April 15, 1969 J. R. ANDREAGGI 3,439,160

LAMP FOCUSING MECHANISM

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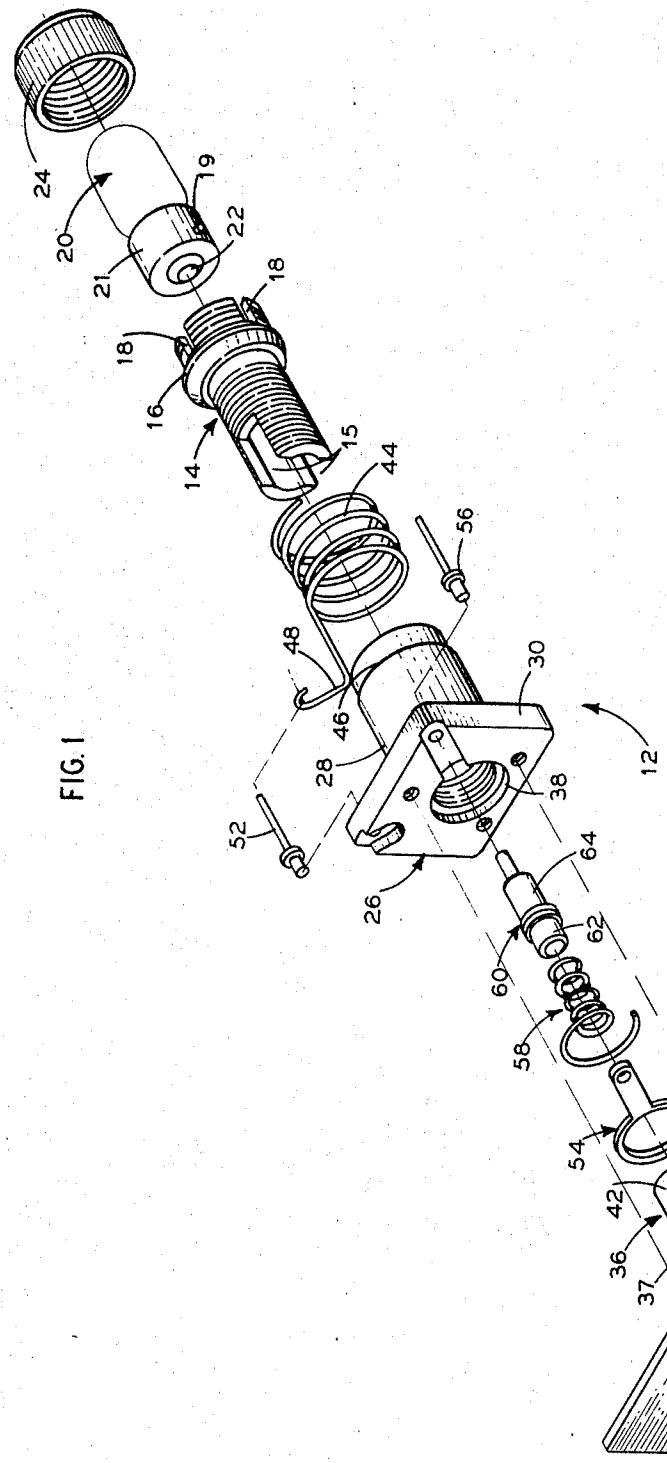


FIG. 1

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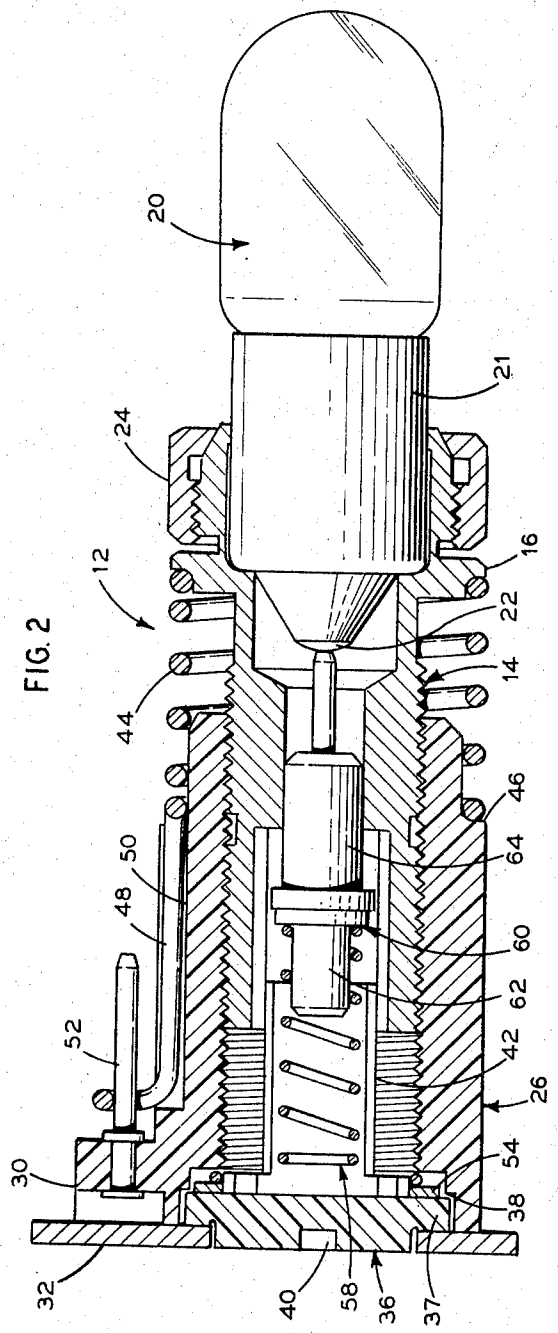


