket; and a stop member mounted on said pin and engageable with a portion of said bushing for limiting the outward movement of said pin with respect to said bushing, said bushing and said pin maintaining at all times an electrical connection between said conducting member and said lamp socket, the arrangement being such that said safety housing may be longitudinally contracted to permit insertion of said lamp and thereafter extended into operative position, with all conductive material within said housing shielded at all times.

5. In a fluorescent lighting unit, a safety housing for operatively supporting the end of a fluorescent lamp, comprising: a hollow insulating member having an opening therein adapted to receive an insulated cable having a bared end, so that the insulated portion of said cable will extend to a point substantially within said hol-

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low insulating member; a conducting member secured within said hollow insulating member for connection with the bared end of said insulated cable, a second hollow insulating member telescopically associated with said first-named hollow insulating member; a lamp socket within said second-named hollow insulating member spaced inwardly from both of the ends thereof; and means maintaining an electrical connection at all times between said conducting member and said lamp socket, the arrangement being such that said safety housing may be longitudinally contracted to permit insertion of said lamp and thereafter extended into operative position, with all conductive material within said housing shielded at all times.

6. In a fluorescent lighting unit, a safety housing for operatively supporting the end of a fluorescent lamp, comprising: an insulating member having a longitudinally extending opening disposed centrally thereof adapted to receive an insulated cable having a bared end so that the insulated portion of said cable extends substantially within said insulating member, and a longitudinally extending annular recess arranged concentrically with respect to said opening; a conducting member secured within said insulating member for connection with the bared end of said insulated cable; an elongated hollow insulating member having a longitudinally extending portion slidably received in said annular recess of said first-named insulating member; a lamp socket secured within said hollow insulating member spaced inwardly from both of the ends thereof; and means maintaining an electrical connection at all times between said conducting member and said lamp socket, the arrangement being such that said safety housing may be longitudinally contracted to permit insertion of said lamp and thereafter extended into operative position, with all conductive material within said housing shielded at all times.

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