July 23, 1946. P. F. EARLY 2,404,476

ELECTRIC LAMP

Filed Oct. 16, 1943 2 Sheets-Sheet 1

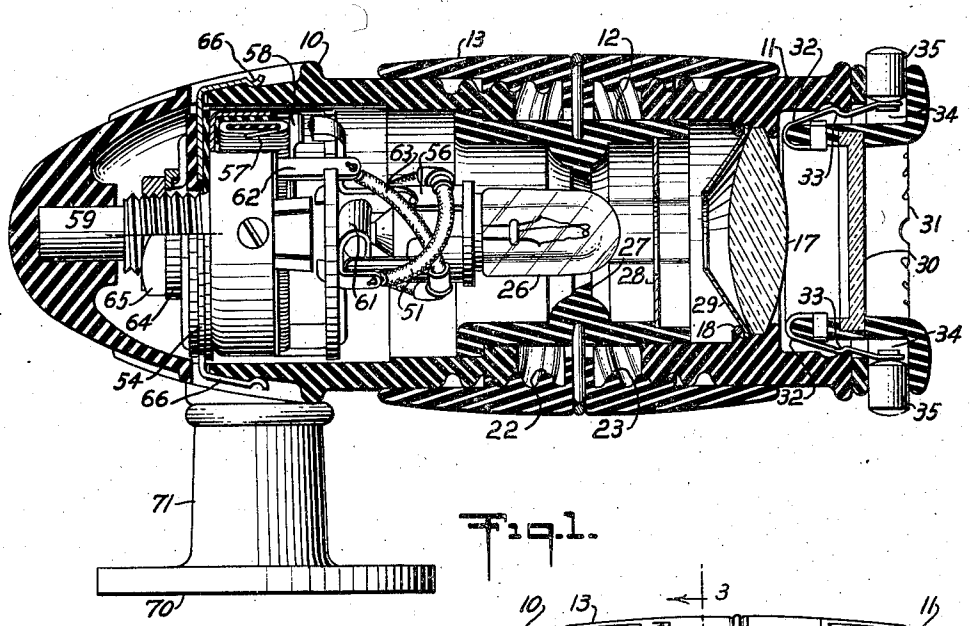


Fig. 1.

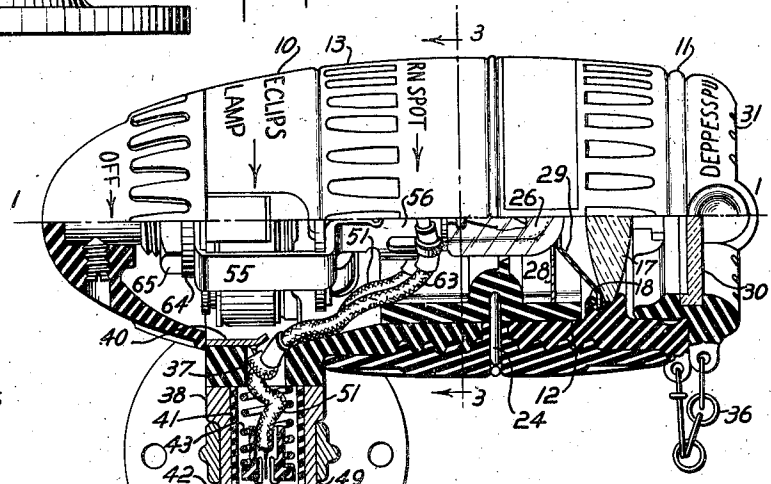


Fig. 2.

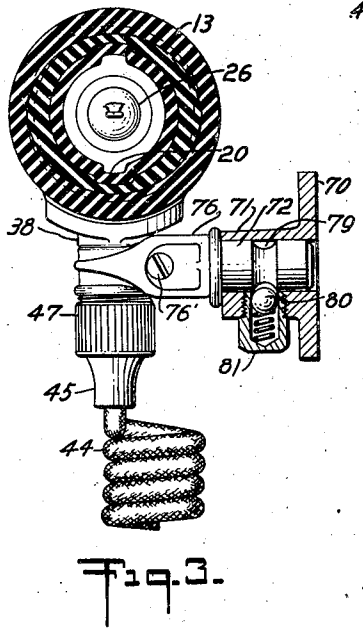


Fig. 3.