FIG. 2

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LAMP FOCUSING MECHANISM

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ABSTRACT OF THE DISCLOSURE

A lamp focusing mechanism is described which provides three-dimensional adjustment of a lamp filament. Use is made of a hollow lamp-supporting socket and a socket adjustment mechanism. Part of the socket exterior surface threadedly engages a stationary housing and this part also includes a slotted portion which receives and is rotated by, a portion of the socket adjustment mechanism. The socket is spring-loaded against rotation by an electrically conductive coil spring which also serves to provide a conductive path between the socket, and one lamp contact in electrical contact with the socket, and a first pin-like terminal which has one end mounted on the housing and a free end which projects externally of the housing. Mounted for axial movement in the socket is a spring-loaded contact which provides a second conductive path between a second lamp contact and a second pin-like terminal similarly to the first terminal.

This invention relates to an improved lamp focusing mechanism, and, in particular, to a mechanism which is used to vary the position of the filament of a low cost lamp after it has been installed into a completed instrument.

Most optical systems employing a "point source" of light require a special prefocused light source. Examples of this may be found in motion picture and slide projectors currently available. The cost of these special lamps is relatively high, since they have their filaments positioned precisely with respect to the lamp base. One solution to this problem is to be able to change the position of the lamp to compensate for any inaccuracies in the position of the filament within the lamp.

Some of the prior art that is concerned with changing the position of an ordinary low cost lamp requires one to have ready access to the socket arrangement which holds the lamp. Other known configurations require special apertures to avoid entangling the electrical lead wires whenever an adjustment is made. On the other hand, in accordance with the present invention, the position of a lamp may be changed from a point somewhat removed from the lamp socket arrangement, by the simple turning of some tool, such as a screwdriver. The present invention accomplishes this purpose using a very compact mechanism and without involving the electrical lead wire in any way.

Therefore, it is an object of this invention to provide a new and improved focusing mechanism for positioning a lamp.

In general, a preferred embodiment of the mechanism of the present invention includes a socket member in which a lamp bulb is mounted, a housing with a threaded bore, an actuator, and two concentric spiral springs which conduct electricity from input terminals on the housing to the two terminals of the lamp bulb. The socket is in threaded engagement with the housing, and has a slotted arrangement for receiving prong-like members which are part of the actuator. Due to the slidable coupling between the prongs and socket slots, rotation of the actuator causes the socket and lamp to move along the longitudinal axis of the socket bore. The springs are arranged so that during the adjustment, electrical contact is maintained between the input terminals and the lamp terminals.

With this and other objects in mind, the features and advantages of the present invention will be best understood in the following detailed description when taken in conjunction with the accompanying drawings in which:

FIGURE 1 is an exploded view of the lamp focusing mechanism; and

FIGURE 2 is a sectional view of the assembled lamp focusing mechanism.

Referring to FIGURES 1 and 2, a lamp focusing mechanism **12** is shown. The mechanism **12** comprises a socket **14** which is divided into two portions by a shoulder **16**. The socket **14** is annularly and cylindrically shaped with the two portions being externally threaded. One portion, the rearward portion, meaning the end furthest away from the front of an instrument in which the mechanism is to be mounted, has a typical bayonet slot construction in the form of a plurality of small grooves **18—18** in order to receive the projecting lugs **19—19** of a typical lamp **20**, having a base **21** and a center terminal **22** for electrical contact members. A knurled nut **24** is internally threaded to fit the external threads of the rearward portion of socket **14** in order to hold the lamp **20** securely to the socket **14**. An alternate arrangement may be used where a screw base lamp is desired, namely the rearward portion of the socket **14** would be internally threaded in order to receive the threads of the lamp base. The other end or forward portion of the socket **14** has a slotted arrangement in that two arcuate portions of the annular wall of the socket **14** are removed to form slots **15—15**.