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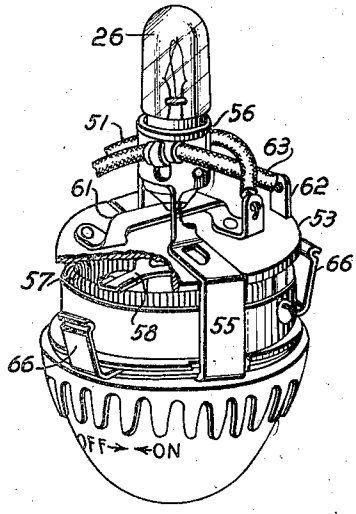


Fig. 4.

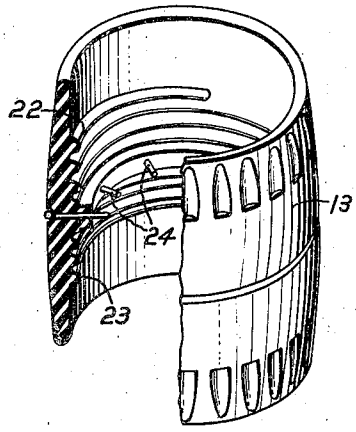


Fig. 5.

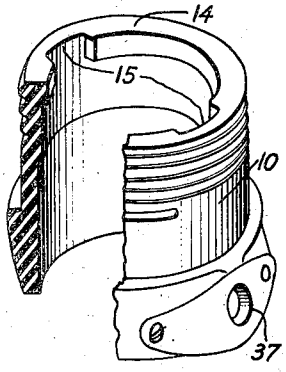


Fig. 6.

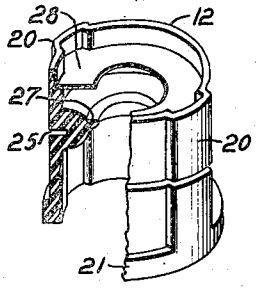


Fig. 7.

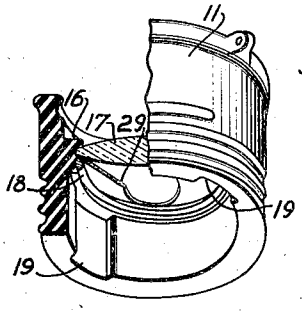


Fig. 8.

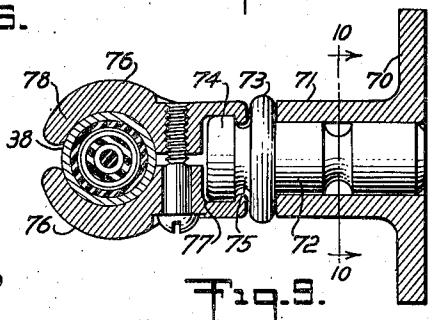


Fig. 9.

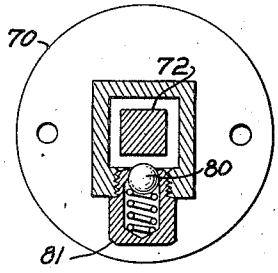


Fig. 10.

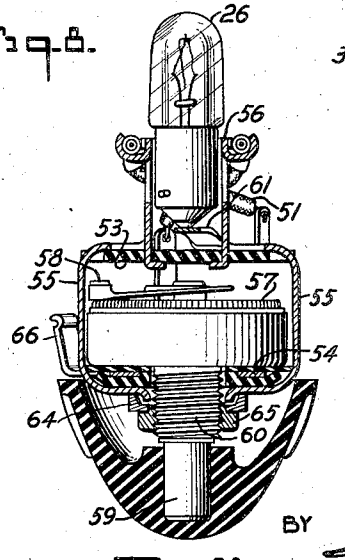


Fig. 11.

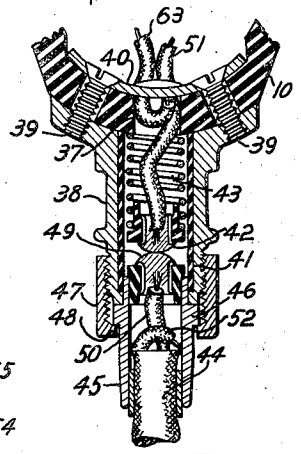


Fig. 12.

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Patented July 23, 1946 2,404,476

UNITED STATES PATENT OFFICE

2,404,476

ELECTRIC LAMP

Paul F. Early, New Carlisle, Ohio, assignor to Standard Aircraft Products, Inc., Dayton, Ohio, a corporation of Delaware

Application October 16, 1943, Serial No. 506,482

4 Claims. (Cl. 240—41)

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This invention relates to an electric lamp and more particularly to a lamp of a type known as a cockpit lamp, which is designed more particularly for use on military aircraft but is not limited to such use.

In the operation of aircraft at night it is important that there should be at least sufficient illumination within the same to render the instrument panel visible and to enable other instrumentalities to be observed and operated, and in the operation of military aircraft it is equally important that there should be no light in or on the same which would be visible to enemy aircraft or from the ground when operating over enemy territory. It has been proposed heretofore to equip military aircraft with a lamp, or lamps, which can be adjusted to provide a diffused or flood light illumination when such illumination is not objectionable and, when concealment is necessary, to provide a concentrated beam, or spotlight, which can be confined to a particular instrument or other restricted area which is to be illuminated.

It is one object of the invention to provide such a lamp of improved construction and operation.

A further object of the invention is to provide such a lamp which can be quickly and easily adjusted to provide the desired illumination and which will be automatically retained in its adjusted position.

A further object of the invention is to provide such a lamp in which maximum adjustment may be effected by a relatively small movement of the adjusting element.

A further object of the invention is to provide such a lamp in which the projected beam is sharply defined and free from stray rays of light.

A further object of the invention is to provide such a lamp in which the lamp bulb support and the circuit controlling element may be removed without the use of instruments and without breaking circuit connections.

A further object of the invention is to provide such a lamp which can be mounted on a fixed support for easy adjustment with relation thereto and which can be easily dismounted for movement from place to place while connected with a source of current supply.

A further object of the invention is to provide such a lamp with means whereby the conductor cable may be quickly and easily attached thereto or detached therefrom without the use of tools.

Other objects of the invention may appear as the device is described in detail.

In the accompanying drawings Fig. 1 is a longitudinal sectional view taken centrally through a

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lamp embodying the invention, on the line 1—1 of Fig. 2; Fig. 2 is a side elevation of such a lamp partly in section; Fig. 3 is a transverse section taken on the line 3—3 of Fig. 2, looking in the direction of the arrows; Fig. 4 is a detail view of the lamp bulb supporting and circuit controlling unit; Fig. 5 is a perspective view, partly broken away, of the rotatable adjusting element; Fig. 6 is a perspective view, partly broken away, of the body member; Fig. 7 is a perspective view, partly broken away, of the key member; Fig. 8 is a perspective view, partly broken away, of the lens support; Fig. 9 is a detail view, partly in section, of the detachable mounting; Fig. 10 is a transverse section on the line 10—10 of Fig. 9; Fig. 11 is a sectional detail view of a part of the control unit; and Fig. 12 is a sectional detail view of the cable connection.

In these drawings there is illustrated one embodiment of the invention which is designed primarily for use on military aircraft, but it will be understood that the invention may take various forms and may be used for various purposes.

In the illustrated embodiment the lamp comprises a substantially cylindrical casing which includes a normally stationary body member 10, a lens supporting member 11 in line with and adjustable lengthwise of the lamp with relation to the body member, a key element 12 to prevent the rotation of the lens support with relation to the body member, and an outer adjusting member 13 to impart axial movement to the lens support. The body member 10 is tubular and substantially cylindrical in shape and has at its forward or inner end a circumferential flange 14 which is provided with notches 15 forming keyways, and is also provided with means whereby it may be detachably connected with a supporting structure and supported in a normally stationary but adjustable position. The lens support 11 is also substantially cylindrical in form and is provided between its ends with an inwardly extending circumferential rib 16 against which a lens 17 is held by means of a snap ring 18. That portion of the lens support in the rear of the lens is provided with longitudinal grooves 19 forming keyways. The key member 12 is of a generally cylindrical construction and is provided on opposite sides thereof with outwardly extending portions 20 forming keys which have a sliding fit in the keyways 15 and 19 of the body member and the lens support and constitute splines which hold the lens support against rotation with relation to the body member. At its rear end the key member is provided with an