A housing **26** has a cylindrically-shaped bore **28** which is internally threaded to receive the forward externally threaded portion of socket **14**. The front portion **30** of the housing **26** is mounted to the front plate **32** of any typical instrument by way of screws **34—34**.

A grooved actuator **36** of electrically nonconductive material is positioned within the bore of the housing **26** for rotation only. The actuator has a flat-headed front portion **37** which is held against the recess **38** in housing **26** by front plate **32**. The actuator **36** is provided with a groove **40** to facilitate rotating of the actuator with a tool, such as a screwdriver. The rearward portion of the actuator is in the form of two prongs **42—42** which are in the shape of portions of a cylindrical tube, the longitudinal axis of which is coincident with the housing bore. The configuration and spacing of prongs **42—42** are such that when the mechanism **12** is assembled, the prongs **42—42** mate with slots **15—15** of socket **14** to provide an unbroken annular wall therefor, when socket **14** is in a retracted position. The prongs **42—42** of actuator **36** are slidably coupled to slots **15—15** and therefore transmit any torque which is applied to the actuator by way of the groove **40** to the socket **14**, resulting in longitudinal movement of the lamp **20** mounted in the socket **14**. This slotted arrangement and the threaded engagement between the socket **14** and the housing **26** makes it possible to have a rotary motion of the actuator **36** translated into the longitudinal movement of the socket **14** in a minimum of space, hence accounting for the extreme compactness of this focusing mechanism.

An outlet helical spring **44** which carries electrical current to the base **21** of the lamp **20** is concentrically wound around the socket allowing for relative movement therebetween and is held in compression between the shoulder **16** of the socket **14** and a circumferential shoulder or ledge **46** around said housing bore **28**. The portion of the spring **44** in contact with the ledge **46** of housing bore **28** has a cantilevered end **48** which continues along a groove **50** of housing **26** and is wound about a pin jack **52** mounted in any well known manner to the front portion **30** of the housing **26**. Since the helical spring **44** is keyed to the housing **26** by way of the groove **50**, it does

not rotate and is merely in slidable contact with the shoulder of socket **14**.

A slip ring **54** is held against the front portion **30** of the housing **26** by the actuator **36** and is in contact with a second pin jack **56**. An inner helical spring **58** concentrically wound within the socket **14** is held in compression against the slip ring **54** and a contact shaft **60**. The contact shaft **60** comprises an inner, solid, cylindrically-shaped element **62** which is electrically conductive and an outer sleeve-like member **64** which is nonconductive. The forward end of the cylindrical inner element **62** is in electrical contact with the inner helical spring **58** and the rearward end of the cylindrical inner element **62**, which is of a reduced diameter compared to the forward end, is in contact with the center terminal **22** of the lamp **20**. This completes the circuit to the lamp. The outer non-conductive sleeve **64** is slidably fitted within the inner bore of the socket **14**.

The position of the lamp **20** is moved along the longitudinal axis of the housing **26** by placing a tool, such as a screwdriver, into the groove **40** of the actuator **36**. By turning the actuator, the lamp socket and lamp rotate and move longitudinally. One electrical contact is made from the pin jack **56**, through the slip ring **54**, through the inner helical spring **58**, through the cylindrical inner element **62**, to the center terminal **22** of the lamp **20**. The other electrical contact is made from the pin jack **52**, through the outer helical spring **44**, through the lamp socket **14**, via the shoulder **16**, to the base **21** of the lamp **20**.

Hence, by the simple turn of a screwdriver, at a point removed from the socket arrangement for holding the lamp, one is able to change the lamp's position without interrupting the electrical connection to the lamp. The fact that the adjustment is removed from the socket arrangement is important, since the lamp can be completely and permanently installed within an instrument casing and subsequent adjustment of the lamp is possible without changing the permanent installation in any way.

While direct access to the lamp is not necessary to make an adjustment, the overall length of the focusing mechanism is very compact due to the slotted and threaded arrangements of the socket **14**.