outwardly extending flange 21 which is arranged in the rear of the flange 14 of the body member to form a stop, as will be hereinafter explained. Mounted about the adjacent portions of the body member and the lens support is an adjusting device 13 so connected with the respective members that the rotation thereof will impart axial movement to the lens support with relation to the adjusting device and will impart axial movement to the adjusting device with relation to the body member so that the lens support is quickly moved from one position to the other by a relatively small rotative movement of the adjusting device. Preferably the adjusting device is in the form of a sleeve or barrel and is provided at its respective ends with internal right hand and left hand threads 22 and 23 which engage corresponding threads on the body member and on the lens support, so that the rotation of the barrel will impart rapid axial movement to the lens support as above explained. The key member is connected with the barrel for movement therewith and, in the present instance, this connection is effected by means of a series of inwardly projecting pins 24 rigidly mounted in the barrel and extending into a circumferential groove 25 in the key member, so as to permit the free rotation of the barrel with relation to the key member but to hold the same against axial movement with relation thereto. The forward movement of the key member and therefore the forward movement of the barrel with relation to the body member is limited by the contact of the flange 21 of the key member with the flange 14 of the body member. This interruption of the axial movement of the barrel also interrupts its rotative movement and prevents the further movement of the lens support.

A lamp bulb 26 is supported within the key member, in a manner which will be hereinafter described, and is so arranged that when the lens is in its rearmost or fully retracted position the light from the lamp bulb will be diffused by the lens and will provide a flood light illumination. As the lens moves forwardly from the lamp bulb the light is progressively concentrated into a sharply defined beam so that when the lens is in its foremost position the beam will be of small diameter and may be confined to the face of an instrument or other small area which is to be illuminated. To maintain the beam sharply defined and to eliminate stray rays of light shields are provided inside the casing. The key member has an inwardly extending flange 27 surrounding the lamp which serves to prevent the light being reflected onto the lens from the inner surfaces of the members in the rear of the flange. An annular shield 28, carried by the forward portion of the key member, has a central opening approximating the diameter of the lamp bulb and prevents the forward reflection of light from the adjacent surfaces of the key member and its flange. A conical shield 29 is mounted on the lens support adjacent the lens, the apex of the cone being cut away to provide a light opening, this shield thus serving to prevent the reflection of light onto the lens from the adjacent surfaces. The lens is mounted in the lens support a substantial distance from the forward end of the latter so that the forward end of the lens support also serves as a shield to eliminate stray rays of light.

It is also desirable to provide the lens support in front of the lens with a filter which will serve to subdue the brilliancy of the light. Such a filter is here shown at 30 as a disk of suitable color, and is preferably formed of red glass or translucent plastic material, which is mounted in a holder 31 having a reduced inner portion adapted to extend into the end of the lens support. Secured to this inner portion of the holder 31, on the respective sides thereof, are spring latching elements 32 which are provided with recesses 33 to engage an inwardly extending annular bead on the lens support. The free ends of these latching elements extend into the inner ends of radial sockets 34 in the holder and are connected with plungers or push buttons 35 slidably mounted in the respective sockets, so that the inward movement of the push buttons will retract the latching elements and release the holder for removal from the lens support. The holder 31 is preferably connected with the lens support by a chain 36 or the like to prevent its being mislaid or lost when it is removed from the lens support.

Removably mounted in the rear end of the body member 10 is a circuit controlling unit, Figs. 1 and 4, which also supports the lamp bulb and to which the conductors are led through a cable connection. As here shown, the body member 10 is provided near its rear end with a lateral opening 37 and a metallic tubular element 38 is rigidly secured to the body member in line with the opening 37 by means of screws 39, the heads of which are seated in a metallic plate 40 arranged within the body member and extending across the opening 37. The tubular element is lined with insulating material 41 and slidably mounted within the tubular element is a contact member 42 which is urged outwardly by a spring 43. The current supplying conductors are preferably contained in a heavily insulated cable 44 to the end of which is rigidly secured a fitting 45 extending into the tubular element and having a flange 46 arranged to contact the outer end of the tubular element and held in engagement therewith by a nut 47 threaded onto the outer end portion of the tubular element and having a flange 48 to engage the flange on the fitting 45 and thus clamp the latter against the end of the tubular element. Mounted in the fitting 45 and insulated therefrom is a contact member 49 with which the contact member 42 is held in engagement by the spring 43. One conductor 50 of the cable 44 is connected with the contact member 49 and through the contact member with the slidable contact 42 with which is connected a flexible conductor 51 extending through the opening 37 into the lamp casing. The second conductor 52 is grounded on the fitting 45 and is connected through that fitting, tubular element 38 and the screws 39 with the conducting plate 40 within the body member. A second flexible conductor 63 is connected with the outer side of that portion of the plate 40 which extends across the opening 37 and extends through the opening into the lamp casing. The plate 40 is notched or spaced from the forward side of the opening to permit the passage of the conductors and to limit the lateral movement thereof.

The control unit preferably comprises a frame which includes a disk 53 of insulating material, a metallic disk 54 spaced rearwardly from the disk 53 and frame members or bars 55 rigidly connecting the disks one with the other, the bars being insulated from the disk 54. The forward end portions of the bars 55 extend forwardly beyond the disk 53 and are secured to, and preferably formed integral with, a socket 56 for the lamp bulb 26. Mounted on the insulating disk 53 is a yieldable contact member 61 which constitutes a base or

center contact for the socket and is formed from a bar of light metal, the intermediate portion of which is spaced from the disk and resiliently supported for contact with the end terminal of the lamp bulb by bending the end portions of the bar toward the disk, twisting the same through an arc of ninety degrees and then bending them transversely to the intermediate portion of the bar and securing the same to the disk. One end of the bar beyond its point of connection with the disk is bent outwardly from the disk and constitutes a terminal with which is connected the conductor **51** leading from the cable connection.

Supported on the frame between the disks **53** and **54** is a circuit controlling device or switch which is preferably in the form of an annular rheostat comprising a winding **57** over which moves a rotatable contact finger **58**, the ends of the winding being spaced apart to provide an open circuit position for the contact finger. The terminal **62** is connected with one end of the rheostat winding and projects inwardly beyond the insulating disk **53** where it is connected with the flexible conductor **63** leading from the cable connection. The contact finger **58** of the rheostat is secured to and electrically connected with a shaft **59** which is rotatably supported in a bearing **60** secured to and insulated from the rear disk **54** of the frame. The shaft projects rearwardly beyond the body member **10** and is provided with an actuating device here shown as a conical knob rigidly secured to the shaft, and which also serves to close the rear end of the tubular body member and prevent the escape of light therefrom. Conducting bars, in the present instance the frame members **55**, are insulated from the disk **54** of the frame, as shown in Fig. 11, and are electrically connected with the lamp socket **56** and with the shaft **59** which carries the contact finger of the rheostat. As here shown, the ends of the conducting member **55** which are connected with the shaft are bent rearwardly along the bearing **60** and a cup-shaped metallic washer **64** supported about the bearing is pressed into firm engagement with the contact members by a nut **65** threaded on the bearing. Thus the current flows from the conductor **63** through the terminal **62**, winding **57**, finger **58**, shaft **59**, bearing **60**, conductor bars **55**, lamp socket **56**, lamp bulb **26** and resilient contact **61** to the flexible conductor **51**. The frame fits snugly within the body member **10** and is removably retained therein by yieldable fingers or clips **66** which are secured to the frame, and are here shown as integral with the metallic disk **54**, and which extend over the exterior surface of the body member and enter recesses therein. Thus the unit may be inserted in or removed from the body member without tools of any kind. The conductors **51** and **63** extend forwardly from the cable connection to the forward end of the control unit and are of such length that the control unit may be withdrawn and moved a sufficient distance from the body member to permit the same to be examined, or a new lamp bulb inserted, without breaking any of the circuit connections.

The lamp is provided with a detachable mounting which in the form here shown comprises a base **70** adapted to be mounted on a wall or other suitable supporting structure and having an outwardly extending socket portion **71** in which is removably mounted a stud **72**, the socket and stud being preferably non-circular to prevent the rotation of the stud. The stud is provided near its outer end with a flange **73** and has at its outer