It will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is, therefore, intended to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A lamp focusing mechanism comprising, a lamp having a filament and first and second electrical contacts through which filament current may flow; a housing having a longitudinal axis; first and second electrical terminal means on said housing; a socket having two ends and a bore extending longitudinally therethrough, one end of said socket mounted on said housing in threaded engagement therewith for longitudinal and angular displacements relative thereto and the other end of said socket supporting the lamp, the other socket end including an external electrically conductive shoulder in electrical contact with the first contact of the supported lamp, the second lamp contact extending into the bore of said socket, the one socket end having at least one slot formed therein; first electrically-conductive spring means having one end thereof electrically connected to said shoulder and the other end thereof electrically connected to the first terminal means for resiliently loading said one socket end and for providing a resilient electrical connection therebetween; electrical contact means mounted for axial movement in the socket bore for providing an electrical connection between the second lamp contact and the second terminal means; and socket adjustment means mounted for rotation on said housing and including at least one member insertable in said slot for engaging and rotating said socket in said housing to change the longitudinal and angular positions of the lamp filament.

2. The mechanism as claimed in claim **1** wherein said socket adjustment means includes a plurality of parallel, elongated members and wherein said one socket end is formed with a plurality of parallel, elongated slots for receiving different ones of said members.

3. The mechanism as claimed in claim **2** wherein said one socket end is of circular cross-sectional shape and wherein said elongated members have external surfaces which conform to an adjacent surface of said one socket end.

4. The mechanism as claimed in claim **1** wherein said first and second terminal means comprises first and second pins mounted on, and projecting externally from, said housing.

5. A lamp focusing mechanism comprising, a lamp having first and second electrical contacts through which lamp-energizing current may flow; a housing of nonconductive material having a longitudinal bore extending therethrough, a portion of the internal housing wall forming the housing bore being threaded, a peripheral shoulder formed on said housing; first and second electrical terminal means mounted on said housing; a socket for supporting said lamp formed of an electrically conductive material and having an outer shoulder and an inner bore, said socket being in threaded engagement with said portion of said housing wall, the socket shoulder being in electrically-conductive relationship with the first contact of the lamp; first spring means of electrically conductive material held in compression between the housing shoulder and said socket shoulder, being in wiping contact with said socket shoulder and in contact with the first terminal means; second spring means of electrically conductive material mounted in said bore of said socket but insulated therefrom and held in compression between the second terminal means and the second lamp contact; and lamp-adjusting means mounted for rotation within the housing bore and including an electrically insulated portion for engaging and rotating said socket to change the longitudinal position of the lamp.

6. A lamp focusing mechanism comprising, a lamp having first and second electrical contacts through which lamp-energizing current may flow; a housing of nonconductive material having a longitudinal bore extending therethrough, a portion of the internal housing wall defining the housing bore being threaded, a peripheral shoulder formed on said housing; first and second electrical terminal means mounted on said housing; a socket for supporting said lamp formed from an electrically conductive material, having an inner bore and having an outer shoulder at one end, said one end making electrical contact with the first contact of the lamp, the other end of said socket being in threaded engagement with said portion of said housing wall for longitudinal and rotational movement relative thereto and including a slotted portion; first spring means of electrically conductive material concentrically wound about said socket, said first spring means being held in compression between and by said housing shoulder and said socket shoulder, and in contact with said first input terminal means; second spring means of electrically conductive material being concentrically wound inside of said inner bore of said socket but insulated therefrom and held in compression between and by said second input terminal means and said second lamp contact; and lamp-adjusting means mounted for rotation within the housing bore and including an electrically insulated portion for engaging and rotating said socket to change the longitudinal position of the lamp.

7. A lamp focusing mechanism comprising, a lamp having first and second electrical contacts through which lamp-energizing current may flow; a housing of nonconductive material having a longitudinal bore extending therethrough, a portion of the internal housing wall defin-

ing the housing bore being threaded, a peripheral shoulder formed on said housing; first and second electrical terminal means mounted on said housing; a socket for supporting said lamp formed from an electrically conductive material, having an inner bore and having an outer shoulder at one end, said one end making electrical contact with the first contact of the lamp, the other end of said socket being in threaded engagement with said portion of said housing wall for longitudinal and rotational movement relative thereto and including a slotted portion; first spring means of electrically conductive material concentrically wound about said socket, said first spring means being held in compression between and by said housing shoulder and said socket shoulder, and in contact with said first input terminal means; second spring means of electrically conductive material being concentrically wound inside of said inner bore of said socket but insulated therefrom and held in compression between and by said second input terminal means and

said second lamp contact; and lamp-adjusting means mounted for rotation within the housing bore and including an electrically insulated portion for engaging and rotating said socket to change the longitudinal position of the lamp and a contact member longitudinally movable within said inner bore of said socket but insulated therefrom, said contact member including an inner electrically conductive element which engages said second lamp contact and said second spring means.

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