end a circular head **74** which is spaced from the flange by a groove **75**. Mounted on this stud is a pair of jaws **76** each having at one end an internal arcuate recess **77** to receive a portion of and to be rotatably supported by the head **74**, and having its other end substantially semi-circular, as shown at **78**, the end portions **78** being adapted to extend about and form a bearing for a supporting element on the body portion of the lamp, the tubular element **38** of the cable connection being employed for that purpose in the present construction. The two jaws are connected one to the other and retained in engagement with the end of the stud **72** and the supporting element **38** by a screw **76'** which extends through one jaw and is threaded into the other jaw, thereby connecting the jaws with the stud for rotation about an axis extending lengthwise of the stud and connecting the supporting element **38** and the lamp with the jaws for rotation about an axis transverse to the stud. By a proper adjustment of the screw the friction between the jaws and the parts connected therewith may be so regulated that the lamp may be easily adjusted about one or both axes to a selected position and will be retained in that position until positive force is applied thereto. The stud **72** is provided with a groove **79** to receive a spring pressed ball detent **80** mounted in a fitting **81** secured to the socket member **71**, the detent thus normally retaining the stud in the socket but enabling the same to be withdrawn so that the lamp may be moved from place to place, within the range permitted by the conductor cable.

While I have shown and described one embodiment of my invention I wish it to be understood that I do not desire to be limited to the details thereof as various modifications may occur to a person skilled in the art.

Having now fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In an electric lamp, a tubular body member having adjacent its rear end a lateral opening, means within said body member for supporting a lamp bulb, a metal contact plate secured to the inner surface of said body member adjacent said lateral opening, a cable attaching device comprising a metallic tubular element rigidly secured to said body member exteriorly thereof and in line with said lateral opening and electrically connected with said plate, a contact member yieldably supported in and insulated from said tubular element, means for detachably connecting a conductor cable with said tubular element, for connecting one conductor of said cable with said yieldable contact member and for connecting the other conductor of said cable with said tubular element, and means within said body member including conductors and a switch for connecting said contact member and said plate in circuit with said lamp bulb.

2. In an electric lamp, a tubular body member having adjacent its rear end a lateral opening, means within said body member for supporting a lamp bulb, a metal plate secured to the inner surface of said body member adjacent said lateral opening, a cable attaching device comprising a metallic tubular element rigidly secured to said body member in line with said lateral opening, electrically connected with said plate and having its outer end screw threaded, a contact member slidably mounted in and insulated from said tubular attaching element, a spring urging said contact member toward the outer end of said

tubular element, a fitting adapted to be rigidly secured to the end of a conductor cable, extending into said tubular element and having a flange to engage the end of the latter, a nut on the threaded end portion of said tubular element having a flange to hold the flange on said fitting in contact with the end of said tubular member, an insulated contact member supported by said fitting within said tubular attaching element for engagement by the first mentioned contact member, one conductor of said cable being connected with the contact member supported by said fitting and the other conductor of said cable being grounded on said fitting, a switch in said body member, conductors in said body member connecting said plate and said first mentioned contact member respectively with said switch and said lamp bulb, and means for connecting said switch with said lamp bulb.

3. In an electric lamp comprising a tubular body member having near its rear end means for connecting a conductor cable therewith, a control unit including a frame removably supported in said body member, having resilient means for retaining the same therein and having an insulating disk adjacent the forward end thereof, a socket for a lamp bulb carried by said frame, projecting forwardly from said disk and including a resilient base on said disk, a rheostat carried by said frame and having an annular winding and a contact member movable over said winding, a terminal adjacent said disk connected with one end of said winding, and a shaft rotatably mounted in said frame, having supporting and electrical connection with the movable contact member of said rheostat and projecting beyond the rear end of said body member, an actuating device connected with said shaft, a conducting member supported by said frame and electrically connected with said shaft and said socket, and flexible conductors connected respectively with the base of said lamp socket and the terminal for said rheostat winding and extending rearwardly to and connected with said cable connecting means.

4. In an electric lamp, a tubular body member having adjacent its rear end a lateral opening, means within said body member for supporting a lamp bulb, a metallic tubular element rigidly secured to said body member exteriorly thereof and in line with said opening therein, a contact member in said tubular element and insulated therefrom, a metallic fitting detachably supported by and electrically connected with said tubular element and adapted to be secured to a conductor cable and to be electrically connected with the conductors of said cable, a contact member carried by said fitting, adapted to be connected with the other conductor of said cable and engaging the contact member in said tubular element, means for electrically connecting said tubular element and its contact member in circuit with said lamp bulb, means for adjustably mounting said lamp including a member having opposed parts embracing said tubular element and forming a bearing in which said tubular element is rotatably supported, and means whereby said bearing member may be mounted on a relatively fixed support for movement about an axis transverse to said tubular element.

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